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Tenth Meeting, 12th April, 1869.

SIR RODERICK I. MURCHISON, BARR., K.C.L., PRESIDENT, in
the Chair.

PRESENTATIONS.—*Frederick Fitch, Esq.*; *Col. Barnett Ford*; *William Clark, Esq.*

ELECTIONS.—*Frederick George Chinnock, Esq.*; *Frederick H. Leaf, Esq.*; *Roger Leigh, Esq.*; *E. B. March, Esq.*; *E. M. Underdouta, Esq.*; *Charles M. T. Western, Esq.*; *Rev. T. G. Wilson, B. A.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING OF MARCH 22ND:—‘Narrative of the British Mission to King Theodore.’ By Hormuzd Rassam. Presented by the Author. ‘Historia del Peru Independiente.’ Por Mariano Felipe Paz Soldan. Presented by the Author. Four volumes of Chinese works relating to Antiquities and Natural Curiosities of the West Lake, Hangchow. Presented by C. T. Gardner, Esq. ‘The Highlands of Brazil.’ By Capt. R. F. Burton. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING:—A Map of Abyssinia, showing the Route of the British Mission under Mr. H. Rassam, &c., from Massowah to Magdala. Compiled and presented by G. P. Badger, Esq., F.R.G.S. Turkistan, with the adjoining Portions of the British and Russian Territories. On four sheets. Compiled by Lieut.-Col. J. T. Walker, R.E., Superintendent of G.T.S. of India. Presented by the India Office, through C. R. Markham, Esq. Map, showing the Route-survey from Nepal to Lhasa, and thence through the Upper Valley of the Brahmaputra. By a Pundit. Compiled by Capt. T. G. Montgomerie, R.E. Ordnance Survey. (191 sheets.) Presented by Sir H. James, R.E., Director of the Ordnance Survey.

The following Papers were read:—

- 1.—*Report of the Trans-Himalayan Explorations during 1867.* By Captain T. G. MONTGOMERIE, R.E., of the G. T. Survey, from the original Journals, &c., of the Trans-Himalayan Exploring Parties.

[ABRIDGMENT.]

THE Trans-Himalayan explorations made during 1865-6, from the Mansarowar Lake to Lhasa, supplied various pieces of information as to routes and places in Tibet, of which the names were unknown in India. Tibetans had been heard to talk of their gold-mines and

salt-mines, and the position of some of the latter was indicated roughly on European maps, but our knowledge of all such places was vague in the extreme, though the Tibetans certainly do bring both gold and salt. The first Pundit heard of these places whilst in Lhasa, and the second Pundit, when at the Gartok fair, heard various particulars from which he gathered that the route to those gold-fields east of Gartok was feasible.

It will be remembered that the second Pundit made his way to Gartok, in 1865, by one route and returned by another, thus connecting that place with points in British territory on the south that had been fixed by regular survey. There, however, still remained a large gap between Gartok and the Ladak territory, which latter had also been surveyed. It appeared to me very desirable that this gap should be filled up, the more especially as it embraced a portion of what was said to be the course of the great River Indus; a portion, moreover, that had never been traversed by any European.

The natives pointed out the position where the eastern branch came in, and a gap seen in the mountains in that direction made its existence highly probable. Having this information, it seemed to me very desirable that the question as to the existence or non-existence of this branch should be settled. I consequently determined that the second expedition of the Pundits should be in that direction, the object being to settle various doubtful points as to the position of the upper basin of the Sutlej; the second object, the question of the eastern branch of the Indus; the third, the connection of Gartok with the regular survey in Ladak; and the fourth, to explore up to the gold and salt mines east of Gartok, and as far beyond as the Pundits could get in an easterly direction. The latter being with a view to gain some knowledge of the vast *terra incognita* lying between the desert of Gobi and Lhasa. Preparations for the expedition were made during the spring of 1867; a third Pundit was entertained and trained to supplement the place of the second Pundit, who had proved to be somewhat wanting in nerve. Starting from Mussoorie, on the 2nd of May, the party under the first Pundit reached Badrinath on the 24th of May, and Mana on the 3rd June. The Mana Pass, to the north, had not been declared open, and the party had consequently to wait at Mana. Whilst there, several heavy falls of snow occurred on the neighbouring mountains.

The Pundit found that before his party could cross into Tibet it was necessary that the opening of the pass should be formally notified by the Tibetan officials, and before this is done the Jongpon (or Zungpung) of Chuprang makes enquiry every year as to the political and sanitary condition of Hindustan. The enquiry seems

to be carried out with all that assumption of lofty superiority for which Chinese officials are famous. Looking down from their elevated plateaux, they decide as to whether Hindustan is a fit country to have intercourse with. The decision come to appears not to be at all a dead letter, for, as will be seen hereafter, it ultimately affected the Pundit's movements not a little. The especial enquiries made are, as to whether there is war, epidemic, famine, &c., such as are in any way likely to affect Tibet.

At length, on the 9th of July, three men, sent by the Jongpon of Chuprang, arrived, and having made all their enquiries, declared the Mana Pass open to traders from Gurhwal; the party accordingly was able to commence its march on the 26th July. It consisted of eleven men, twelve asses, and one pony; the men being all armed with weapons they had borrowed at Badrinath, as they were told that arms would be required to keep off robbers. On the 28th they crossed the Himalayas by the Mana Pass (18,570 feet), and on the 29th July reached Lumarti Camp. Here they were told to halt until more traders joined them, so that the Tibetan officials might be saved trouble by examining and taxing a number at the same time. The second Pundit, however, was sent on ahead to intercede with the Chuprang Jongpon, and he succeeded in getting authority for the party to advance alone. Churkong is the place where traders are generally taxed, but in this instance the examination was made at Barku. The Abtuk of Chuprang searched the baggage, fortunately without discovering the instruments, and, being satisfied that the party was a trading one, he levied the taxes at the usual rates.

On the 6th August the party reached Totling, passing the small town of Chuprang on their left (north). From Totling the party advanced direct towards Gartok, crossing the Sutlej by a remarkable iron suspension-bridge 76 feet span, 7 feet wide and about 40 feet above the water. The chains are formed by links of iron of the shape of the figure 8, each about one foot in length, the iron being over one inch square. The bridge is said to have been built by Gyalpo Kesar, or Sekundar Badshah (Alexander the Great)! The iron is in capital preservation, owing to the very small rainfall, and to the care with which it is annually lubricated with butter (ghee).

On the 9th August they crossed the watershed between the Sutlej and the Indus, by the Bogola Pass, 19,220 feet above the sea, and reached Gugti Camp, close to Gartok, on the 11th instant, avoiding the latter place, lest its officials should in any way interfere with their onward progress. Continuing their journey, they ascended

the mountains east of Gartok, and, after crossing the Gugtila Pass, 19,500 feet above the sea, they found themselves, on the 14th August, in a vast desolate plateau, the lowest points of which they ascertained to be 15,280 feet above the sea.

On the 10th they crossed the Pabha-la, 17,650 feet above the sea, and descended to the Giachuruff Camp, on the banks of the Singh-gi-chu, or Indus River, 15,730 feet. After the desolate and arid table-land they had crossed, the sight of the river and its fresh water, and of the large camp beyond, was at first very pleasant to the Pundit's party; their pleasure was, however, soon damped, as they found the inhabitants of the camp very suspicious as to the object of their journey: their progress being for the first time impeded by the officials. Gopa Tajam, the head man, questioned them as to the objects of their journey, and as to who and what they were, &c. When told that they were Bisáhiris, who had come there solely to sell coral and purchase shawl-wool (pushm) in exchange, he told them flatly that he did not believe their story. With great correctness he then proceeded to point out the proper country of each individual, and said that if they had been really all Bisáhiris, and had been lately in Bisáhir, they would never have dared to enter Nari Khorsum that year, as an order had been promulgated, at the time of opening the passes, forbidding Bisáhiris to enter the country on any account, as they had in the previous year introduced small-pox, which proved fatal to many of the inhabitants. The head man, moreover, hinted that the party had introduced Europeans into the country.

The Pundit thought these suspicions were due to the jealousy of an acquaintance of his who lived near Badrinath. However, by repeated protestations, he managed to bring the head man round to a partial belief in their story, so that he at last consented to allow a portion of the party to proceed onwards, provided the remaining portion was left as a hostage for their good faith.

As the second Pundit's nerves were again considerably shaken by the dreary mountains they had crossed, and by the check they had received, the first Pundit decided to leave him at Giachuruff whilst he and the third Pundit pushed on ahead on the pretence of selling their coral. Whilst preparations for this purpose were being made the head man's suspicions began to gather again, and it was only after further entreaties, accompanied by presents, that they were allowed to advance. The Pundit left the Giachuruff Camp, on the 22nd August, with the third Pundit; but the latter was, very soon after starting, detached with one servant to carry a route-survey up the river Indus as far as he could get. The Pundit himself made a

very long march, so as to get well clear of the Giachuruff people, and by night was far away to the east, resting near the bed of a small dry stream. On the 23rd August he hoped to have been able to cross the Chomorang Range, but, owing to a very heavy fall of snow, he was obliged to halt at a camping-place below it. Snow continued to fall on the 24th and 25th, and he was not able to continue his march till the 26th August, when he crossed the Chomorang-la Pass, 18,760 feet above the sea, and after a very long march, crossing a good deal of snow, he reached the large camp of Thok-Jalung,* the chief gold-field of that part of the country.

As the Pundit descended the Chomorang-la Pass, the Thok-Jalung Camp came in sight; he found it pitched in a large desolate plain, of which the prevailing colour was reddish brown. As far as he could see, it at first appeared to be like other Tibetan standing camps, except that it was very much larger. As he got closer he made out the noise of a great number of voices singing together, and, on his arrival, found that this came from the gold-diggers and their families whilst the men were at work.

The Pundit had armed himself with a letter from the Giachuruff Chief, and this he presented the next day to the Thok-Jalung Chief with a small present of the best Indian tobacco, which he had somehow discovered to be a particular weakness of that individual. The Chief received the Pundit in his large tent; he was much gratified by the present, but, in spite of that and the letter, it was evident, from his manner, that he did not think that matters were quite right. He cross-questioned the Pundit, and then advised him to do what he had to do in Thok-Jalung quickly and to return to Giachuruff by the same road as he came. The Chief said that it was out of his power to allow the Pundit to stay long, and that properly he ought to have sent him back at once, as there was an order in force forbidding all Bisáhiris to enter the country that year.

The Chief was an inhabitant of Lhasa, called Yoodak Mingmár, about 45 years of age. He had been master of the Thok-Jalung gold-field for some time. The Pundit saw him several times afterwards, and always found him very civil. His usual dress was a red robe of Lhasa or Shigatze manufacture; his head was covered with a brown felt hat of Chinese fashion, with a broad rim turned up all round. He told the Pundit that he and every one else wore furs in the winter, and that they could not live at that season without them; which is no doubt correct, as the Pundit's observations make the gold-field to be at the great altitude of 16,330 feet above

* Latitude, N. 32° 24' 26.5", longitude 81° 37' 38".

the sea. His tent was a large circular one, about 25 feet in diameter, with two poles; it was pitched in a wide pit, some 7 or 8 feet below the surface of the ground, and the descent to it was by means of steps. Outside, the Pundit noticed one of the gigantic black dogs of Lhasa; this beast was tied unpleasantly near the door, and was so savage that there was great difficulty in preventing him from flying on strangers. The Pundit had seen many of these dogs in Lhasa, and he at once recognised it by its great size, deep jowls, and the white mark on its chest. The Lhasa people call them Gya-ki or "royal dogs."

The tent was made of black yak's hair; it contained bales of shawl-wool (pushm), leather, packages of tea, strings of dried beef from the yak, and a few other Tibetan luxuries, such as dried apricots, currants, &c.; the poles were garnished with several matchlocks and a sword. The Chief's seat was beside a small box, in which there was a drawer containing paper, pen, ink, and a couple of cups or bowls; one for drinking tea and the other for chung or whisky. The Chief's tent seems to have also been the shrine of the camp, as behind his seat there were piled up the usual images, small brass bells, tiny vases, books, pictures, lights, &c., that are carried about by wandering Buddhist Lamas. Whether the Chief was also a Lama was not ascertained, but his red dress and the ritualistic instruments point to that conclusion.

The Chief was constantly smoking a silver-mounted Nepalese hookah. Tea was forthcoming at all hours. He had about ten personal servants, who lived in small tents round about his own. The Chief was a very intelligent man, and, all things considered, the Pundit thought him well informed. His shrewdness there was no mistaking, as instanced in the matter of the coral. He noticed the Pundit's box, examined it carefully, and then asked him how he came to have such a good box. The Pundit was fortunately ready with his answer, and said he bought it at one of the "Saheb logues" auctions, to carry his coral in. The fame of these auctions had reached even this Tibetan Chief, and he expressed himself as quite satisfied, allowing the box to be removed without discovering the large sextant which was stowed away in a secret compartment. The Chief took a great liking to the Pundit, and used to send for him every now and then, in order to discuss, over tea and tobacco, the great country down below.

The Pundit found the part of the gold-field that was being worked to be a great excavation from 10 to 200 paces in width, and some 25 feet in depth, access to the bottom being by means of steps and slopes, the earth as dug out being thrown upon either side.

The excavation at the time of the Pundit's visit was about a mile in length. The digging is carried on with a long-handled kind of spade, and occasionally with an iron hoe; the iron for these implements is brought from Bisáhir, Ladak, &c. The camp had a blacksmith who could repair these tools.

A very small stream runs through the gold-field, and the bottom of the excavation is consequently rather a quagmire during the day-time; but the stream is put to good use for washing the gold out of the soil. The diggers dam up the water, and leave a sloping channel for it to escape by. A cloth is spread at the bottom of the channel, and kept down by a number of stones so as to make the bottom uneven. One man brings earth from the excavation and sprinkles it over the channel, whilst another man drives water down the channel by means of a leather bag. The water carries the lighter soil right away, but the pieces of gold fall into the uneven places, and are easily collected in the cloth by lifting up the stones. The yield of gold seems to be large, and the "finds" are occasionally very heavy—the Pundit saw one nugget of about 2 lbs. weight (75 tolahs). The diggers say they can recognise the soil that contains gold at once, but, judging from the large number of gold-fields that have been used at one time around Thok-Jalung, and are now more or less abandoned, the Tibetan gold-diggers seem to be quite as capricious as those of Australia or California; and the probability is that, whenever they are a long time without getting good finds, they strike their camp and move off to what they think a more tempting field.

From what the Pundit heard during this last expedition and the previous one to Lhasa, there is a whole string of gold-fields extending all the way from Lhasa to Rudok, along the route which must run close to the northern watershed of the Brahmaputra, probably in the depression to the north of it. The gold-fields are carefully watched by the Lhasa authorities, a gold commissioner, called Sarpon, superintends the whole of them, and each field has a separate master. Any individual is allowed to dig, provided he pays the annual tax of one sarshoo weight of gold, which is about half a tolah, or two-fifths of an ounce. The greater part of the diggers come from the Chung province around Shigatze. The gold commissioner makes an annual tour through the gold district, visiting each field and collecting the taxes.

The Pundit says that in all his travels he never experienced such intense cold as he did at Thok-Jalung, owing, as he thought, to the high cold wind that was always blowing, more than to the great elevation, viz., 16,330 feet above the sea. The tents of the diggers

are always pitched in pits, some 7 or 8 feet below the surface of the ground, so as to keep out the wind. Spite of the cold, the diggers prefer working in the winter, and the number of their tents, which in summer amounts to 300, rises to nearly 600 in winter. They prefer the winter, as the frozen soil then stands well, and is not likely to trouble them much by falling in.

The water near Thok-Jalung is so brackish that the diggers cannot drink it till it has been frozen and then re-melted. Considering these difficulties about water, the great elevation, the total absence of wood, and the general severity of the climate, gold-digging at Thok-Jalung is carried on under very much greater difficulties than in any other part of the world. Nevertheless the diggers appeared to be cheerful and were constantly singing, their families joining in a sort of chorus, which could be heard at a great distance.

Argols of dried dung from the yaks, ponies, and sheep, &c., form the only fuel. The Tibetans cook and eat three times a day, their food consisting chiefly of boiled meat, barley-cakes, butter-milk, and tea stewed with butter. The Pundit said the Tibetans all preferred China tea, and did not approve of Himalayan tea, spite of its price; they vowed the latter was too heating for them, and that only very poor folks take it.

The Pundit mixed freely with the gold-diggers, and observed all their ways and habits, but his time was limited; the Chief, spite of his friendly conduct, insisting that he could not let him stay beyond the 31st of August. He ascertained that the price of the gold at Thok-Jalung was only $5\frac{1}{2}$ to 6 rupees in silver per saishoo (which weighs about a half-tolah and 8-ruttees), or rather less than 30 rupees per ounce. There were two tents belonging to goldsmiths in the camp, they came from the Chung or Shigatze province. Seeing no chance of extending his journey to the east of Thok-Jalung, the Pundit retraced his route to Giachuruff; there he found the third Pundit, who had made his way for a considerable distance up the River Indus to a place called Jiachan.

Though the third Pundit had heard that a large band of mounted robbers were wandering about the Upper Indus, he was in no way hindered by them till he reached Jiachan. There, however, whilst he was down at the river, a couple of armed robbers fell upon his servant, an oldish man, and knocked him over, seizing a thermometer and the cocoa-nut containing the supply of quicksilver. Fortunately the Pundit was not far away, and, hearing the cries, he rushed to the rescue. Seizing one of the robbers by his pig-tail, he swung him round and took back the stolen things. This third Pundit, being a tall, powerful man, completely turned the tables,

and the robbers pretended that they had only been joking with the old man, and did not really mean to take anything. The robbers made off as soon as they could, and the third Pundit, thinking they might bring down more of their brethren on him, decided to retrace his steps. He was very reluctant to do this, as, from all he could hear, three or four marches more, at the outside, would have taken him to the source of the Indus, which at the farthest point he visited was still a good-sized stream. He was, however, certain, from the peculiar head-dress of the robbers, that they belonged to the armed band he had been warned against—the head-dress being one peculiar to the nomadic inhabitants of the Shellifuk and Majin districts, who are noted as professional robbers.

The whole of the Pundit's party having been recollected at Giachuruff, he decided to trace the Indus down to its junction with the river upon which Gartok stands. Starting on the 4th September, they marched steadily down stream, passing numerous camps with their flocks and herds, but seeing no cultivation or villages till the 7th, when they came to a small village with the first patch of cultivation. All along the banks there was a low bushy jungle. The grass appears to have been abundant, and near one camp there was a herd of five or six hundred horses or large ponies running almost wild, mostly of a white or a greyish colour. On the 12th September they reached the junction of the Indus and Gartok rivers, and, crossing the latter, encamped near the Lujan-Chumik spring.

From Lujan-Chumik the Pundit sent the third Pundit to trace the river down into the Ladak territory, whilst he traced it up to Gartok. On the 14th September he reached Gargunsa, the winter residence of the Gartok authorities. He found only three large and eight small houses in it, and was informed that the rest of the inhabitants lived in tents. All along the banks of the river he found the grass tall and luxuriant. The valley all the way up was flat and wide.

On the 16th September the Pundit reached Gartok, where he found a camp of about 200 tents, mostly belonging to traders. On his arrival, he was alarmed to find that some one had been spreading reports as to his being in British employment, and he found it advisable to hasten his return. Choosing a new route, he got separated from his baggage and the greater part of his party; and had he not fallen in with traders from Shipki, he would have been put to very great hardships. He crossed by the Laochia Pass, and, marching by Shiang and Dunkhar, reached Totling on the 26th of September. Here they waited for the third Pundit, who joined

them on the 29th of September, after having traced the Indus down to Demchok in Ladak. From Demchok he crossed from the basin of the Indus to that of the Sutlej by a very high pass, and carried a route-survey down to Totling. From Totling the second and third Pundits were sent down the Sutlej to Shipki, tracing the river as closely as they could. From Shipki they carried a route-survey in a southerly direction, crossing the Himalayas by a high pass, and descending to Nilung on the upper course of the Ganges.

The Pundit himself returned from Totling to Badrinath by nearly the same route as he advanced by, only making one small variation. Ultimately the second and third Pundits rejoined the first, and they all made their way down into British territory by the beginning of November.

The geographical results of the exploration can be seen at a glance from the accompanying map. They account for the geography of about 18,000 square miles, founded on 850 miles of route-survey, with 80 heights. The routes are checked by 190 latitude observations taken at 75 different points.

The course of the Sutlej River has been roughly traced from Totling down to Shipki, on the border of British territory. Hitherto there has been no survey of any kind of this portion; and the route, though only actually touching the river for a short distance, was carried near enough to it to enable the Pundits to lay down its probable course very closely. The position of Gartok, as determined by the two routes of the last expedition, has been confirmed by a third route carried up from Badrinath. The mean of three gives a very good longitude of Gartok,* as has been proved by the further route-survey carried from Gartok to Demchok, which latter had been previously fixed by the regular survey operations in Ladak. The longitude by the route-survey only differing from that of the regular survey by 2½ minutes—a very satisfactory result from a route-survey † traversing 160 miles direct over such a very rough tract of mountains.

* Longitude, E. $80^{\circ} 23' 33''$; latitude, N. $31^{\circ} 44' 4''$, and height 14,250 feet above sea.—T. G. M.

† The values of the pace, as tested by the differences of latitude, were very accordant, thus:—

	Difference Latitude.	Deduced length of pace in feet.	REMARKS.
From Badrinath to Gartok ..	0 59 36	2·495	By 1st Pundit.
„ Gartok to Thok-Jalung	0 40 23	2·512	„ 1st Pundit.
„ Gartok to Demchok ..	0 57 17	2·634	„ 1st and 3rd Pundits.
„ Demchok to Totling ..	1 13 24	2·495	„ 3rd Pundit.

T. G. M.

The routes have also defined the courses of both the upper branches of the River Indus from near their sources to their junction and the conjoint stream from that point into Ladak. Neither of these branches had been previously surveyed in any way, except a small portion of the Gartok branch above Gartok, which had been roughly laid down by Moorcroft.

The existence of the eastern branch was doubted by many geographers,* as no Europeans had ever seen it. The Pundit's route has now proved that this eastern branch is the main stream known to the natives as Singh-gi-Chu or Singh-gi-Khamba (Lion's Mouth), the River Indus itself; whilst the other branch, hitherto generally supposed to have been the main stream, is much smaller than the eastern one, and invariably called the Garjung-Chu.

The routes extended beyond the eastern watershed of the Indus as far as the great Thok-Jalung or Thok-Samba gold-field. Thok-Jalung was, moreover, roughly connected with various other gold-fields and salt-mines, by means of information derived from travellers; and the general correctness of this information was roughly established by a route to Rudok, derived from similar information, which made out the position of that place tolerably close to that determined by the regular survey.

A number of lofty snowy peaks were determined from various stations of the route-survey, the most remarkable being the Aling-Gangri group north of the Indus, which, judging from the great mass of snow seen on the southern face during August and September, must be upwards of 23,000 feet above the sea—possibly as much as 24,000 feet. The line of perpetual snow on the southern slopes of the Ladak Mountains approximates to 20,000 feet in the same latitude; and it would require several thousand feet of snow above that line in order to be very imposing at 80 miles, at which distance the Pundit first saw it. The Aling-Gangri group had never, as far as I am aware, been heard of before. They appear to be a continuation of the range between the Indus and Pangkong Lake. The Pundit could see no farther continuation of the range to the east of Thok-Jalung. Another high group was seen to the east of the Medok-la, on the watershed between the Sutlej and Indus.

Altogether the Pundit and his brethren have, as I predicted, improved very much in the art of fixing distant peaks. Satisfactory proof of this has been forthcoming from their back bearings to well-

* It was indicated from native information by H. Strachey, on his Map of Ladak and Gnair-Khorsum.

known peaks,—such as Leo-Porgyal, Kamet, &c., which gave very accurate positions to those peaks—forming at the same time a valuable check on the route-surveys, and proving that there has been no large accumulation of error.

The numerous heights determined by the boiling-point give a good idea of the great elevation of the country traversed, and the consequently enormous difficulties under which the route-surveys were made. From them it will be seen that the Pundits were for more than three months at an elevation of over 13,000 feet. They crossed the great range between the Sutlej and the Indus three times—that between Gartok and Chajothol once, between Chajothol and Giachuruff once, the Chomorang range twice, and the Himalaya range three times, each of the crossings involving a pass of over 17,000 feet, two of them being over 19,000 feet.

The height of Gartok by the above is only 14,250 feet, instead of 15,000, as had previously been assigned to it. At the several points—Totling, &c., where Henry Strachey's heights were taken—the Pundit's heights are generally lower. A difference in the same direction was noted in the results of the previous expedition, at a point near the Mansarowar Lake; and, judging from the following comparisons, it appears to arise from a constant difference, probably due to the thermometer employed:—

	By the G. T. Survey.	By H. Strachey.
	Feet.	Feet.
Hanle	14,276	14,500
Pangkong	13,936	14,300
Tangse	12,791	13,000
Diskit	9,950	10,400

The above shows that Captain H. Strachey's were generally higher than the Great Trigonometrical Survey values, by about 300 feet on the average; and the Pundit's values differing from Captain Strachey's by about the same amount, it may be concluded that they are tolerably near the mark, and at any rate not in excess.

The actual source of the eastern branch or main stream of the Indus was not reached; but the people between Giachuruff and Jiachan said it rose at a place called Gangri-Goorgiap, which may perhaps refer to the Gangri or Kailas Peak; but the direction of the course of the Indus, as seen from near Jiachan, pointed rather to the east of that mountain. The whole district along the upper course of the Indus is called Bongthol, which is divided into the small districts (puttees) of the Singhtod and the Singhmet—"Tod" signifying upper, and "Met" lower.

At the highest point visited, the Indus was still a considerable stream. At Giachuruff the ford was always a difficult one; and for

eight days after the fall of snow the Pundit experienced the river was not fordable in any way. While it was snowing on the Chomrang range, heavy rain fell at Giachuruff, and the river consequently rose very much. The stream was generally very clear, and full of fish* of all sizes, up to about 18 inches in length.

From Jiachan to Giachuruff the Indus flows through a rather broad, flat valley; and from Giachuruff to its junction with the Gartung-Chu it flows through a similar valley, the banks being lined in many places with long patches of low jungle. The Indus above the junction was from 100 to 200 paces in breadth, with a depth of 6 to 4 feet; while the Gartung-Chu was in places as much as 250 paces in width, but with a depth of only 1 to 2 feet. The Gartung-Chu, between Gartok and the junction, flows through a particularly broad and flat valley. The Indus below the junction flows through a wide valley to a considerable distance below Demchok.

When at Thok-Jalung, the Pundit made diligent enquiry as to the adjacent countries; he was informed that a large district, called Majin, extended for nine days' journey to the east, and that a smaller district, called Shellifuk, lay to the south-east. The Majin country was said to be a difficult one to travel in, as no rivers ran through it. The Shellifuk district boasted of some streams, but they all run into a large inland lake.

Immediately to the north of the gold-fields there is no regularly inhabited country, as far as the Thok-Jalung people are aware. They say there are some wandering thieves—Champas, or Khampas—who live entirely on meat, and have had so little acquaintance with grain in any shape, that they get sick when they take it from their more southerly brethren. The Pundit, however, seemed to have very little faith in this part of the story. We heard that at a considerable distance to the north-east there was a tract called the Whor country, inhabited by Shakpo people—the same style of people as those who come from Jilung.† Tartary is said to be to the north-east of Whor. To the north-west of Thok-Jalung lies Rudok, the route to which has been roughly indicated on the accompanying map. Ting-Chu and Rawung are the intermediate districts; the first is a very cold place, and has very little sweet water, though plenty of brackish water. Rawung has much the same climate as Rudok, only slightly colder; it has, however, plenty of fresh water.

* The Dokpa people eat these fish, but those Tibetans who have read Buddhist books do not do so.

† About one month north of Lhasa.

There is said to be a direct route from Thok-Jalung, south-east to Tadam Monastery, on the great Gartok and Lhasa road. This route crosses some comparatively low ranges, but is said generally to run over great plains. Such inhabitants as there may be on the north, east, and south are all nomadic, living in standing camps, shifting every now and then according to the state of the pasture, time of the year, &c. They are almost all addicted to highway robbery.

I have already pointed out how well the Pundits have succeeded in the difficult art of intersecting and fixing distant peaks. The way in which the chief Pundit quartered his ground and divided it, so as to account for the geography of the whole, with a few routes, is another great improvement; their work covering a much greater breadth, and leaving very little doubt as to the position of the intermediate ranges. As before, the chief Pundit showed great tact in making his way among strangers; and his conduct of the whole expedition is highly creditable; and the way in which he has carried out my instructions is deserving of all praise.

The memoir will be printed entire in the 'Journal,' vol. xxxix.

The PRESIDENT remarked that the communication just read was a production of which Captain Montgomerie had every reason to be proud. These Pundits had been trained to penetrate these difficult countries, acquiring the languages, and being instructed how to make observations, which rendered their journeys of high scientific value. Many persons were not fully aware of the great dangers these people had to encounter. They travelled at the risk of their lives every moment; for if one of the scientific instruments which they possessed had been detected in their boxes, they would have been put to death. Animated by an *esprit de corps*, and a love for science, these Pundits had been able to traverse the country where no European would be safe, and to make a series of observations for latitude and longitude, and to determine the height of a great many mountains, approximatively, 3000 feet higher than Mont Blanc. He had much pleasure in making these observations, because he saw in front of him two distinguished Indian authorities—Sir Robert Montgomery, without whose countenance, in the first instance, Captain Montgomerie could not have carried out his novel project, and the ex-Governor-General of India, Lord Lawrence, who had assented to the arrangements made by Captain Montgomerie. The results were most gratifying to every geographer.

Sir HENRY RAWLINSON believed he was only expressing the feeling of all geographers in saying how deeply they were indebted to Captain Montgomerie for having devised and executed this system of exploration by native agents; because it was owing to that system alone that we had succeeded, and should in future succeed, in gaining a knowledge of the territories beyond the northern frontier of India, because they were utterly inaccessible to European travellers. Sir Roderick had drawn attention to the value of these discoveries. It was certainly of the greatest importance to remember that at last we had penetrated beyond the great elevated plateau which bounded India to the north. The Pundits had ascended the Himalayas, and had gone straight across to the outer crest, and descended to the lower plateaux of Tartary—the gold-

fields being really beyond the western frontier of Thibet. It was curious to find that there was not only a single gold-field, but a succession of gold-fields, extending the whole way from Rudok to Lhasa, along the range; and there was reason to believe that gold-fields continued in the same direction as far to the north-west as Ilchi. This was the central mart of the gold of Central Asia. The officer formerly employed by the Chinese Government to superintend the collection of this metal used to reside at Ilchi, and to send the people down into this district. We did not know how far they went; but we knew that the gold-diggers resorted to a place about 100 miles to the south-east of Ilchi, and obtained the gold along this range, so we had fair ground for believing that the gold-fields extended from Lhasa, along the foot of that range, for a distance probably of nearly 1000 miles in a direction north-west and south-east. It had been noticed by a writer in the public press, that we really had an account of these gold-fields in the most ancient times, because there seemed hardly any doubt that the gold-diggings described by the Pundits were the very same which attracted the notice of Herodotus. He described them in words which were singularly applicable. He told us that there was a wild country to the north of Cashmere—Cashmere in a broad sense including all Thibet; and that the gold was found there by "ants," whom he described as burrowing underground, just in the same way as these people were described by the Pundits, as making subterranean dwellings by throwing up the earth into heaps, and in the earth the gold was found. Then, he said, the Indians from Cashmere came very often to try and get gold, upon which the ants sallied out, and if they caught any person they ate him up, there being no hope of escape from the ants. Now, in the early history of Asia, it was usual to call races and tribes after certain animals: thus we heard of the "snakes," the "horses," the "wolves," "dogs," "lions," and "foxes." He believed that the race who then inhabited the gold district of Thibet were called "ants." It seemed to him that that was the real explanation of the statement of Herodotus. Again, their peculiarly crouching attitude, which Captain Montgomerie described, might have had something to do with suggesting the cognomen of "ants." There was only one other point which he would notice. In giving every possible credit to the Pundits, we must remember that this was not entirely a new country. The portion from Gartok to the north-east was entirely new; but Moorcroft and Henry Strachey had both been up the Indus as far as Gartok. Strachey there heard of the other branch of the Indus now discovered by the Pundits, but he was unable to penetrate into Independent Thibet. He believed, in fact, it was quite impossible for any European traveller to penetrate into that country. He trusted the future explorations of the Pundits would be equally successful; and that they would be able to clear up the question as to the existence of an ancient royal road from Hindostan to Central Asia. Moorcroft told us, that having crossed a native path between the Sutlej and Gartok, he discovered the traces of a large, wide, paved royal road; that in the plains it was paved, and in the hills excavated through the mountains; he understood it went along the Indus to Rudok, and from that point passed round the Kuen-luen hills into the plains of Tartary. A mission to discover this royal road would be a grand expedition for the Pundits; and he hoped Captain Montgomerie would be induced to send them in that direction next season. It would be very desirable, for the purposes of trade, to know the exact line which that road followed, because we might be quite certain that if such a line did exist under the Moguls, it could be opened out again with infinitely better results than were accomplished at that time.

SIR ROBERT MONTGOMERY said, with reference to the royal road mentioned by Sir Henry Rawlinson, he knew it was generally supposed that there was a royal road extending from Lhasa to Ilchi. Some of the members of the

Society might remember that, in 1854, Lord Dalhousie tried to make a road from Simla towards Gartok, with the object of opening an overland route to China from India. But the road was not carried on, partly on account of the want of funds, and for other reasons. When he was in the Punjaub he endeavoured to continue the road, the object being to strike the royal road between Lhasa and Heli, so as to enable traffic to come direct from China to India, avoiding the roundabout course through Ladak and Cashmere, and thus turn the flank of Cashmere, and so escape the heavy duties which were levied on goods coming through that country. The road was not completed, and still remains unfinished, for want of funds; but three-fourths of it have been made between Simla and Gartok. As time passed, they hoped to get funds sufficient to complete the road; and he thought the recent discovery of the Pundits would induce the authorities to go on with that road. The President had kindly credited him with having been instrumental in the employment of the Pundits. All that he had to do with the system was this. When Captain Montgomerie first commenced sending natives into the interior, he (Sir R. Montgomery) procured for him a man in 1863, who went up to Yarkand and made observations. He believed he was the first native who accomplished such a journey. Subsequently, Captain Montgomerie adopted the plan of employing Pundits, and he had no doubt that, hereafter, we should receive very important information from these men.

Sir ANDREW WAUGH said that he had the honour of having trained Captain Montgomerie originally as an Indian surveyor, and he was naturally proud of his present achievements. He must accord to him the entire credit of having originated this system of employing native agents. Captain Montgomerie was one of his favourite officers, and belonged to his staff, and he had proved himself so worthy that the Society had awarded him their gold medal. He might remark that surveys of routes in these stupendous mountain regions were exceedingly difficult, requiring great skill, caution, and scrupulous care to prevent the intrusion of large errors. For the Pundits to close their survey with an ascertained error of only two miles and a half in so long a mountainous circuit, showed not only that dependance was to be placed in their accuracy, but also that they had been trained on right principles. He was sure Captain Montgomerie would carry this enterprise still further, and that we should yet receive even more interesting accounts of still more *terras reclusas*.

The PRESIDENT believed that the award of a gold watch to the first Pundit, in 1868, had been productive of much advantage. He hoped, before another year was over, the Council would have to vote an additional honorary distinction.

2. *On the Transit of Tea from North-West India to Eastern Turkestan.*

By T. DOUGLAS FORSYTH, Esq., F.R.G.S.

THIS communication consisted of a letter addressed to the President of the Society by Mr. Forsyth, with an enclosure from Mr. Shaw, who is now engaged in a commercial undertaking to the capital of Eastern Turkestan:—

“MY DEAR SIR,

“Jullundur, 26th February, 1869.

“As you will be anxious to hear of the progress of Lieutenant Hayward, whom you have sent out on an expedition to Yarkand, I send herewith the copy of a letter just received from Mr. R. Shaw

to his sister, who has placed it at my disposal. Mr. Shaw is the first Englishman who has ever sent a letter from that country to us, and, with the exception of Mr. Johnson, the first Englishman who has ever been in Eastern Turkestan, and lived to let us know about the land. I trust his life may be spared, and then I have no doubt that we shall soon see trade communication freely established between the two countries.

“The path for Mr. Shaw's entry was carefully prepared. When I was at Leh last September, I sent a horse-load of tea with a letter to the Kooshbegi, telling him that this was only a sample of what could be supplied in larger quantities from the Indian tea-plantations. At the same time the Kooshbegi was asked to receive favourably a caravan of traders, who went with the Vakeel who had my letter. In this caravan was one of Mr. Shaw's servants, who took presents from his master to the Kooshbegi. Mr. Shaw himself followed about three weeks afterwards, and waited at the confines of Turkestan for news from his servant. He received encouragement to proceed, and his letter tells the rest. Further information, as soon as it is received by me, shall be sent to you.

“Mr. Hayward's approach, it appears, was *not* made smooth beforehand, and, as the people of that country are naturally suspicious, they have hindered his advance. No personal injury, however, will, I trust and believe, be done to him, for the Kooshbegi is evidently desirous of entering into friendly relations with us.

“I have to thank you exceedingly for the very kind letter you have sent me, and for the flattering notice which you are good enough to bestow on my humble efforts to open out trade with Turkestan. I can truly say that, in setting this task before me, I have been actuated by no idea of Russophobia, and, in justice to myself, I hope you will allow me to explain that recent allusions by me to possible complications with Russia have been greatly misunderstood by the English press.

“I will not enlarge on this subject, which is foreign to the commercial and scientific question with which alone the Royal Geographical Society concerns itself, but I owe it to you, as our distinguished President, no less than to myself, to say that, because the impression had got firmly fixed in people's minds that my efforts to open out this trade were utterly futile on account of the impassable character of the Himalayas, I ventured to show how very easy the passage by the Changchenmo route really is. You, doubtless, know that the province of Ladak has been invaded ere now by a Kalutick army passing over this route.

“Having but one object in view—the furtherance of trade and

the advance of science—I desire to pursue the subject with single earnestness of purpose; and it is, indeed, a high honour and reward to receive words of encouragement from the President of our Society.

“The great interest which Lord Mayo takes in the subject is a guarantee that this interesting country will not much longer remain a sealed book to us.

“I may add, that Mr. Shaw is one of our most enterprising settlers in the Kangra Valley. After receiving an University education, he came out to India to set up as a tea-planter. From the time when we commenced to make efforts for taking advantage of the expulsion of the Chinese to open communications with Yarkand, Mr. Shaw has evinced the utmost practical interest in the subject, and I am personally indebted to him for valuable information and important help. This year, when he announced to Dr. Cayley and me his determination to visit Yarkand, I honestly confess that I did my utmost to dissuade him from running what was considered by so many a fearful risk. To him, therefore, rather than to any one else, will be due all the credit of success, should we hereafter find our mercantile relations with Yarkand established on a sound basis.

“Even if Mr. Hayward should fail to penetrate into those regions, I feel sure that your Society will, ere long, receive most valuable and reliable information regarding them from one whom I am glad to be able to call my friend.

“I am, my dear Sir,

“Yours, very faithfully,

“T. DOUGLAS FORSYTH.

“Sir R. Murchison, Bart., &c., &c.”

Copy of Letter from Mr. R. Shaw to his Sister at Lahore.

“Camp near Sanju, Turkestan, Nov. 28th, 1868.

“I AM within a few days of Yarkand, having crossed the last pass on my road yesterday (the 11th since leaving Dhurmsala). I am being received in the most handsome manner. A swell Moghul came as far as Shahdulla Khoja (beyond the pass) to meet me. I was detained there eighteen days for orders from the King. The delay was chiefly caused by the arrival (most inopportunistly) of a second Englishman. However, on the 20th, we left Shahdulla, and to-day have been met by the Governor of Yarkand's brother, who has been sent to meet me as Mihmandar, with a large camp. Guns

were fired, and I was escorted in state to a Kirghiz tent. (see Atkinson's 'Siberia' for description). I was ushered in, made to sit alone in the place of honour, on the carpet at the far end, while my Mihmandar sat on a side carpet. He gave me the most complimentary welcome from his King, saying that he was sent simply in order to facilitate my journey and consult my wishes. I paid him a return visit at his tent, and in departing was clothed with a silk robe. I must tell you that I now dress entirely as a Turkec, turban, robe, and everything. He excused himself for the want of proper presents out in the jungle, saying otherwise I should have received a horse, &c.

"None of my servants are allowed to go on foot; even the Tibetan coolies are mounted on yaks. I have picked up some knowledge of Turkec, and hope to improve in it during the winter.

"In fine, you may consider that I am about as well off as I could be, were my utmost wishes realised in the present matter. All my goods, too, have been taken over by the King's people, who are to give the price. The tea will fetch about 8 rupees per pound, as far as I can make out. It is much liked. Unfortunately, half my caravan, which was following me, has either wandered off towards China or gone to Khoten by mistake.*

"The apples and pears are delicious here, after a long desert journey. A lot of fruit and a sheep are given me every-day, and I have now a large flock, though all my servants are sated with meat. They, too, are gorgeously clothed. This letter will go inside a bag of flour with the return Tibetan yak-drivers; for my hosts, although most polite, are very suspicious of letters in unknown tongues. I am afraid the other Englishman, Hayward, who is sent by the Royal Geographical Society, but has not prepared his way as I have, will not be allowed to come on. He is kept under guard at Shahdulla, and we were not allowed to communicate."

The PRESIDENT, in calling for observations on the adventurous and successful undertaking of Mr. Shaw, said he would take this opportunity of correcting a misapprehension into which many persons had been led respecting some prior observations on this route by Sir Henry Rawlinson. All that Sir Henry meant was, that there was a road across the Himalaya and Kuen-lun available for camels and yaks, without very great difficulty; and this had been taken as an admission that this route was practicable for an army.

Sir HENRY RAWLINSON said he had the honour on a previous occasion to notice the opening out of this particular road, which was now generally

* The man in charge lost his way and returned to Ladak. He has since written to tell me of his making a fresh start to join his master.—T. D. F.

known as the Changchenmo route, and to be the most direct and easiest route between Ladak and Turkestan. Judging from the information then available, he certainly said the physical difficulties of the route were very much less than those of any other, and that it promised to be a valuable line for commerce. At the same time he said he considered such a route was impracticable to an army. To move a caravan consisting of a few mules and camels was a very different thing from moving an army with a commissariat. He had been met on that point by the statement that in former times armies had marched without great difficulty from Kashgar to Cashmere, in fact that one of the kings of Kashgar had died at Cashmere. He must reply to that by saying that the passage of the flying hordes which, in former days, swept over Asia, led by Mogul emperors, had no analogy to the movements of armies in the present day. Those flying hordes never carried a commissariat, and never required one. There was one point in Mr. Shaw's journey which he wished to refer to, and this was that a portion of the route he travelled over was absolutely new to us. When on the former occasion he described Mr. Forsyth's route, he was not aware that Dr. Cayley had himself travelled over the whole distance from Leh to the Karakash River. But he was now in possession of Dr. Cayley's Report, with an excellent map of his journey; and had received from him, since he had returned to England, a description of his journey in detail. Dr. Cayley, who was our agent at Ladak, in September last year, travelled along this route by the Changchenmo route to the Karakash. Here began the difficulties. When Mr. Johnson went to Ilchi he crossed the great range by two very difficult passes; but he heard that there was a route down the banks of the river. Dr. Cayley travelled to the same point, but was unable to go down the river. Mr. Shaw had now accomplished this. He travelled by the Changchenmo route as far as the upper waters of the Karakash, and then he followed the banks of the river to Shadula. He found this road an easy one. Hitherto, he believed, no one had followed the Karakash River down into the plain of Tartary. Dr. Cayley had informed him that where the route left the river it was quite impossible for any traveller to keep to the bed of the stream. The only means of entering the plain was by crossing a saddle on the west of the Karakash River, called the Sanju Pass. With respect to Mr. Hayward, he still hoped that that gentleman might succeed in getting forward, and that he would send us some very valuable information. Regarding trade, it was interesting to hear that Mr. Shaw sold his tea at 16s. per lb. Considering that the same tea could be purchased in England at 2s. 6d. per lb., 16s. per lb. was a tempting bait to traders. Unfortunately, as we learned from the Pundit's paper, the Thibetans did not like Himalayan tea, they preferred China tea. It should also be borne in mind that our merchants in taking tea to Yarkand would meet with very great competition on the part of Russia, who was doing all she could to extend her trade. He thought it was all the better for our merchants that they should have to meet competition rather than that they should go into a market with unlimited control.

Captain SHERARD OSBORN congratulated the Society upon the steady way in which, by pundits, travellers, or by tea-merchants, we were getting rid of another of those bugbears, the so-called impenetrable geographical barriers of the world—the Himalayas. Some years ago a Russian officer asked him if the English had not put a good many thousand feet on to the Himalayas, and created a good many difficulties there, for political purposes. He began to think that there was some grounds for the question, and that we should find, as we went on exploring, that where there were routes available for yaks, ponies, and horses, there would soon be found others fit for all commercial purposes. It struck him that the line of the Russian territory, which he held was the line of civilisation, would come down southward and obliterate that

Mahomedan Barbarism which had been the real impediment in Central Asia. The Russians would come down as a natural law, and the sooner we recognised that fact, and the sooner we got rid of all our fetters respecting the extension of Russia, the better for the world and for us.

Eleventh Meeting, April 26th, 1869.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,
in the Chair.

PRESENTATION.—*Frederick H. Leaf, Esq.*

ELECTIONS.—*E. C. Bowra, Esq.; Frederick T. Galworthy, Esq.; C. T. Gardner, Esq.; Eduard J. Leveson, Esq.*

ACCESSIONS TO THE LIBRARY FROM APRIL 12TH TO 26TH, 1869.

By Purchase.—Chardin, 'Voyage en Perse.' 10 vols. Paris, 1811. Cordiner's 'Ceylon.' 2 vols. 1807. Cuninghame's 'Cosmographical Glass,' 1559. D'Anville, 'Carte de l'Inde,' 1753. D'Anville, 'États en Europe.' 1771. Davison's 'Africa.' 1839. 60 Tracts relating to Dutch Possessions in the Indian Archipelago. 1799 to 1847. Engelmann's 'Bibliotheca Geographica.' Hoffmeister's 'Ceylon, 1848.' 'Missiono alla Cocincina.' Roma, 1631. 'La Bissachere Tunkin.' 2 vols. 1812. Mann's 'Mer Noir,' &c. 1778-79. Marryat's 'Borneo, 1848.' Osbeck's 'China, 1771.' Prevost's 'Collection des Voyages.' 19 vols. 1746-70. Seemann's 'Viti, 1862.' Shelvocke, 'Voyage Round the World, 1726.' Temminck, 'L'Inde Archipel.' 3 vols. 1846-49. 'Viaggi di tre Francesi.' 1669. Pertusier, 'La Bosnie.' 1822. Fortis' 'Dalmatia, 1778.' Gamba's 'La Russie, 1826.' 'Histoire de la Moldavie.' 1731. Ardouin's 'Haiti.' 2 vols. 1853. J. E. Tennent's 'Natural History of Ceylon.' 1861. Von der Decken's 'Reisen in Ost-Afrika.' 1869.

By Donation.—Carl Zimmermann's 'Chiwa.' Berlin, 1840. By W. Spottiswoode, Esq. 'Dualla Language of the Camaroons River.' The same.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF APRIL 12TH.

—Carte lithologique des Mers de France, &c. Par M. Delesse, Professeur à l'École des Mines. Presented by Sir R. I. Murchison, Bart., President. Map of the Eastern Part of Abyssinia, showing the Route of the British Army in 1867-8 from Annesley Bay to Magdala. By Dr. A. Petermann. Presented by the author. A large Map of China in 32 Sections (in Chinese characters). Presented by J. S. Coysh, Esq., F.R.G.S. Two Diagrams, showing the Surface