Note on the Construction of the Map of the British Himálayan Frontier in Kumaon and Garhwál, by Lieut. H. STRACHEY.

My map is based on the *Indian Atlas*, Nos. 65 and 66; the cis-Himalayan parts of which, being the result of Mathematical Survey, I have copied exactly, with the following alterations and additions:

1. Some alteration made about the extreme north-eastern Káli in Byáns, the original being decidedly wrong.

2. Other occasional defects in the positions of small streams, villages, &c. here and there amended, from observation or information.

3. Glaciers inserted in many places: these for the most part show the general position merely as derived from information or distant view; approximation to the true size or figure being attempted only in the Gori Glacier above Milam in Jwár, from personal inspection.

4. Entry from information, of sundry inter-Himálayan passes between the several Alpine valleys of Kumaon: there are doubtless many more of these remaining to be mapped in northern Garhwál.

5. All elevations of places to be found in Capt. Webb's book, reduced to sea level by the addition of 87 feet for the (supposed) height of his Calcutta comparisons above the sea; and the mean of all measurements given where more than one is recorded for any place. I have also got elevations of one or two places on the Alpine and sub-Alpine Káli (neither in Webb's book, nor in the map), from Vol. XII. Asiatic Researches, adding 72 feet for correction of the starting point from which they were derived trigonometrically in Webb's survey.

6. In south-eastern Jwár, I have marked in the map the Rálam valley, with the Pass from upper Jwár, Barjigánw-Dhura: the village of Rálam, and the river down to its confluence with the Gori at the entrance of Munshári: in northern Jwár details have been given of the intricate passes into Tibet.

The last mentioned additions to the maps of the "Indian Atlas" are mostly from my own observations, in June, 1846, which, though unaided by surveying instruments of any sort, will give an idea of the

* This map, a part of which only has been reduced to illustrate Lieut. Strachey's Journal, will be published hereafter, but it seems desirable that these remarks on its construction should be printed with Lieut. Strachey's other papers. —EDS.

ground preferable to the total blank left by the surveyors. I have obtained the elevations of a few places on the route from Bhuni to Rálam and from Milam to the Unta-Dhura pass, from the Barometric measurements given by Manson in Vol. XI. (part II. 1842, No. 132, Article III.) Asiatic Society's Journal, which, being without any comparison, I have reduced in a manner similar to that adopted for my own boiling observations. Manson makes his own measurement of Unta-Dhura "about 17,500 ft." but, according to my computation, it is not less than 18,200 ft. and the latter elevation agrees much better with my own personal experience of the pass and adjacent places, as also with Lieut. Weller's boiling observations.

I have also availed myself of the account given by Lieut. Weller (in Asiatic Journal, No. 134, 1843) of his journey to the Balch pass in May and June 1842, but his boiling observations were far too loosely conducted to give any thing in the shape of certain measurement for the elevation of places.

The most probable mistake here and there, doubtless must be much error, is in the longitude of Laptel and the Balch pass (as also Chirchun, &c.) which should, perhaps, be a mile or two further west, so as to make the Balch route to Dungpu more direct than that by Shelshel Sakh, &c., as the Bhotias declare it to be. I was not sufficiently aware of this till my map was past further correction, but the fault may easily be remedied in another copy. It will be observed in this quarter that I have made the British frontier include a good deal of ground unexplored and omitted by the surveyors: the valley of Laptel being so much more open and accessible to Gnari than to Jwár or to Painkanda, it seemed questionable whether it did not belong to Lhassa, but I have allowed its place in the boundary map to be decided by the flow of its water into Painkanda, so as to advance the British frontier to the crest of the Balch mountains and the low pass into Shelshel: the value of the ground itself is little or nothing to either party. Lieut. Weller then penetrated not "three day's journey into Chinese Tartary" (as a certain "pilgrim" supposed) but just up to the frontier line; Laptel has been visited by two or three other English travellers, but for venatic rather than geographical purposes.

Between the Jwár passes and upper Painkanda the map is compiled from the best information I could get of the Jwári Bhotias. The

Girthi valley has been once explored, I believe, by Manson and Irving in 18—? but without any record of results that I am aware of. My accounts of the Hoti valley between Laptel and Niti were very obscure and contradictory, and in this part of the map there may be great error!

The central part of Munshari is studded with a multitude of small villages and hamlets, the spring and autumn residence of the Jwári Bhotias, not half of which are shown in the Atlas No. 66. I have endeavored to supply the defect from information, and my map shows the approximate position of nearly all these places, but they are so crowded together that I was forced to omit the names of many of the hamlets.

In the trans-Himalayan part of my map, I have copied all of the Indian Atlas No. 65, which shows the explorations of Moorcroft and Hearsay in 1812, taken, I believe, from actual rough Survey of Hearsay's, though not so acknowledged on the map, and the positions there assigned to Gartokh and all the principal villages, rivers, &c. in the route of those travellers, remain unaltered up to longitude 81°, saving the direction of a stream here and there, which I had reason for knowing to be otherwise. East of that longitude, where the Atlas No. 65 terminates, is the result of my own explorations now recorded, including the lakes with the details of Kailás, and Gángri, the eastern and south-eastward sources of the Sutlej, the sources of the Karnáli, Momonangli, and the valley of Pruang, with its numerous villages. My survey was a very rough one, made with pocket compass (Smalchalder) and a watch: I took bearings of my course here and there, as I observed any particular change of direction, as also of Kailas, Momonangli, &c., from many different points, and I estimated my distances from noted times by supposed rate of progress according to nature of ground: from the road distances thus computed (at very moderate rates) I made liberal deductions for the map protraction, so that my errors are, I trust, always on the side of diminution rather than exaggeration. As even these rough methods of observation were often interrupted by night marches, &c. the survey is, of course, inaccurate in many respects; but, at the worst, I suppose that the place which I have assigned to Kailás, the furthest extremity of the survey, lies within a circle of 5 miles radius, described about the true position, and other parts accordingly. Kailás and Momonangli were placed from the average of a number of

intersections. In such rugged country no good flying-route survey is possible without constant latitudes: I regret that I had no instrument for getting them. I ascertained the deviation of my compass by bearings of the principal peaks of the Kumaon snowy range taken from Binsar (a high mountain near Almorah) compared with the protraction of the same upon the Atlas No. 66. This gave an average of some 3½° eastern declination, which I was obliged to apply to my survey of the lakes, &c. as I could get no means of checking my compass on the spot, in the whole course of my route from Almorah to Kángri; however inaccurate this process and its result may be, it is good enough to match the other operations of my survey.

My topography of Pruang from a nocturnal survey and bad information is far from perfect; some of the villages given in Angil's list are wanting, and the place of others doubtful, but it will give a fair idea of the position of the four principal places, Kardam, Taklakhar, and Jidi, the three *Khar* and Kajarh (Kocharnatti), of which the second Khar only is exhibited in previous maps under its Hindustani name of "Taklakot," and all the rest superseded by names and places purely fictitious.

It will be observed that in the trans-Himálayan part of my map (as also east of the Kali) I have given a rough representation of hills and mountains over extensive tracts of country which the Atlas (65 and 66) leaves all blank. These delineations of the mountains of Gnari, are such as I could make from partial and distant views, with scarcely any data for details or true positions of ridges, &c., but I thought it best to adopt this method, however inaccurate, because the other, contrasted as the blank is with the vivid representation of the cis-Himálayan mountains, tends insensibly but forciblly to convey the still more erroneous impression of a vast continuous plain on the north side of the passes, whereas the face of the country of Gnari is, for the most part, extremely mountainous.

It would have been interesting and useful (and may still be so, should the wanting material be hereafter forthcoming) to compare my delineation of the lakes, and adjacent places, Gangri, &c. with Hearsay's map of the same, but I have not been able to find any authentic copy of the latter, including the parts east of longitude 81°, which lie outside of the Atlas No. 65; the last mentioned map does indeed show the north-western part of Rákas Tal, with an effluent falling into the Sutlej be-

tween Tirthapuri and Kyunlung, but this at least, I have proved to be quite wrong, no part of the lake extending so far west, and the river in question being properly the Dárma Yánkti, rising in the Byáns Himálaya. In order to make this part of Hearsay's (?) map unite with my own, I have been obliged to bend down the portion of his route next east of Tirthapuri 2 or 3 miles to the southward, so as to enter the Gangri valley south of Kailás and Darchin, and the rivers crossed by this route have been similarly adjusted to meet the Lajandak Sutlej. In other respects Hearsay's map, as also Moorcroft's narrative, agrees very well with the information I have received from the Bhotias, and I have been able to identify many points of the route of those travellers with the Bhotias' descriptions. In the hilly ground between the Sutlej and Gartokh, I have merely had to insert the names of a few streams, encamping-places, &c. in Gugi, i. e. the valley of the Sutlej; I have added some villages and hamlets and corrected the names of others previously mapped, together probably all that exist (and more than are at present inhabited) from Mangnang eastward, many villages in Gangri were ruined by the plunder of the invading Sikhs in 1841, and have since been deserted. I could not get so much information about the country west of Mangnang, and the mapping of that part is comparatively defective, but I have obtained a material correction for the course of the Sutlej there, and the position of Tholing, hitherto wrong on all maps.

All the routes in Gnari, with the several encamping-places on them, are the result of most minute inquiries, where not personally explored. The road from Laptel viâ Shelshel to Dungpu, and thence back to Jwár by Chirchoon, I explored myself in June last, 1846, without surveying instrument however, and the present draft of it is subject to the possible correction suggested for the positions of Laptel and Balch, (viz. a mile or two more westward.) For the routes on information, I am indebted chiefly to the Jwári Bhotias (particularly to the family of the Patwári of Milam) who so far surpass the others in intelligence that I learned more from them about the lakes and Pruang than from the Byánsis, whose constant resort is to those places, and these parts of my map are perhaps as correct as they could be made without personal exploration.

A separate paper, accompanying this, gives all requisite particulars

regarding the determination of the elevations of places on my journey to the lakes, which are entered on that part of the map.

My orthography is always after the system of Sir W. Jones, and the Asiatic Society, but for Hunia names it follows the simple Hindustani pronunciation of the Bhotias, and not the complex Tibetan spelling, which can only be mastered by a critical knowledge of the language. I have had to ascertain de novo and re-write most of the names of places given in the Indian Atlas, the mistakes of which surpass belief: those which I have now given are, I hope, tolerably correct for most of the places in Kumaon and in Gnari, but I had not equal opportunity for revising those of Garhwál.

In my map I have made and explained the distinction between agricultural villages and mere temples and monasteries, places permanently inhabited and mere encamping-grounds, and all other requisite discriminations, the neglect of which simple but necessary details, together with the abominable kakography of names, has much impaired the value of the sheets in question of the Indian Atlas.

The separate sheets of the Atlas (Nos. 65 and 66 at least) though with scales, margins and other marks of completeness, omit to state their scale referred to a known standard, and their mode of projection. I had no access to authentic information on these points, till after the completion of my own map, and the latter was drawn, from one or two old copies of the Atlas, the paper of which had lost its proper size and shape, so that my scale is 25 miles to 6 inches, the nearest Aliqout measure that I could find to my originals, instead of 4 miles to one inch, as it should have been. My map differs from the Atlas also in its graticule, being on the conical development, which I adopted for its facility of execution (being without proper drawing instruments) and in ignorance of the projection applied to the Atlas. The latter I have since found to be based upon the most scientific elaboration, emanating from high authority, notwithstanding which it is palpably inferior to the simple geometrical process of the conical development, both in theoretical accuracy and in facility of practical application. My copies of the Atlas, sheets 65 and 66, gave the length of the meridional arcs sensibly in excess of the truth (like the Tables of Baily); in my map I have reduced them to the lengths given in the tables of Pearson, &c. (after Lambton). In other respects however my map does not pre-

tend to any accuracy of execution, for which I had neither the requisite mechanical appliances nor sufficient time, but all the cis-Himálayan part of it traced from the Indian Atlas is quite correct enough for practical purposes: the trans-Himálayan ground, nowhere fully explored or accurately surveyed, is of course open to much correction.

Description and Analysis of a large mass of Meteoric Iron, from the Kurruckpore hills, near Monghyr. Presented to the Museum of the Asiatic Society, by Captain W. S. SHERWILL, *B. N. I. By* HENRY PIDDINGTON, *Curator Museum Economical Geology.—With two Plates.*

The Museum is indebted for this magnificent specimen to our valued member and active contributor, Captain W. S. Sherwill, of the Revenue Survey.

Upon his first visit to the Museum some months ago I showed this gentleman amongst our mineralogical treasures and curiosities, the Aerolites, and next to them our specimens of meteoric iron, upon which he remarked that he had a large lump of iron "*of some kind*" which had been found in the Rajmahal hills "*a good deal like that.*" I begged of him forthwith by all means to send me at least a specimen of it, which he did, and my conjecture (from his account of its qualities, such as toughness, &c.) that it might prove a mass of meteoric iron, were, after some baffling in the research which mineralogical chemists will understand from the chemical details which follow, was crowned by indubitable proofs that it was so! Captain Sherwill, when recently here, at my request desired a friend to send the whole mass down, and the Society now possesses this most valuable specimen, which I proceed first to describe as to locality and physical properties, before detailing my examination of it.

Locality.

Captain Sherwill's note is as follows:

"*The accompanying mass of iron, supposed to be of meteoric origin, was found imbedded in the soil on the top of the forest-clad Kurruckpore hills near Monghyr. It had been exhumed and worshipped for many years by the hillmen.*"

2	Ditto, East Peak, ...	27,825.9
3	Junnoo, ...	25,311.5
4	Kabroo, ...	24,004.5
5	Powhunry, ...	23,175.5
6	D. 2, ...	22,581.9
7	Pundeem, ...	22,015
8	D. 3, ...	19,242.10
9	Black Rock, ...	17,556.9
10	Nursing, ...	19,139.2
11	Chola, ...	17,319.5
12	Gipmoochi, ...	14,509.2

Thibetan Mountain.

Chumalari, ...	23,929.2

Your's truly,

A. CAMPBELL, *M. D.*

Darjeeling, Nov. 23rd, 1848.

Extract of a letter from Lieut. R. Strachey, Engineers, (communicated by the Hon'ble Mr. THOMASON.)

I just write a few words to let you know that we have come back from Tibet. We returned here yesterday, having got along without any difficulty any where. We left this on the 2nd, as I before wrote to you, and got over all the passes on the 7th into the "table-land." We halted the 8th, and on the 9th got to the Sutlej, some miles below Kyunghing. Thence we returned back towards the southern edge of Rakas Tal, reaching Gyanima, or Nimakhan, on the 12th. On the 14th we got within sight of Rakas Tal, and encamped near its southern shore. On the 15th we went on towards Manasarowar, which we reached on the 16th, encamping about a mile or so below Tu-Gamba, the monastery at the effluent from the Lake; we went up to look at the outlet, which was quite unmistakable. The opening is in an elevated beach, and might perhaps be overlooked when the lake was low. The beach of which I talk is rather curious, being evidently the effect of the waves of the lake, and raised perhaps 6 or 8 feet above the level of the water on one side, and of the low ground outside the beach on the other. These beaches are common to both lakes, and are, I suppose, the result of the

frightful winds that blow there, of which we had most freezing examples. I never felt any thing like the wind (excepting at sea) either for cold or intensity; it was absolutely frightful. On the 17th we returned from Manasarowar; on the 19th, we crossed over into the valley of the Karnali, up which we came, passing Lama Choktan on the 23rd, and arrived at the foot of the passes at Chirchun on the 24th. The next day we came over the passes, three in number, of which Unta Dhura is the lowest. The highest ridge crossed will probably be upwards of 18,500 feet above the sea.

From the accident to my barometer, I can't give even any approximation to heights yet—i. e. until I make comparisons with the barometers left here, which I hope to do in a day or so.

The main results of our visit to Tibet are to see that the plains are very evidently produced by Lakes or Sea. The great mass of them being perfect gravel to a depth of 800 or 1000 feet, to which extent the great ravines cut into them.

The part of the country towards the long lake of Gyanima, seems to have been much more recently under water than the other, and in fact appears to be in many places even now imperfectly drained and subject to flood. The whole of the country from the lake of Gyanima to Rakas Tal, and along almost the whole of the southern edge of the latter, is a great eruption of volcanic rock, and the bar between the lakes is probably also caused by this trap eruption, as it consists of gravel (exactly such as now exists *in* the lakes) to a height of 6 or 800 feet above the present level of the water.

With some difficulty I got an observation of the elevations of Kylas and Gurla, from which I hope to get a decent approximation to their height. The dreadful wind almost stopped me altogether—blew away both ends of the tape used for measuring a base for me to work upon, and prevented any thing like real accuracy.

The valley of the Karnálá, Pruang, &c. is also certainly part of the same great deposit of gravel as the rest of the plain to the westward.

The country generally is more hilly than I had anticipated. The plain more flat, in fact perfectly so, with hills rising abruptly from it. The plain seems to run along the northern foot of the Himalaya, the Sutlej apparently having hills along its southern bank all down its course as far as we saw.

We found none of the recent fossils of large animals, of which I have got indifferent specimens from Bhotias which I had hoped to see. They seem to come from more to the westward. An almost unlimited supply of fossil shells may however be got on the passes into Tibet, and some specimens I have got from 18,000 feet at least, probably higher up.

In the latter part of our trip the thermometer has been as low as 15 or 16° at sunrise—but it became rapidly colder at last, and we before suffered more from the violence of the sun than from cold.

Tibetan Type of Mankind.

To the Secretaries of the Asiatic Society of Bengal.

GENTLEMEN,—The accompanying remarks upon a series of human skulls, collected by me in the valley of Nepál, and forming part of the general osteological* collection made in the sub-Himalayas and deposited in the British Museum, are from the pen of the celebrated author of the Physical History of Mankind. The novelty and the importance of accurate ethnological research in India, together with the eminent qualifications of the commentator on these materials, will, I fancy, readily induce the Society to give a place in its Journal to Dr. Prichard's observations, hereto subjoined. Symbhúnáth and Sankmúl are places of interment or cremation in the valley of Nepál, and there the skulls were procured: Dr. Prichard rightly conceived that the skull No. 8 is a typical Tibetan, and the skull No. 4, a normal Néwár, one; and it is very satisfactory to me to find this gentleman's estimate of the physical character of these races as deduced from the crania so perfectly correspondent with that deduced by myself from the living subjects.

I am, Gentlemen, &c.

B. H. HODGSON.

Darjeeling, November, 1848.

* A recent letter from Mr. Gray, the Curator of the British Museum, acquaints me that this collection, the first of the sort ever deposited there, has proved the nucleus of an osteological collection in the great national Institute of England, which already rivals that of any Museum in the world, save the French one, in the single department of Fishes.