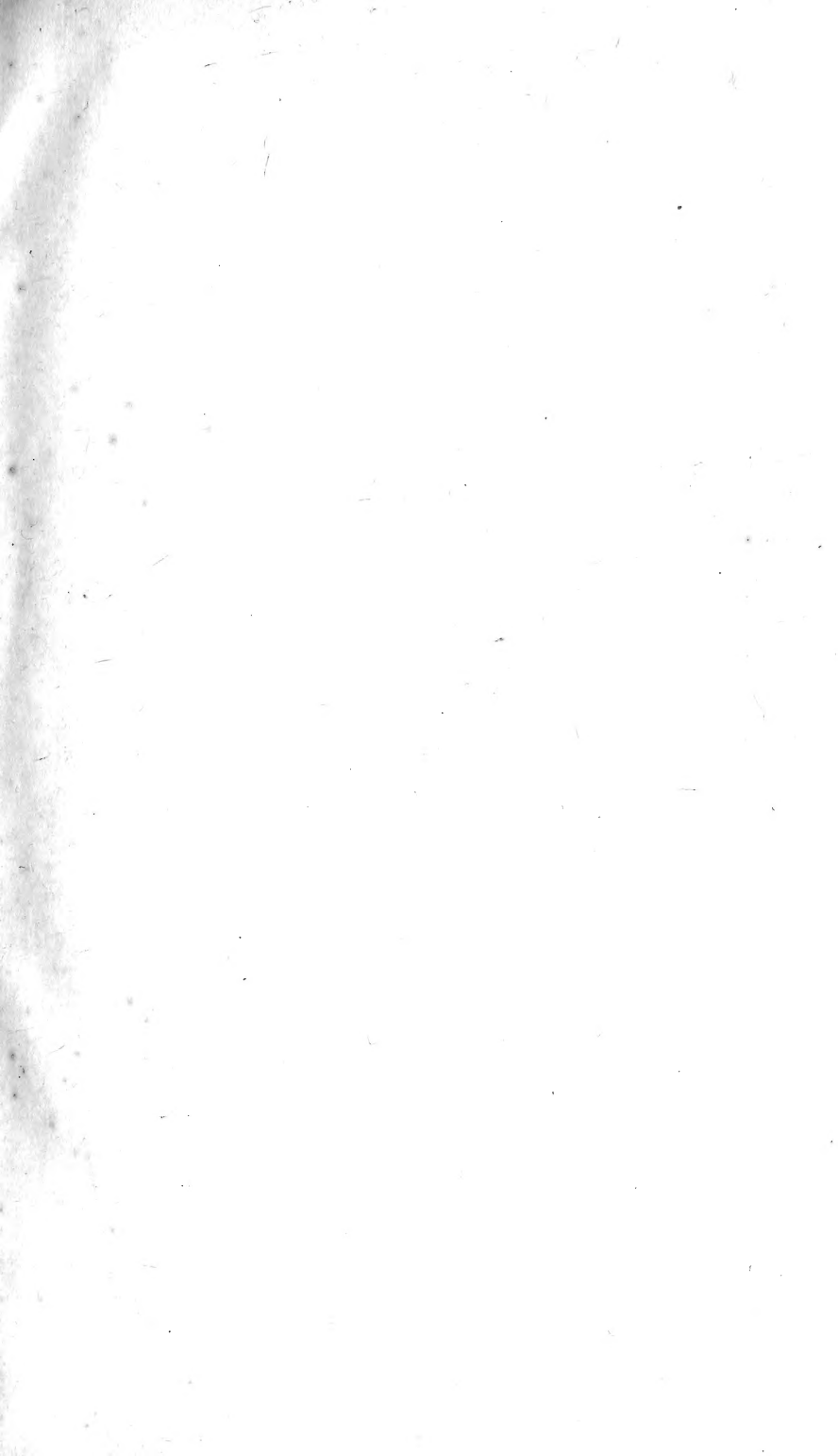


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# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL,

EDITED BY

THE SECRETARIES.

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VOL. XVII.

PART II.—JULY TO DECEMBER, 1848.

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“ It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away if they shall entirely cease.”—SIR WM. JONES.



CALCUTTA :

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1848.





# INDEX TO VOL. XVII.

## PART II.

	<i>Page</i>
Aborigines of Central India, The. By B. H. Hodgson, Esq.....	550
Addendum on the Anatomy of Ailurus. By B. H. Hodgson, Esq. ....	573
Anatomy of Ailurus, Porcula, and Stylocerus, &c. By B. H. Hodgson, Esq.	475
Arian Order of Architecture, as exhibited in the temples of Káshmír, An Essay on the. By Capt. A. Cunningham,.....	241
Bal'amy's translation of the History of Tabary, and Ghazzaly's History of the Prophets. By Dr. A. Sprenger,.....	437
Battle Field of Alexander and Porus, Some account of the. By Capt. J. Abbott, .....	619
Chepáng and Kusundá Tribes of Nepal. By B. H. Hodgson, Esq. ....	650
Chinese Map of India, .....	60
Coleoptera of Hong Kong, Notice on the. By Capt. Champion, 95th Regt.	206
Extract of a letter from Dr. Campbell, to the Hon'ble the President of the Asiatic Society, .....	572
————— from Lieut. R. Strachey,.....	
Explanation of the Elevations of places between Almorah and Gangri, given in Lieut. Strachey's Map and Journal, .....	527
Fragments of the History of Mooltan, the Deraját, and Buhawalpúr. By Lieut. R. MacLagan, .....	559
Glacier of the Pindur in Kumaon, Note on the motion of the. By Lieut. R. Strachey, .....	203
Gleanings in Buddhism ; or translations of passages from a Siamese version of a Pali Work, termed in Siamese "Phrá Pat'hom." By Lieut.-Col. J. Low, .....	72
Gleanings in Buddhism, A few. By Lieut.-Col. J. Low, .....	591
Gum Kino of the Tenasserim Provinces, The. By the Rev. F. Mason,....	223
Ibn Qotaybah's Adab al Kátáb,' on Arabic Astronomy, A Passage from. By Dr. A. Sprenger, .....	659

	<i>Page</i>
Ikwan al çafá, Notice of the. By Dr. A. Sprenger, .....	183
Inscriptions found in Province Wellesly, on the Peninsula of Malacca, An account of several. By Lieut.-Col. James Low, .....	62
———— from Singapur and Province Wellesly, Note on the. By J. W. Laidlay, Esq., .....	66
Journey to Cho Lagan, (Rákás Tal,) Cho Mapan, (Manasarowar,) and the valley of Pruang in Gnari, Hundes, in September and October 1846, Nar- ration of a. By Lieut. H. Strachey, .....	98, 127, 327
The Passage from the Dhari Falls to the Hirnphal. By Capt. Fenwick, ..	210
Map of the British Himalayan Frontier in Kumaon and Gurwal, Note on the construction of the. By Lieut. H. Strachey, .....	532
Memorandum relative to the seven Cosis of Nepal. By B. H. Hodgson, Esq.	646
Meteoric Iron from the Kharrakpur hills, Description and Analysis of a large mass of. By H. Piddington, Esq., .....	538
Meteorological Register for July, 1848, .....	125
———— for August, 1848, .....	239
———— for September, 1848, .....	353
———— for October, 1848, .....	475
———— for November, 1848, .....	591
———— for December, 1848, .....	
Notes on the Eastern Desert of Egypt, from Gebel Afrit, by the Ancient Porphyry Quarries of Gebel Dukhan, near to the old station of Gebel Gir. By Hekeleyan Bey, .....	584
Notes on the Nidification of Indian Birds. By Capt. T. Hutton, .....	3, 681
Notice of the Kiang, By H. Walker, Esq., .....	1
Observations made when following the Grand Trunk Road across the hills of Upper Bengal, Páras Náth, &c. By Dr. J. D. Hooker, .....	355
Proceedings of the Asiatic Society of Bengal, for July 1848, .....	121
———— for August, 1848, .....	233
———— for September, 1848, .....	472
———— for November, 1848, .....	588
———— for December, 1848, .....	697
Relics of the Catholic Mission in Tibet. By B. H. Hodgson, Esq. ....	225
Report on the Salt Range, and on its Coal and other Minerals. By Dr. Andrew Flemming, .....	500
Resultant System for the construction of Iron Tension Bridges. By Major H. Goodwyn, .....	412
Routes from Darjeling to Thibet. By A. Campbell, Esq. ....	488
Route from Katmandu to Darjeling. By B. H. Hodgson, Esq., .....	634
Temperature of the Hot Springs at Peer Mangal, or Munga, or Mungear, ..	230
Tibetan Type of Mankind. By B. H. Hodgson, Esq., .....	222
———— Extract of a letter from Dr. Prichard to B. H. Hodgson, Esq.	580

	<i>Page</i>
Verification of the Itinerary of the Chinese Pilgrim, Hwan Thsang, through Afghanistan and India, during the first half of the 7th century of the Christian Era. By Capt. A. Cunningham, .....	13

---

INDEX TO NAMES OF CONTRIBUTORS.

Abbott, Capt. James. Some account of the Battle Field of Alexander and Porus,.....	619
Campbell, A. Esq. Routes from Darjeling to Tibet, .....	488
———. Extract of a letter to the Hon'ble the President, Asiatic Society, .....	572
———. Letter on the Elevation of Peaks in the Himálayá, .....	576
Champion, Capt. Notice on the Coleoptera of Hong Kong, .....	206
Cunningham, Capt. A. Verification of the Itinerary of the Chinese pilgrim Hwan Thsang, through Afghanistan and India, .....	13
———, An Essay on the Arian Order of Architecture, as exhibited in the Temples of Káshmir, .....	241
Fenwick, Capt. Journey of the Passage from the Dhári Falls to the Hirnphal, .....	210
Fleming, Dr. A Report on the Salt Range and on its Coal and other Minerals,.....	500
Goodwyn, Major H. A Resultant system for the construction of Iron Tension Bridges, .....	412
Hekekyan Bey. Notes on the Eastern Desert of Egypt, .....	584
Hodgson, B. H. Esq. On the Tibetan type of Mankind,.....	222
———. Relics of the Catholic Mission in Tibet, .....	225
———. Anatomy of Ailurus, Porcula, and Stylocerus, .....	475
———. The Aborigines of Central India, .....	550
———. Addendum on the Anatomy of Ailurus, .....	573
———. Route from Kátmandu to Darjeling,.....	634
———. Memorandum relative to the seven Cósís of Nepal,.....	646
———. On the Chépáng and Kúsunda tribes of Nepal, .....	650
Hutton, Capt. T. Notes on the Nidification of India Birds, .....	3, 681
Hooker, Dr. J. D. Observations made when following the Grand Trunk Road across the hills of Upper Bengal, Páras-Náth, &c. in the Soane Valley; and on the Kymaon branch of the Vindhya hills,.....	355
Laidlay, J. W. Esq. Note on the Inscriptions from Singapur and Province Wellesly, forwarded by the Hon'ble Col. Butterworth, and Col. J. Low, .....	66
Low, Lieut.-Col. James. An account of several Inscriptions found in Province Wellesly, on the Peninsula of Malacca,.....	62
———. Gleanings in Buddhism; or translations of passages from a Siamese version of a Pali work, termed in Siamese "Phrá Pát'hom," .....	72
———. A few Gleanings in Buddhism, .....	591

	<i>Page</i>
Maclagan, Lieut. R. Fragments of the History of Mooltan, the Deraját, and Buhawulpur, from Persian MSS. ....	559
Mason, Rev. F. on the Gum Kino of the Tenasserim Provinces,.....	223
Piddington, H. Esq. Description and Analysis of a large mass of Meteoric Iron, from the Kharackpur hills, near Monghir,.....	538
Prichard, Dr. J. C. Extract of a letter from,.....	580
Sprenger, Dr. Aloys. Notice of the Ikhwan al çafá, .....	183
———. Balamy's Translation of the History of Tabary, .....	437
———. A passage from Ibn Qotaybah's Adab al Katib' on Arabic Astronomy, .....	659
Strachey, Lieut. H. Narrative of a journey to Cho Lagan, (Rákás Tal), Cho Mapan, (Mánasarowar,) and the Valley of Pruang in Gnari, Húndés, 98, 177, .....	327
———. Note on the Construction of the Map of the British Himalayan Frontier in Kumaon and Gurwal,.....	532
———. Lieut. R. Extract of a letter from, .....	578
———. Lieut. R. Note on the motion of the Glacier of the Pindur in Kumaon,.....	203
Walker, H. Esq. Notice of the Kiang, .....	1

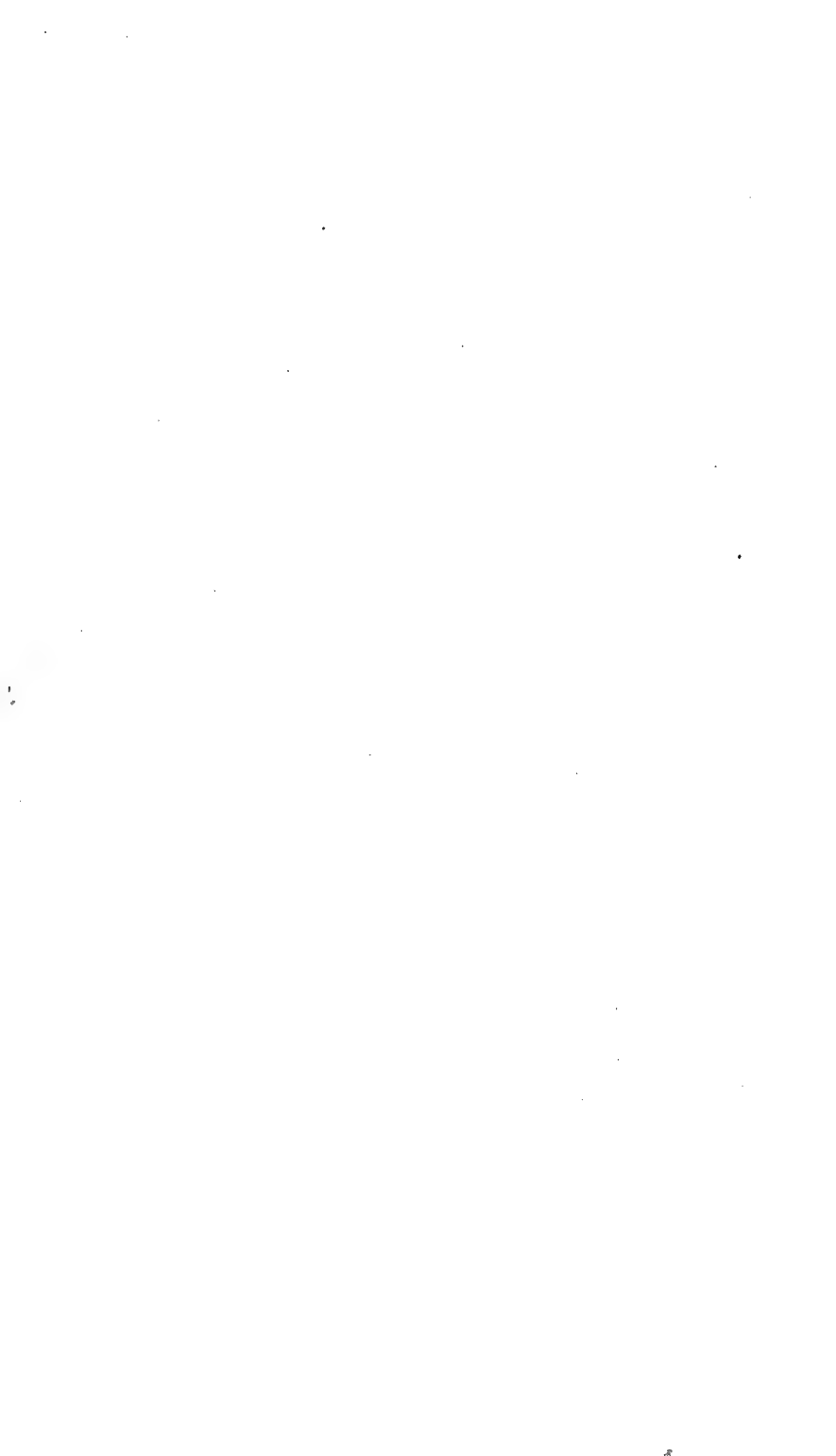


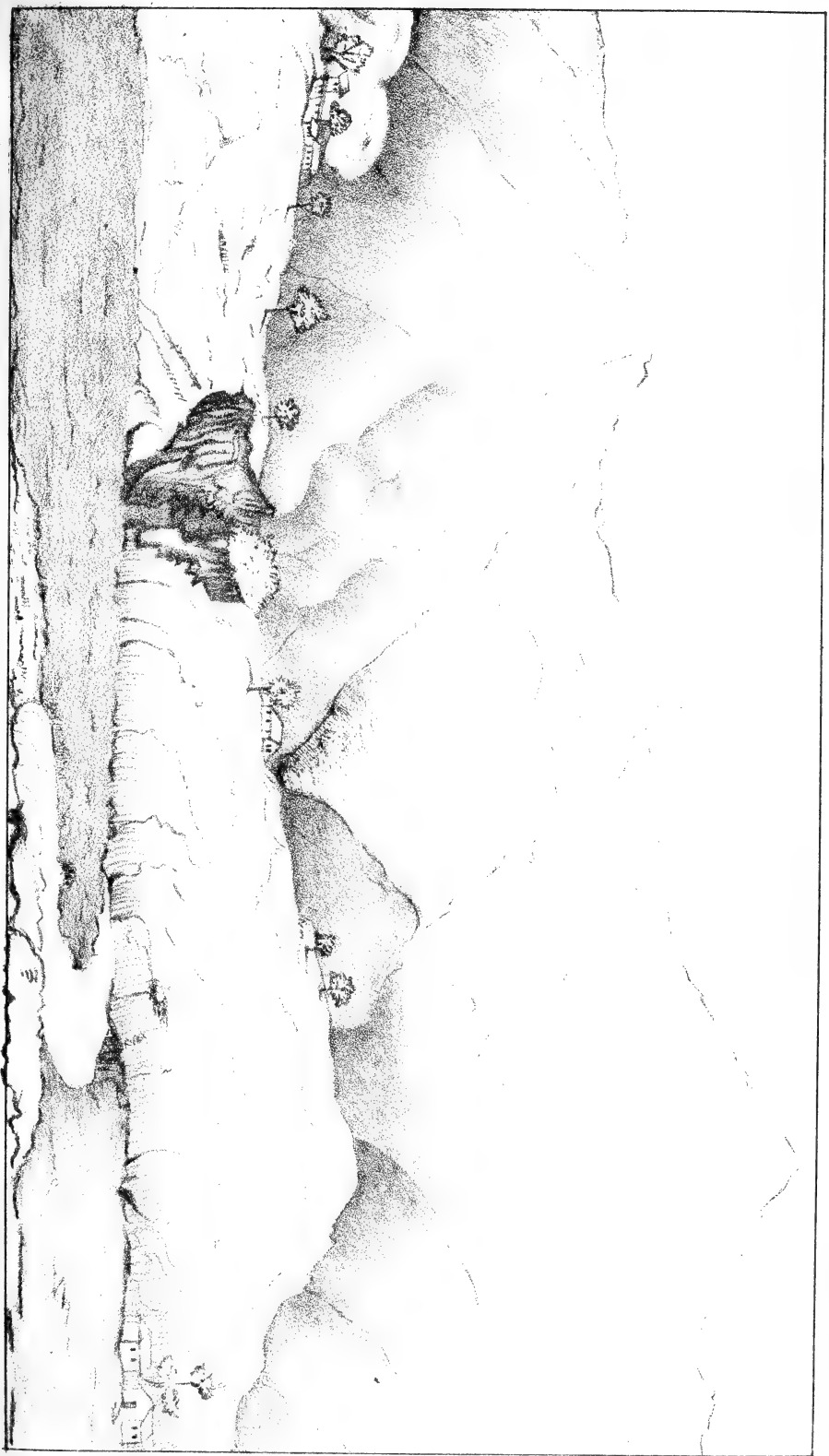
## TO THE BINDER.

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*The Plates will be inserted as follows:—*

|                                                                    | <i>Page.</i> |
|--------------------------------------------------------------------|--------------|
| I. (The <i>Equus hemionus</i> ), .....                             | 1            |
| II. ....                                                           | 62           |
| III. ....                                                          | 68           |
| IV. Map to illustrate the route of Lieut. Strachey to Manasarowar. | 72           |
| V. Map shewing the sites of Temples in Kashmir, .....              | 242          |
| VI. ....                                                           | 244          |
| VII. ....                                                          | 246          |
| VIII. ....                                                         | 248          |
| IX. ....                                                           | 248          |
| X. ....                                                            | 252          |
| XI. ....                                                           | 254          |
| XII. ....                                                          | 254          |
| XIII. ....                                                         | 258          |
| XIV. ....                                                          | 258          |
| XV. ....                                                           | 259          |
| XVI. ....                                                          | 266          |
| XVII. ....                                                         | 280          |
| XVIII. ....                                                        | 278          |
| XIX. ....                                                          | 276          |
| XX. ....                                                           | 282          |
| XXI. ....                                                          | 282          |
| XXII. ....                                                         | 284          |
| XXIII. ....                                                        | 412          |
| XXIV. ....                                                         | 418          |
| XXV. ....                                                          | 424          |
| XXVI. ....                                                         | 428          |
| XXVII. ....                                                        | 476          |
| XXVIII. ....                                                       | 490          |
| XXIX. ....                                                         | 538          |
| XXX. ....                                                          | 539          |
| XXXI. (Bearings from Darjeeling, &c.) .....                        | 577          |
| XXXII. (Battle Field of Alexander and Porus.) .....                | 622          |
| XXXIII. ....                                                       | 641          |
| XXXIV. (Feeders of the Sun Cosi.) .....                            | 647          |
| XXXV. (Man of the Chepang tribe.) .....                            | 650          |

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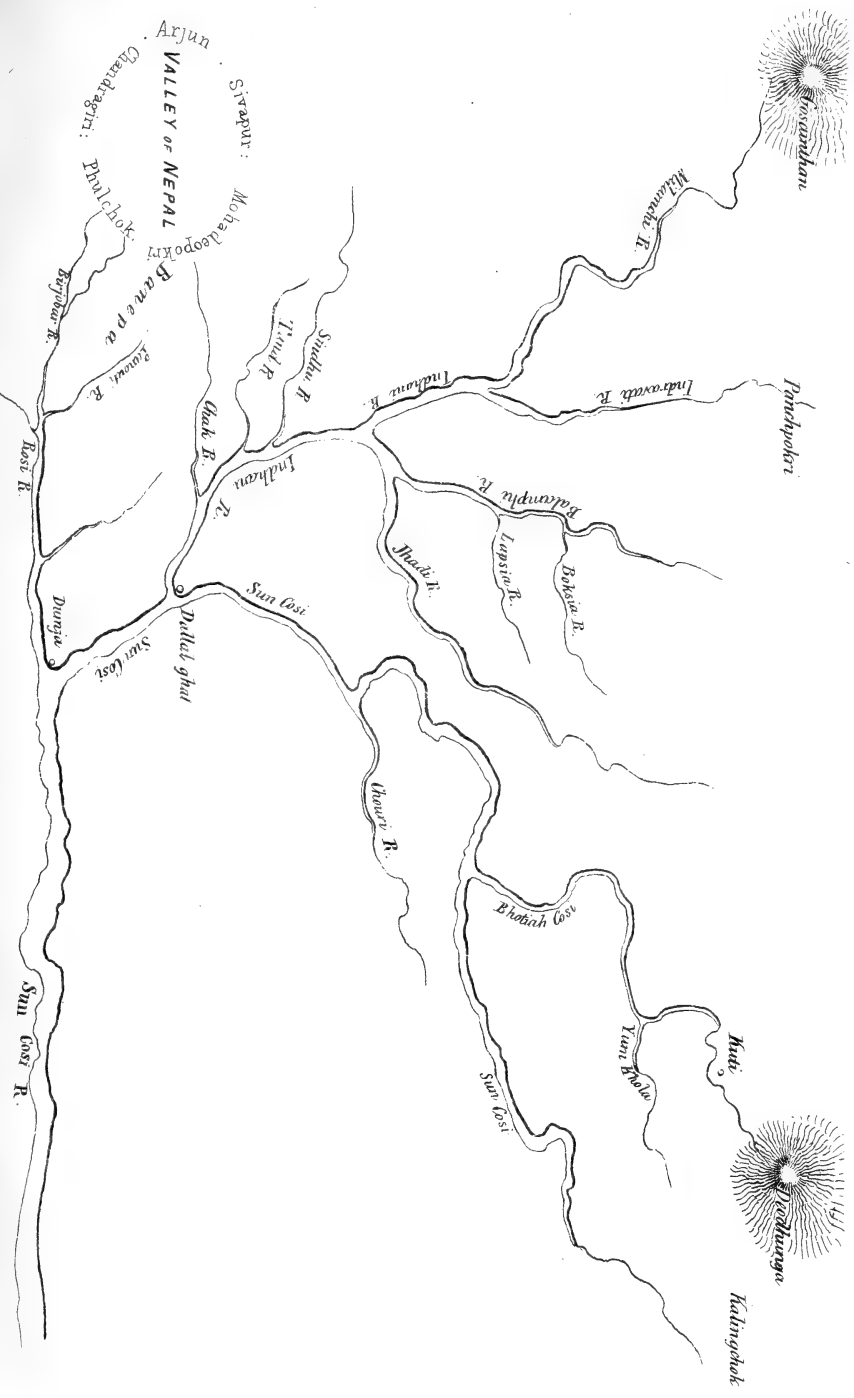


Low ridge of Chobhar in the valley of Nepal with the desiccating dale therein and the houses appearing in the distance.





FEEDERS OF THE SUN COSI



B.F.H.

73

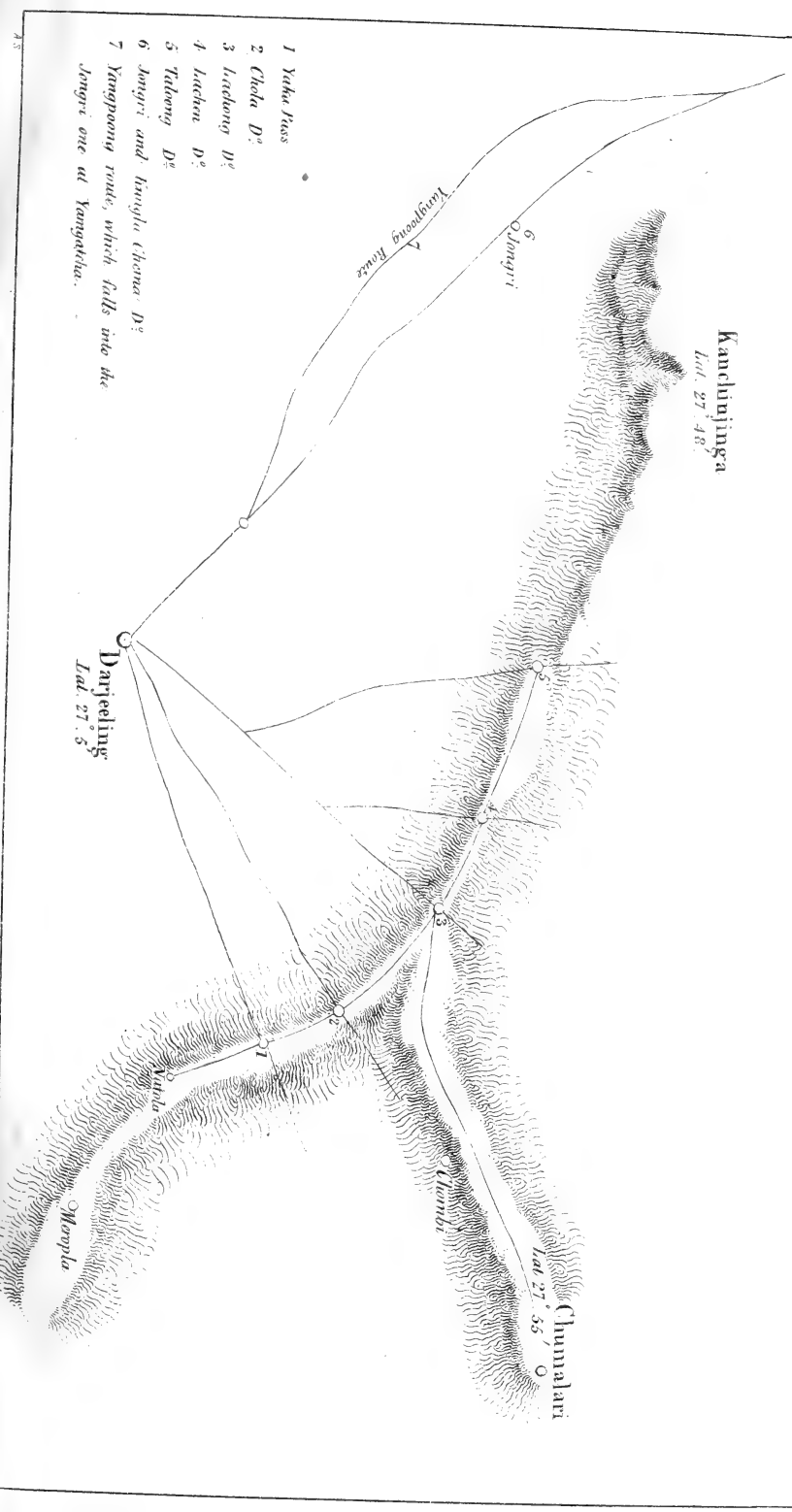


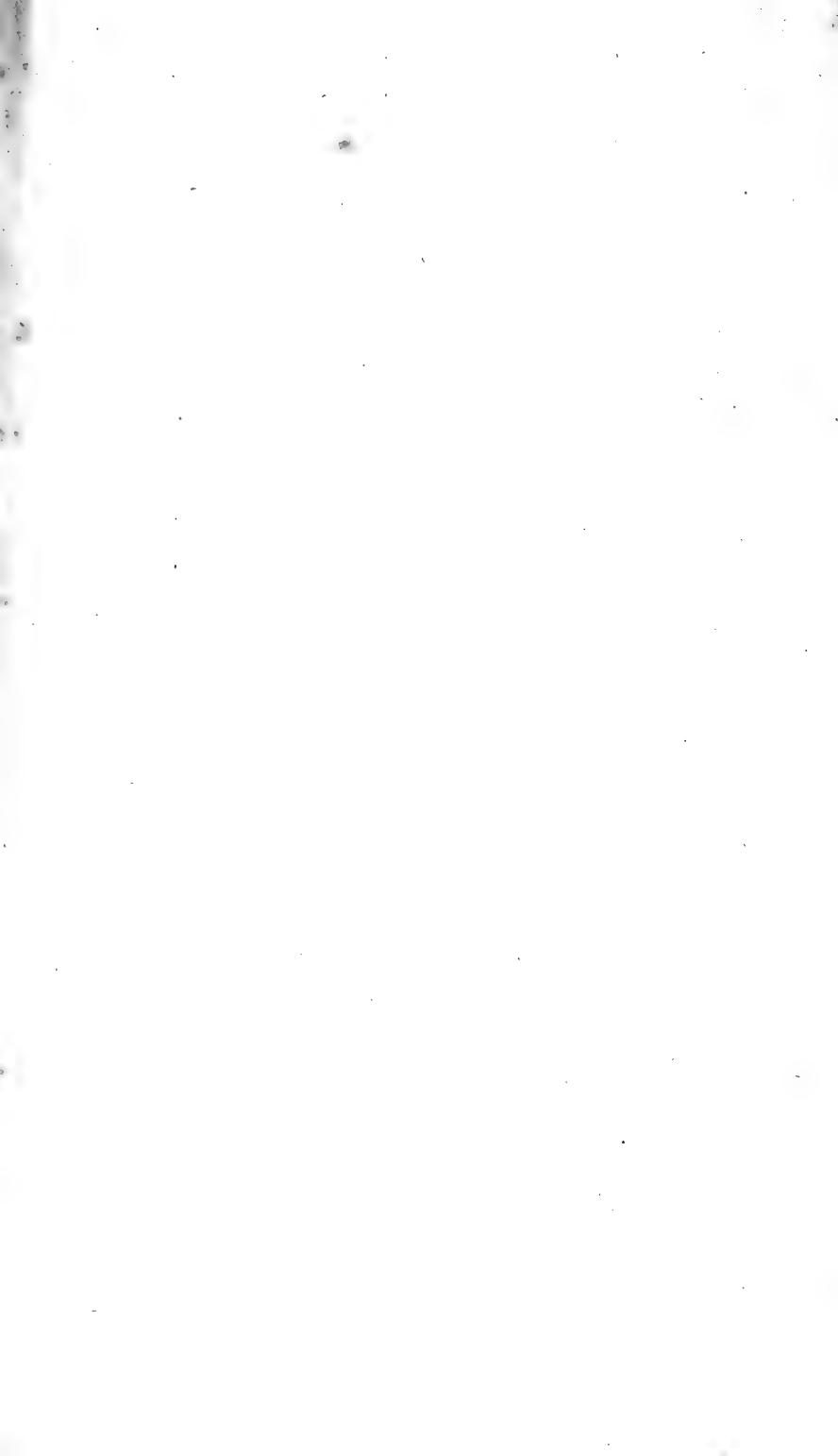
DIAGRAM OF THE ROUTE FROM DARJEELING TO TIBET.

Kanchungpa  
Lat. 27° 48'

Chumalari  
Lat. 27° 55'

- 1 Yaka Pass
- 2 Chola D<sup>s</sup>
- 3 Ladlong D<sup>s</sup>
- 4 Lachan D<sup>s</sup>
- 5 Tidoong D<sup>s</sup>
- 6 Jongri and Sangla Chama D<sup>s</sup>
- 7 Yangpoong route, which falls into the Jongri one at Yangachka.

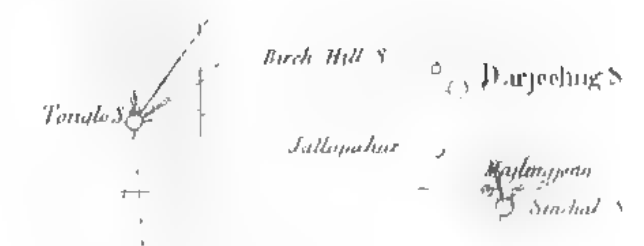




Position of Chamalaris according to B. W. Vol. 12



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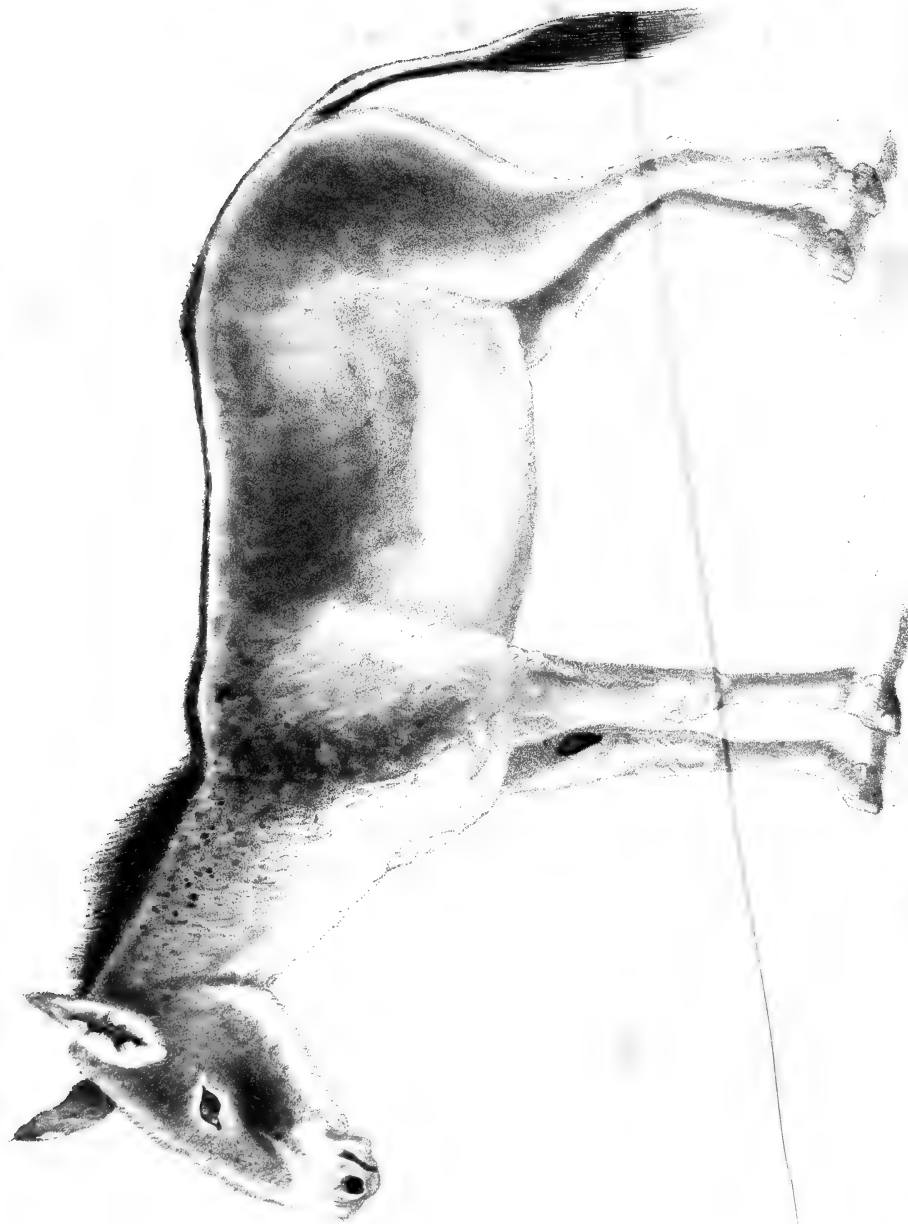
SCALE 8 MILES TO AN INCH

88

89

90





*J. Black, Artist, Ind. Digs*

**EQUUS hemionus, Pallas**

*D<sup>r</sup> Cantor from Life*



# JOURNAL

OF THE

# ASIATIC SOCIETY.

JULY, 1848.

*Notice of the Kiang.—(With Plate.)*

In the month of March last a Kiang or wild ass of Tibet, arrived in Calcutta in company with a Hill-poney, to which it had taken a fancy and followed every where. It had been sent down by the Hon'ble J. Thomason, Esq. Lieut.-Governor of the North-West Provinces, to be forwarded to England, and came originally from the plains of Tibet. The following description was taken whilst it was in Calcutta.

It is a male between 2 and 3 years old, and has either been gelt or his testicles have not yet descended. He is still partially covered with his winter coat. His general form, except the head, which is very large, is more that of a horse than an ass. Limbs slender, hind-quarters good, shoulder small and straight. Head large, nose arched, forehead flat, as far as can be perceived, covered as it is with long thick hair. Nostrils large and more terminal than in the horse or ass. Ears of medium size between the horse and ass, but more approximated at their bases than in either of those animals. The eye much more bright and intelligent than in the common ass. Mane erect, and the hair, of which it is composed, about 4 inches long: no foretop. The coat is thick, long and frizzled, something like a camel's. A thick tuft at the end of the tail, which however is not confined to the tip, but extends half way up towards the base. Callosities on the forelegs, none on the hind ones. Height at shoulder 3 feet 10 inches, or 11 hands and a half. Colour; above, isabella, with a dash of bay or fawn. Beneath, and the 4 legs, breast and nose, yellowish white. The whole of the trunk has a slight tinge of a bluish or leaden hue. The mane, dorsal line, and tuft of tail brown black; the dorsal line expands at the

rump : ears, outside isabella, inside white, tips and outer border brown black ; irides gray. He neighs like a horse.

*Manners.* The animal is quite unmanageable by any one except his own saees. On the approach of a stranger he kicks or bites, and it is impossible to get near him to examine any part of his body. He is much attached to the Hill-poney, and never leaves him or allows him to be taken away. He will eat and drink only in company with the poney, which on this account has been sent with him to England.

The Kiang is the same animal as the Dshikketaei first discovered in Siberia by Pallas and named by him *Equus Hemionus*. The Kiang was first seen on the plains of Tibet by Moorcroft, who says it is certainly not the Gur-khur or wild ass of Sindh. The latter appears to have been considered the *Equus Hemionus* in Europe, where specimens are now living in the Zoological Gardens, and in Mr. Cross's menagerie, London, and at the Garden of Plants in Paris.

Besides the difference of habitat, there are two points which require to be settled before the identity of the Kiang with the Wild Ass of Cutch can be satisfactorily made out. The first relates to the nature of the voice ; the second to the presence or absence of Zebra-stripes.

First with regard to the voice, the Kiang neighs like a horse, the wild ass of Cutch brays like an ass. 2nd. There are no Zebra-stripes in the Kiang, neither in the adult nor in the foal. In the wild ass of Cutch, transverse Zebra-stripes are seen on the shoulder in the adult, and still more in the foal. Sometimes also the shoulder-cross has been seen. In a live specimen at Mr. Cross's there was a cross-band at the shoulder 4 inches long on each side.—*Nouvelles Annales du Museum*, Vol. 4, p. 117.

The habitat of the Kiang is on the high table-land of Tibet, that of the wild ass of Cutch in the sultry plains near the mouth of the Indus.

Mr. Hodgson has described the Kiang as a new species under the name of *Equus polyodon*. The anterior premolar, however, upon which Mr. H. bases his new species, is found not unfrequently in the common horse, and may be seen in two of the five specimens of the head of that animal in the Museum of the Asiatic Society ; whilst in the specimen of the Kiang in the same Museum, the anterior premolar does not exist, nor is there any trace of it. This evidence appears conclusive that the Kiang is not a new species.

*Notes on the Nidification of Indian Birds.*—By Capt. THOMAS HUTTON, F. G. S. (Communicated by E. BLYTH, Esq.)

Captain Tickell having made a praiseworthy beginning, in the April number of the Journal of the Asiatic Society for 1848, to dispel the darkness that has hitherto hung over our knowledge of this portion of the history of the Birds of India, I have thought it advisable, being in possession of a few facts bearing on the subject, to follow in the path he has so well pointed out.

No. 1.—“*Haliæetus Macei*, Cuv.

I notice this species because Captain Tickell has remarked that it “never makes the slightest attempt at defending its nest,—a striking contrast to the marvellous tales we read of, concerning the Golden Eagle in the Highlands of Scotland, &c.!” This remark is correct only so long as there are eggs in the nest, for no sooner are these hatched than the temper of the bird becomes wholly changed, and it will then defend its young with fierceness and determination. The nests I have repeatedly found and robbed, both on the banks of the Ganges and of the Sutledge, and in all cases where they contained only eggs, not the least show of resistance was made,—the old birds either sailing away with a loud querulous cry,—or sullenly remaining on an adjacent tree watching the robbery that was going on. On one occasion, however, I met with a very different reception, when my servant was attacked with an unexpected ferocity from which nothing but my gun could have saved him. The circumstance occurred in January 1832, when on my way up the country. The nest was placed near the summit of a tree growing on one of the Colgong rocks in the middle of the Ganges, and contained two half-fledged young ones. The old birds offered a most determined resistance, and without the aid of fire-arms we should decidedly have been defeated, as they dashed fiercely and fearlessly at the man in the tree, who prayed hard to be allowed to descend, and was only kept at his post by the promise of reward and fear of the cudgel. At first we had to contend with the female only, but after one or two rapid stoops and dashes at the robber’s head, which he avoided by bobbing under the nest,—finding she could make no impression, she suddenly uttered a shrill cry, which was responded to in the distance, and in an instant after, her mate was seen swiftly

gliding to her aid from the opposite bank of the river. The two then charged together towards the nest with the rage and fierceness of despair, and so terrified the man in the tree, hampered as he was with the young ones, that had I not fired at and wounded the Eagles as they advanced, they would assuredly have hurled him into the river. In this manner however, after repeated attempts to come to the rescue, we managed at last to drive them off, and secure the booty. At the end of 5 weeks the young ones exhibited as nearly as possible the plumage of the bird figured by Hardwicke and Gray as "*H. lineatus*."\*

No. 2.—[ "*Ephialtes scops*," (L.) :

*E. spilocephalus*, Blyth, (a large specimen in immature plumage).

*Scops pennata*, Hodgson (grey variety) :

*Sc. sunia*, Hodgson (rufous variety).]

This species occurs on the Himalaya in the neighbourhood of Mussooree, at an elevation of about 5,000 feet, and nidificates in hollow trees, laying 3 pure white eggs, of a rounded form, on the rotten wood, without any preparation of a nest. Diameter of egg  $1\frac{3}{8} \times 1$  ins. The nest was found on the 19th March.

In the 169th number of the J. A. S. for 1846, Mr. Blyth has named and described this species as "*Ephialtes spilocephalus*," giving "*Noctua auribarbis*" and "*Athene badia*" of Hodgson, as doubtful synonymes.† In plumage and aigrettes the bird is to all appearance a *Scops* or *Ephialtes*,—but the wing is that of *Noctua* or *Athene*, having the 4th and 5th feathers longest—whereas in *Scops*, as laid down by Mr. Hodgson in J. A. S. No. 65 of 1837,—the 3d and 4th are longest. Mr. Gray, in his Catalogue of the collection presented by Mr. Hodgson to the British Museum, gives "*N. auribarbis*" of that naturalist as a synonyme of "*Athene cuculoides*" of Vigors,—but it seems scarcely probable that Mr. Hodgson would have placed his "*auribarbis*"

\* Mr. G. R. Gray, in his Catalogue of Mr. Hodgson's specimens presented to the British museum, erroneously gives *H. lineatus* as a synonyme of the common Kite of India : but the Kites are closely allied to the *Haliæti*, and immediately connected with them by the interposition of *Haliastur*. The ferocity of the Indian Kite when it has young in its nest must have been remarked by most residents in this country.—E. B.

† *Noctua auribarbis*, Hodgson, is now referred by Mr. G. R. Gray (as mentioned above) to *Athene cuculoides*, and *Ath. badia* doubtfully as the young of *Ath. Brodiei*.—E. B.

in the genus "*Noctua*," if the characters of the wing rendered it improper so to place it. Had such however been the case, the necessity for coining a new *specific* name is not apparent. This handsome little species appears to agree neither with *Scops* nor *Athene*,—for while the wing belongs to the latter genus,—the plumage, aigrettes and nude feet refer it to the former. It would now seem however that neither *Scops* nor *Ephialtes* can stand for a genus of Owls,—the first being otherwise employed in Ornithology,—while the latter is a genus in Entomology instituted by Gravenhorst. (Vide Nat. Lib. Introd. Entom.) It is therefore necessary to form a genus for these Owls.

No. 3.—"*Athene Brodiei*." (Burton).

This pretty little species is exceedingly common in the Himalayas in the neighbourhood of Mussooree and Simla, and may be heard at nightfall uttering its monotonous but not unmusical whistle of two notes oft times repeated. Like the last, it nidificates in hollow trees without any preparation of a nest. On the 11th May, I found 3 young ones and an egg just ready to hatch in a hole of a wild Cherry tree. The egg was nearly round and pure white, but being broken I could take no measurement of it. The young ones were clothed in a soft and pure white down.

In both these instances, namely, "*A. nudipes*" and "*A. Brodiei*," the old females remained in the holes while we cut into the trees, and allowed themselves to be captured.

No. 4.—"*Caprimulgus albonotatus*," Tickell.

*C. nipalensis*, Hodgson, (Gray's Zool. Misc.)

Of this species, which is a summer visitor at Mussooree, Captain Tickell says, the eggs are—"fleshy clay colour, sprinkled with patches of darker brownish red; female, paler and redder." I took 2 eggs of this bird at an elevation of 5000 feet, on the 19th April, from the bare ground beneath bushes on the side of a hill, the colour being a rich cream white with darker blotches of reddish brown or clay colour. Of one the diameter was  $1\frac{1}{4} \times \frac{7}{8}$  inches; the other was somewhat smaller.

No. 5.—"*Garrulus lanceolatus*," Vigors.

*G. gularis* et *G. Vigorsii*. (Gray's Ill. Ind. Zool.)

This is one of the commonest birds in the Hills, usually appearing, except in the breeding season, in small parties of 5 or 6, most probably

comprising a family. It breeds in May and June, placing the nest sometimes on the branch of a tall oak tree (*Quercus incana*); at other times in a thick bush. It is composed of a foundation of twigs, and lined with fine roots of grass, &c., mixed with the long black fibres of ferns and mosses which hang upon the forest trees, and have much the appearance of black horse hair; the nest is cup-shaped, rather shallow, loosely put together, circular and about  $4\frac{1}{2}$  inches in diameter. The eggs are sometimes 3, sometimes 4 in number, of a greenish stone-grey, freckled chiefly at the larger end with dusky,—and a few black hair-like streaks, which are not always present; they vary also in the amount of dusky freckling at the large end. Shape ordinary. The nestling bird is devoid of the lanceolate markings on the throat, and in this stage is the "*Garrulus Vigorsii*" of Hardwicke and Gray.—"*Bun-sar-rah*," of hillmen.

No. 6.—*Garrulax albogularis*, (Gould.)

*Cinclosoma albigula*, Hodgson.

Is very common at Mussooree at all seasons, and appears in large flocks of several families united. It breeds in April and May,—placing the nest in the forks of young oaks and other trees, about 7 to 8 feet from the ground, though sometimes higher, and fastening the sides of it firmly to the supporting twigs by tendrils of climbing plants. It is sometimes composed externally almost entirely of such woody tendrils, intermixed with a few other twigs, and lined with the black hair-like fibres of mosses and lichens; at other times it is externally composed of coarse dry grasses, and leaves of different kinds of Orchis, and lined with fibres,—the materials varying with the locality. Unlike the eggs of *Crateropus*, which are stated to be white,—in this species they are of a deep and beautiful green, shining as if recently varnished, and 3 in number. In shape they taper somewhat suddenly to the smaller end, which may almost be termed obtusely pointed; the diameter  $1\frac{3}{16} \times \frac{1}{16}$  inches. The usual number of eggs is three, though they vary sometimes to one or two,—but only on one occasion out of more than a dozen, have I found four eggs. The old bird will remain on the nest until almost within reach of the hand.

No. 7.—"*Trochalopteron? rufigularis*. (Gray's Catalogue.)

*Crateropus rufimentum*, (Hodgson.)

This species differs from the last in not congregating into large and

noisy flocks, but appearing usually, according to my observation, in pairs. It breeds in May, in which month I took a nest at about 6,500 feet, in a retired and wooded glen; it was composed of small twigs externally, and lined with the fine black fibres of lichens, like the preceding. The nest was placed on a horizontal bough about 7 feet from the ground, and contained 3 *pure white eggs*. Diameter  $1\frac{2}{16} \times \frac{1}{16}$ ; and shape ordinary. The stomach of the old bird contained sand, seeds and the remains of wasps.

No. 8.—“*Trochalopteron? setifer*, (Hodgson and Gray, Zool. Misc.)  
*Cinclosoma setifer*, Hodgson.

*C. lineatum*, Vigors?

If the colour of the eggs affords any generic character, this and the foregoing species cannot well rank together, for while in that the eggs are *pure white*, as in *Crateropus*, in this they are *pale greenish blue* (like those of “*Acridotheres tristis*.”)\* The nest is loosely and rather slovenly constructed of coarse dry grasses and stalks externally, lined sometimes with fine grass,—sometimes with fine roots. It is placed near the ground in the midst of some thick low bush,—or on the side of a bank amidst overhanging coarse grass, and not unfrequently in exposed and well frequented places. The eggs are 3 in number, and in shape and size exceedingly variable, being sometimes of an ordinary oval—at others nearly round. Diameter varying,— $1\frac{2}{16} \times \frac{1}{16}$ ;—or 1 inch  $\times \frac{1}{16}$ ; or  $\frac{1}{16} \times \frac{1}{16}$ . The most usual measurement however is the second one, or 1 inch  $\times \frac{1}{16}$  inches.

In these three species, which have sometimes been placed in *Cinclosoma*,—sometimes in *Garrulax*,—and again in *Crateropus*,—there are several points both of similarity and dissimilarity, in their habits and manners.

In the number of eggs they agree, and there is a general similitude in the construction of the nest, more so between the two first—less so between them and the last;—in the colour of the eggs they all differ very materially; the first congregates into large and noisy flocks,—turning up the dead leaves and screaming and chattering together in most discordant concert. The second is most usually in pairs—sometimes in a family of 4 or 5;—the last in pairs or family of 4 or 5, and to be seen under every bush. Its mode of flight and its note are totally unlike the other two. Any one observing the birds in their native

\* So in *Ruticilla phænicurus* the eggs are blue; in *R. tithys*, white.—E. B.

haunts, could not fail to perceive that *G. albogularis* and *G. leucolophus* are allied in manners, voice and habits;—that *G. rufigularis*, *G. erythrocephalus* and *G. variegatus* are likewise allied,—and that *Trochilopteron setifer vel lineatum* stands distinct from all; the three forming distinct sections of the same group.\*

No. 9.—“*Acridotheres griseus*,” (Horsfield.)

*Maina cristalloides*, Hodgson.

This is a summer visitor in the hills, and is common at Mussooree during that season, but it does not appear to visit Simla, although it is to be found in some of the valleys below it to the south. It breeds at Mussooree in May and June, selecting holes in the forest trees, generally large oaks, which it lines with dry grass and feathers;—the eggs are from 3 to 5, of a *pale greenish blue*; shape ordinary, but somewhat inclined to taper to the smaller end;—diameter  $1\frac{3}{16} \times \frac{1}{16}$  inches; or  $1\frac{2}{16} \times \frac{1}{16}$  inches. This species usually arrives from the valley of the Doon about the middle of March; and until they begin to sit on their eggs, they congregate every evening into small flocks and roost together in trees near houses; in the morning they separate for the day into pairs and proceed with the building of nests or laying of eggs. After the young are hatched and well able to fly, all betake themselves to the Doon in July.

No. 10.—“*Acridotheres tristis*,” (Linn.?)

This too is a summer visitor in the hills, arriving with the preceding species. The colour and number of eggs are also the same. It is curious however to observe that while Mr. Blyth and Captain Tickell state, that it builds in “out-houses, verandas and trees,” in which last, according to the latter gentleman, the nest is composed of “twigs and grass within,”—with us in the mountains its habits are precisely those of *A. griseus*, and as with it, the *hole* of a tree is selected and lined with dry grass and feathers;—on no occasion have I ever seen a nest made on the branches of a tree, and only once in any place except the hollows of large oaks; the exception being in the chimney of my house, which the stupid bird had evidently mistaken for a hollow tree, and seemed to be amazed that all the grass and feathers dropped into it invariably fell to the bottom; at last it contrived to place some grass

\* The difficulty is to class such species as *cærulatus*, *ruficollis*, and others of intermediate character. My *imbricatus* would rank with *lineatus*, and numerous species in Capt. Hutton’s second group.—E. B.



on a projecting brick. Can this difference betoken a distinction in species? I am inclined to believe it—for why in the *plains* should a nest be constructed among the open branches of trees,\*—while in the mountains it is constructed within their hollow trunks? If distinct, it will, I imagine, bear Mr. Hodgson's ill-constructed name of "*A. tristoides*."†

No. 11.—"*Corvus culminatus*," Sykes.

[*C. orientalis*, Eversmann].

Occurs at Mussooree throughout the year, and is very destructive to young fowls and pigeons; it breeds in May and June, and selects a tall tree, near a house or village, on which to build its nest, which is composed externally of dried sticks and twigs, and lined with grass and hair, which latter material it will pick from the backs of horses and cows,—or from skins of animals laid out to dry. I have had skins of the *Surrów* (*Næmorhædus thar*) nearly destroyed from their depredations. The eggs are 3 or 4 in number and of a dull green, thickly spotted over with long and sometimes confluent spots and dashes of dusky brown or blackish. Diameter  $1\frac{9}{16} \times 1$  inch.

No. 12.—"*Saroglossa spiloptera*," Hodgson.

*Lamprotornis spilopterus*, Vigors.

This species arrives in the hills about the middle of April, in small parties of 5 or 6, but it does not appear to ascend above 5,500 to 6,000 feet, and is therefore more properly an inhabitant of the warm valleys. I do not remember seeing it at Mussooree, which is 6,500 to 7,000 feet,—although at 5,200 feet on the same range, it is abundant during summer. Its note and flight are very much those of the Starling (*Sturnus vulgaris*), and it delights to take a short and rapid flight and return twittering to perch on the very summit of the forest trees; I have never seen it on the ground, and its food appears to consist of berries. Like our two species of *Acridotheres*, it nidificates in the holes of trees, lining the cavity with bits of leaves, cut by itself; the eggs are usually 3, or sometimes 4 or 5, of a delicate *pale sea green*, speckled with

\* Has Captain Tickell recorded this on his own personal knowledge,—or from information furnished by the natives? If the latter, I suspect Captain T. has been deceived.

† Mr. Hodgson's specimens marked *tristoides* are specifically undistinguishable from those of the plains. In those from Ceylon the general colouring is invariably deeper, but there is no other difference.—E. B.

*blood-like stains*, which sometimes tend to form a ring near the larger end—shape oval, somewhat tapering ; diameter  $1\frac{1}{8} \times \frac{11}{16}$  inches.

No. 13.—“*Pomatorhinus erythrogenys*,” Vigors.

*P. ferrugilatus*, Hodgson.

Common from 3,500 feet up to 10,000 or 12,000 feet ; always in pairs, turning up the dead leaves on copse-wood covered banks, uttering a loud whistle, answering and calling each other. It breeds in April, constructing its nest on the ground, of coarse dry grasses and leaf stalks of walnut trees, &c. ; covered with a dome-shaped roof so nicely blended with the fallen leaves and withered grasses among which it is placed as to be almost undistinguishable from them. The eggs are 3 in number and *pure white* ; diameter  $1\frac{2}{8} \times \frac{13}{16}$  inches, of an ordinary oval shape. When disturbed the bird sprung along the ground with long bounding hops so quickly, that from its motions and the appearance of the nest, I was led to believe it a species of Rat. The nest is placed in a slight hollow, probably formed by the bird itself.

No. 14.—“*Pycnonotus leucogenys*,” Gray.

*Ixos leucogenys*, Hodgson & Gray.

*Brachypus leucogenys*, (Hardw., Gray. Ill.

Ind. Zool.

Common in the Doon all the year, and in the hills during the summer. It breeds in April and May. The nest is neat and cup-shaped, placed in the forks of bushes or pollard trees, and is composed externally of the dried stalks of “Forget-me-not,”—lined with fine grass-stalks ; eggs 3 or 4, *rosy or faint purplish white*, thickly sprinkled with specks and spots of darker rufescent *purple or claret colour* ; diameter  $\frac{14}{16} \times \frac{10}{16}$  inches ;—diameter of nest  $2\frac{1}{2}$  inches and  $1\frac{1}{2}$  inch deep. Sometimes the outside of the nest is composed of fine dried stalks of woody plants, whose roughness causes them to adhere together.

No. 15.—“*Hypsipetes psaroides*,” Vigors.

Exceedingly common at Mussooree in large flocks during the winter and spring. In the latter season, when the *Rhododendron arboreum* is covered with its bunches of deep crimson flowers, these birds may be seen thrusting their beaks into every flower in search of insects and nectar, and the forehead is in consequence then generally covered with the pollen and sweets derived from the flowers. It pairs in April and appears fond of the wild mulberries and other forest berries which

then abound in some of the glets. In March, at an elevation of 5000 feet, I saw them feeding on the wild cherries. They breed during April, May and June, making a rather neat cup-shaped nest, which is usually placed in the bifurcation of a horizontal branch of some tall tree;—the bottom of it is composed of thin dead leaves and dried grasses, and the sides of fine woody stalks of plants, such as those used by *Pycnonotus leucogenys*, and they are well plastered over externally with spiders' webs; the lining is sometimes of very fine tendrils, at other times of dry grasses, fibrous lichens and thin shavings of the bark of trees, left by the wood-cutters. I have one nest, however, which is externally formed of green moss with a few dry stalks, and the spiders' webs instead of being plastered all over the outside, are merely used to bind the nest to the small branches among which it is placed. The lining is of bark shavings, dry grasses, black fibrous lichens and a few fine seed stalks of grasses. The diameter of the nest is  $2\frac{3}{4}$  inches; and  $1\frac{1}{2}$  inch deep. The eggs are usually 3 in number, of a rosy or purplish white sprinkled over rather numerous with deep claret or rufescent-purple specks and spots. In colours and distribution of spots there is great variation,—sometimes the rufous and sometimes the purple spots prevailing;—sometimes the spots are mere specks and freckles,—sometimes large and forming blotches;—in some the spots are wide apart,—in others they are nearly and sometimes in places quite confluent; while from one nest the eggs were *white*, with widely dispersed dark purple spots, and dull indistinct ones appearing under the shell. In all, the spots are more crowded at the larger end. Diameter varying from  $1 \times \frac{1}{16}$  inches, to  $1\frac{1}{16} \times \frac{1}{16}$  inches. "*Bun bukrî*" of hill-men, from a fancied resemblance of one of its cries to that of a goat.

No. 16.—"*Treron sphenurus*," (Vigors.)

*Vinago sphenura*, Vigors.

*Ptilonopus macronotus et turturoides*. (Hodg., Gray.)

*Treron cantillans*, Blyth, (the caged bird, moulted in confinement.)

This species, which is the "*Kookla*" of the natives, arrives in the neighbourhood of Mussooree in the beginning of April, and remains during the summer to breed; it is usually silent during the height of the monsoon, but may occasionally be heard on a bright day. It is

probable that it migrates to the eastward on leaving Mussooree, as it does not winter in the Doon, nor does it occur there even in summer, being apparently a true hill species. In confinement it looses or does not put on the maronne mantle which ornaments the wild bird, and the plumage assumes a dull greenish-ashy hue, in which state it is the *T. cantillans* of Mr. Blyth.\* The nest is composed of dried twigs, and the eggs are usually 2 in number and pure white, and more gracefully ovate than those of *Turtur risorius*. Diameter  $1\frac{2}{16} \times \frac{13}{16}$  inches. The breeding season is from the end of April till the latter end of June; the nest a slight platform, usually placed in high forest trees. In October they collect into small flocks of 6 or 8, and quit the neighbourhood of Mussooree;—where do they then go to? The female differs from the male in the absence of the fulvous colour of the top of the head and breast, and in wanting the beautiful maronne colour on the mantle and lesser wing-coverts; the greater wing-coverts are also more broadly edged with pale yellow. I observe that Mr. Blyth states of this species that it is distinguishable from *T. nipalensis*, (Hodgson,) “by having but a slight pale yellow margin to only the great coverts of the wing;” whereas in both male and female, the great coverts, tertiaries, and primaries are edged with that colour, although on the latter it amounts to a mere thread. These birds are very fond of the wild mulberries and other forest fruits. Gould, in his ‘Century of Birds,’ appears to think the species is only found far within the mountains, whereas it occurs on the outer or southernmost range overhanging the Doon, from an elevation of 4,000 feet, probably to the snows. The Huryal, or *T. phœnicopterus*, lays a similar egg, but is confined to the plains, ranging up to the base of the mountains but never ascending them.

No. 17.—“*Turtur risorius*,” Selby.

*Columba risoria*, Linn.

*T. douraca*, Hodg., Gray.

This is common in the Doon at all seasons, but only visits Mussooree during summer, arriving on the hills about the end of March and returning to the plains in October. It breeds in April, May and June, making a loose platform nest of dried twigs, with a few roots within; the eggs are 2 in number and pure white; diameter  $1\frac{3}{16} \times \frac{14}{16}$  inches.

\* In the bird described by me as *Tr. cantillans*, the maronne colour is retained, and the green replaced by pearl-grey. I now believe, however, with Capt. Hutton, that it is a cage variety of *Tr. sphenurus*.—E. B.

No. 18.—“*Turtur orientalis*,” (Latham.)

*Columba meena*, Sykes.

*C. agricola*, Tickell.

*C. pulchrala*, Hodg.

*C. ferrago*, Eversmann.

This also is a mere summer visitor at Mussooree, where it arrives early in April, when every wood resounds with its deep-toned cooing;—it is not found lower than 6,000 feet with us,—and departs in October. At Mussooree it breeds in May, making a platform nest on tall forest trees; the eggs are 2 and pure white;—diameter  $1\frac{4}{16} \times 1\frac{14}{16}$  inches.

No. 19.—“*Turtur suratensis*,” (Gm.)

*T. vitticollis*, Hodg.

*Columba tigrina*, Temm.

Abundant in the Doon, and arrives in the hills in the end of March, leaving again in the autumn. It breeds at about 5,000 feet—and lays 2 white eggs,—diameter 1 inch  $\times \frac{13}{16}$ . Captain Tickell says, “eggs 2 to 6;” I have never seen more than 2 in any nest.

No. 20.—*Turtur senegalensis*, (Linn.)

*C. cambaiensis*, Gm.

Arrives at 5,000 feet like the others, about March or April, departing again in Autumn;—its eggs are 2, and pure white;—diameter 1 inch  $\times \frac{12}{16}$ ; I have observed in this, as well as in the foregoing different species of *Turtur*, a tendency in the eggs to become suddenly pointed, or slightly nipple-shaped.

(*To be continued.*)

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*Verification of the Itinerary of the Chinese Pilgrim, HWAN THSANG, through Afghanistan and India, during the first half of the seventh century of the Christian Era. By ALEX. CUNNINGHAM, Capt. Engineers.*

The numbers are those of M. Landresse, the Editor of the FOE-KUE-KI, which I retain for the purpose of easy reference. Where not otherwise specified the distances and bearings of the modern places agree with those of Hwán Thsáng. The identifications of Landresse and Lassen have their names attached to them. The other identifications have

been made by myself. My remarks are separated from the text by brackets.

No. 5—CHE-SHI or SHI, situated on the river YE. (*Túshkand* or *Shásh*, on the Sihún or Jaxartes—Landresse.)

Thence at 1000 *li* (166 miles) to the S. E.

No. 6—PU-KAN, to the East of the river YE. (*Khwákand*, خواقند or *Kokán*.)

Thence at 1000 *li* (166 miles) to the W.

No. 7—SU-TU-LI-SE-NA, to the eastward of the river YE. (*Satrustah*, ستروسته, of Ibn Haukal. Landresse gives Osrushna, اوسروشنه, which is the reading of Abulfeda, of Násér-ud-din Tusi, and of Ulugh Beg.) To the north-west is the great sandy desert. (This is of course the sandy waste now called *Kizil-Kum*.)

Thence at 500 *li* (83 miles.)

No. 8—SO-MO-KIAN, KHANG-KIU or KHANG—(*Samarkand*—Landresse.)

No. 9—MI-MO-HO, (*Maimorgh*,—Landresse. This place is perhaps the *Indikomordana* of Ptolemy.)

Thence to the N.

No. 10—KIEI-PU-TAN-NA of TSAO. (Probably *Kohistan*, the *Kilah Kaukán*, ككك, of Ibn Haukal, one day's journey beyond Derbend, on the road from *Chagánián*. It seems to answer to the position of the rock of *Chorienes*.)

Thence at 300 *li* (50 miles) to the W.

No. 11—KIU-SHWANG-NI-KIA or KUEI-SHWANG-NO. (*Kesh* or *Shehr-i-Sabz*. This town no doubt took its name from the *Kuei-shang* tribe of Yu-chi, as noticed by me some years ago in an article on the monograms found upon the Ariano-Grecian coins, which was published in the 8th volume of the Numismatic Chronicle of London.)

Thence at 200 *li* (33 miles) to the W.

No. 12—KO-HAN, TUNG-AN—(Perhaps *Karshi*, or some place to the northward of it.)

Thence at 400 *li* (66 miles) to the W.

No. 13—PU-HO, CHUNG-AN. (*Bokhára*—Landresse.)

Thence at 400 *li* (66 miles) to the W.

No. 14—FA-TI, SI-AN. (This I believe to be an old name for the ferry of Char-juí on the Oxus.)

Thence at 500 *li* (83 miles) to the S. W.

No. 15—HO-LI-SI-MI-KIA or HO-TSIU. (Perhaps *Alasadda Marvi*, or *Alexandria Margiané*, the modern *Merv*.)

From SO-MO-KIAN, at 300 *li* (50 miles) to the S. W.

No. 16—KO-SHWANG-NA (*Kesh*, as already noticed in No. 11.) At 300 *li* (50 miles) to the S. E. was the Iron Gate. (This is the well known *Derbend-i-Ahina*, commonly called *Kolugha*; a proof of the correctness of the identification of *Kesh*.)

No. 17—TU-HO-LO, (*Tochari* of Ptolemy,—Landresse.) To the north of the Oxus and to the south of the Iron Gate. (It therefore corresponds exactly with the *Tokhárestan* of the Musalmán Geographers.)

Below TU-HO-LO lies

No. 18—TAN-MI, on the north of the FU-SSE-SU. (*Termed* to the north of the *Waksh-su*, or Oxus river.)

Thence to the E.

No. 19—CHHI-AO-YAN-NA. (*Chagánián*.)

Thence to the E.

No. 20—HU-LU-MO. (Perhaps the *Hamurán*, هـ و ر ا ن, of Edrisi, 30 miles to the eastward of Saganian.)

Thence to the E.

No. 21—IU-MAN, which stretches to the Oxus on the S. W. (This must be the *Shumán* or *Nomán* of Ibn Haukal, the *Shumán* of Abulfeda, and the *Sumán* of Edrisi, which was 93 miles to the eastward of *Hamurán*.)

Thence to

No. 22—KIU-HO-YAN-NA. (Perhaps the *Andián* of Edrisi and the *Alubán* of Ibn Haukal.)

Thence to the E.

No. 23—HU-SHA. (The district of *Waksh* of the Mahomedan Geographers.)

Thence to

No. 24—KO-TU-LO. (The well known district of *Khutlán* on the northern bank of the Upper Oxus.)

Thence to.

No. 25—KIU-MI-THO, the mountains of TSUNG-LING, and to the S. W. the river FA-TSU. (These are clearly the *Vallis Komedorum*, and the *Komedæ Montes* of Ptolemy, with the river Oxus to the S. W.)

(As the other names mentioned in this paragraph occur again, they are here omitted.)

To the S. W.

No. 26—FO-KIA-LANG. (*Baghalán*, to the W. N. W. of Anderáb).

Thence to the S.

No. 27—KI-LU-SI-MIN-KIAN. (Perhaps *Khinjan*, to the W. of Anderáb.)

Thence to the N. W.

No. 28—HU-PIN. (Probably *Mazar* near Balkh.)

Thence to the W.

No. 29—FO-KO, bounded by the river FA-TSU to the N. (Undoubt- edly *Baktra* or *Balkh*, and not *Badakshán* as supposed by Landresse- Badakshán is called PO-THO-TSANG-NA.)

Thence towards the snowy mountains.

No. 30—YUEI-MI-THO. (Perhaps *Maimuna*, the *Yehudiah* of Edrisi, and the ΕΥΘΥΣΜΟΥ ΑΝΑΣΣΑ of Ptolemy, for which I propose to read ΕΥΘΥΔΗΜΟΥ ΑΝΑΣΣΑ.)

To the S. W.

No. 31—HU-SHI-KIAN. (*Kushk*, to the north of Herát, the *Kasiké* of Ptolemy.)

Thence to the N. W.

No. 32—TA-LA-KIAN. (*Talikán*.—If the last identification is correct, the bearing should be N. E. ; as according to Edrisi, *Tálekán* stood upon the high road leading from Merv to Balkh. Landresse has identified this with the lesser Talikan, to the eastward of Balkh, a mistake into which he was led by identifying FO-KO with *Badakshán*, but Hwán Thsang particularly notices that TA-LA-KIAN stretched to PHO-LO-SSE or *Persia*, on the westward.)

From FO-KO, at 100 *li* (16 miles) to the S.

No. 33—KO-CHI. (There is no map of the Balkh river in existence ; this place therefore cannot be identified.)

Thence to the S. E. towards the snowy mountains.

No. 34—FAN-YAN-NA. (*Bámián*,—Landresse.)

Thence to the E. over a snowy chain and the black mountains.

No. 35—KIA-PI-SHE, at the foot of the mountains of TSUNG-LING. (Lassen has identified this with the *Kapisa* of Ptolemy, and the *Capissa* of Pliny, which I further identify with the *Caphusa* of Solinus, and



with the *Kafshán*, كَفْشَان, or *Kushán*, كُوشَان, of the present day.) To the S. of the town, at 40 *li* (nearly 7 miles) was the town of SI-PI-TO-FA-LASSÉ (in Sanskrit, *Sweta-varsha*, the “white district,” perhaps the modern Ghorband, from the Sanskrit *gaura-varṭta*, or “white region.”) Thence at 30 *li* (5 miles) to the S. mount A-LU-NAO, (in Sanskrit, *Aruna*, “dark red.”) To the N. W. of the capital, at 200 *li* (33 miles) are the great snowy mountains (the Hindu Kush) and to the S. W. of the same is mount PI-LO-SO-LO, “firm as an Elephant,” (in Sanskrit, *pilu*, an elephant, and *sára*, strength.) To the south of Kushán there is a small isolated hill, in Walker’s map, which is probably the mountain here mentioned.) Thence to the E. at 600 *li* (100 miles) over the difficult passes of the Black mountains, is the frontier of northern India, and

NO. 36—LAM-PHO. *Lamghan*, Lassen—the district of Ptolemy’s *Lambataæ*.

Thence to the S. E. at 100 *li* (17 miles) across a mountain range and a great river,

NO. 37—NA-KO-LO-HO, surrounded on all sides by hills, and possessing some lofty topes built by Asoka. (*Nangrihar*, the *Nagara* or *Dionysopolis* of Ptolemy, and the *Nysa* of Alexander’s historians; most probably *Begrám* near Jallálabád. It is the NA-KIE of Fa-Hian, close to which was HI-LO, the present *Hidda*, where Masson opened several topes. The name of *Dionysopolis* was still existing at the time of Mahmud Ghaznavi’s invasion; for Al Biruni mentions the town of *Dinus* or *Dinuz*, as being situated about midway between Kabul and Parashawar. I have a suspicion that the *Adinahpur* of Abul Fazl, Ayin Akbari, 2, 165, is only a Mahomedan alteration of the same name.)

Thence to the S. E. at 500 *li* (83 miles) across some mountains, to

NO. 38—KIAN-TO-LO. *Gandhara*—Lassen. The capital is called PU-LU-SHA-PU-LO. (*Parasháwara*, the *Parsháwar* of Abu Rihán and Báber, and the modern *Pesháwar*, a name given by Akbar to denote a frontier town.) To the N. E. of the monastery of King KIA-NI-SI-KIA, (*Kanishka*) and across a large stream (the Kabul river) was the town of PU-SE-KO-LA-FA-TI. (In Sanskrit, *Pushkalávatī*, in Prakrit, *Pukkalaoti*, the original of the Greek Πευκελαωτις, as *Pukkala* was of the Greek Πευκελα. It corresponds to the modern *Hashtnagar* or *Hastinagara*, which perhaps derives its name from *Astes* or *Hasti*, the chief of Pukkelaotis in the time of Alexander.) To the S. E. of this was the town

of PA-LU-SHA (perhaps the Niçetta of General Court's map,) from which to the N. E. at 50 *li* (8 or 9 miles) stood the temple of PI-MA, the wife of Iswara (*Bhimá*, one of the many names of Durga, the consort of Siva. The temple must have been close to the present Noshehra.) Thence to the S. E. at 150 *li* (25 miles) was the town of U-TO-KIA-HAN-CHA, resting on the Indus to the S. with the city of PHO-LO-THU-LO at 20 *li* (3 or 4 miles) to the N. W. (Taking the recorded distances and bearings from Noshetra, and from PHO-LO-THU-LO, the present ruins of *Partháwara* or *Bithor*, the position of U-TO-KIA-HAN-CHA, must be looked for in the neighbourhood of *Niláb*, which agrees with Hwáng Thsáng's measurements in two of the best maps, those of Walker and Mirza Mogal Beg. The present Attak was built by Akbar: and it is besides to the N. of the ruins of *Partháwara*, instead of to the S. E. The name is usually derived from *Attak*, prevention; and a silly story is added that it is so named because the Hindus are forbidden to cross the Indus. But the name of *Attak* belongs to the town and not to the river; and I believe that the word has a very different signification. If the original name really was derived from अर्थ, *artha*, prevention, it must have been given to the place from the *natural obstacle* which the rocks here present to the passage of the river. But a preferable derivation in my opinion would be from उत, *ut*, much, त्रि, *trri*, passing over, that is, the place of much passage, or in other words the "chief ferry." The Chinese syllables seem to point to *Uttak* and not to *Attak*, and I suggest the above as the most probable derivation of U-TO-KIA-HAN-CHA; for the modern name of Attok is, I believe, only one of Akbar's numerous alterations of names, manufactured to suit the frivolous meanings attached to them by Musalmáns.)

From thence to the N. across mountains and rivers, at 600 *li* (100 miles)

NO. 39—U-CHANG-NA, OR "the Garden," capital MENG-HO-LE. (This has already been identified by Lassen with *Udyána* or *Ujjana*, which has the same signification. The position indicated agrees with the modern valley of *Swát*, of which the capital for many centuries past has been *Manglora*; no doubt the MENG-HO-LI of Hwán Thsáng. This identification is rendered quite certain by the mention immediately afterwards that at 250 or 260 *li* (40 to 43 miles) to the N. E. of the capital, and on a high mountain, was situated the spring of A-PHO-LO-LO,

which was the source of the SU-PHO-FA-SU-TU, or Swát river, in Sanskrit *Subhavastu*, which flows to the S. W. as stated by Hwán Thsáng.) To the S. of MENG-HO-LI, at 200 *li* (33 miles) was the great forest of MA-HA-FA-NA. (This is no doubt the high jungly hill now called *Mahában*, in Sanskrit *Maha-vana*, around the end of which the Indus sweeps in the neighbourhood of Derbend. From Turee, the W. peak of this well known hill bears E.  $71^{\circ} 30'$ , and from Akora it bears E.  $55^{\circ} 40'$ .) To the W. of the capital, at 50 *li* (8 or 9 miles) and across the river, was a monastery built by Asoka, called LU-YI-TA-KIA, or "the red" (in Sanskrit *Lohitaka*.) To the N. E. at 30 *li* (5 miles) was the monastery of KO-PU-TO. Thence to the W. across the river there was a statue of A-FO-LU-CHI-TI-SHE-FA-LO-PHU-SA, (perhaps *Aparajiteswara Bodhisatwa*.) To the N. E. of MENG-HO-LI, over the mountains, and ascending the Indus, at 1000 *li* (166 miles) and over some suspension bridges, was the brook THA-LI-LO, where once stood the capital of *Udyána*. (Both distance and bearing point to the Dardu district of *Darél* on the Indus, to the south of Gilgit. The Chinese syllables are indeed only a literal transcript of *Darél*. Fa Hian calls it THO-LI.)

Thence to the E. over mountains, at 500 *li* (83 miles) to

No. 40—PO-LU-LO, amidst the snowy mountains. (In No. 134, this kingdom is said to be to the S. of PHO-MI-LO or *Pámer*, and to produce "much gold." These two bearings from *Darél* and *Pámer* point to the kingdom of *Balti* or Little Tibet, which is still called *Palolo* by all classes of the Dardus. It is besides famed for its gold dust. As *Balti* likewise abounds in rock-crystal, the Persian بلور, *Bilor*, is probably derived from the name of this district; and the *Bolor* mountains may perhaps mean simply the "crystal mountains." The name of *Bilor* is not however confined to Persian; for the Chinese know PHO-LI or *Bilor* as a synonyme of SE-PHO-TI-KIA, or *Sphaṭika*, स्फटिक, "rock crystal."

From U-TO-KIA-HAN-CHA, across the Indus to the S. was

No. 41—TAN-CHA-SHI-LO, the boundary of India towards the north, and a dependency of Kashmir.—(This is the Sanskrit *Takshasila*, and Pali *Takkasila*, the *Taxila* of the Greeks, as noticed by Lassen.—It is undoubtedly the present *Manikyála*, which is surrounded by ruins. One of the neighbouring villages is still called *Takkála*, a name of the same import as *Takkasila*, and most of the coins now procurable at Ráwal-Pindi and in the neighbouring villages are brought from *Manikyála*.) To

the S. E. at 30 *li* (5 miles) was a monastery built by Asoka, called according to Fa Hian, CHU-SHA-SHI-LO, signifying "tete coupée," (in Sanskrit *Chutya-sira*, Remusat.)—The king was named CHEN-THA-LO-PO-LA-PHO, or "moonlight" (a literal transcript of the Sanskrit *Chandra-prabha*.) To the S. E. of the town was a *Stupa* built by KEU-LANG-NU, the son of Asoka. (I take this name to be a Chinese rendering of *Kuloka*, which is a synonyme of *Jaloka*, the name of Asoka's son, who reigned over Kashmir. According to Wilford, one of Asoka's sons was named *Kulāta*, a name of precisely the same meaning as *Jaloka* and *Kuloka*. Fa Hian mentions only two topes at this place. 1st,—that of *Chutyasira*, where Buddha made an "offering of his head," beside which was a *Vihāra* or monastery of the same name—2nd, that where Buddha made an "offering of his body" to a hungry tiger. The latter is probably that which is mentioned by Hwán Thsáng as having been built by KEU-LANG-NU, the son of Asoka. There is no doubt however that it is the great Manikyāla tope which was opened by General Ventura; for the small silver disc found in that tope bears a short inscription of only two lines, of which the upper line reads 𑖀𑖄𑖔𑖧 *Gomangasa*, in Sanskrit गमङ्गस्य, "of the abandoned body," from गुण, *guna*, abandoning, and अङ्ग, *angga*, body. The great tope was therefore built upon the spot where Buddha "abandoned his body" to a hungry tiger (abandonné son corps à un tigre affamé).—The smaller tope opened by General Court also contained an inscription which mentions "*Kanishka, Maharāja of the Gushang* (tribe)."—It must therefore have been built either by him or during his reign.—It bears a date also, which I have not yet been able to read.)

Thence to the S. E. at 700 *li* (117 miles) across mountains (that is over the Salt range) to

No. 42—SENG-HO-PU-LO, a dependency of Kashmir, bounded on the west by the river Sindh or Indus. (Both distance and bearing bring us to the position of *Sanghela*, between the Chenáb and Rávi, which Wilford identified with the *Sangala* of Arrian. I could hear nothing of this place: but *Ságara* or *Jángala*, with a small natural *jhil*, or sheet of water, was well known.)

From TAN-CHA-SHI-LO, across the Sindh to the N. to some nameless place, to the S. E. of which at 200 *li* (33 miles) was a great stone gate, (probably Derbend, where the Indus breaks through the mountains.)

Here was a *Stupa* built by Asoka on the spot where Sakya had made an offering of his body. (Close to Derbend, at a place called Kabal, there are several topes.)

Thence to the S. E. amongst the mountains, at 500 *li* (83 miles) to

No. 43—U-LA-SHI, a dependency of Kashmir. To the S. W. of the capital, at 4 or 5 *li* (rather more than half a mile) was a stupa built by Asoka. (This is clearly the *Varsa regio* of Ptolemy, and the *Urasa* of the Rája Taringini, a mountainous district where Sankara Varmma of Kashmir was killed by an arrow. It corresponds in position to the modern district of *Rash*, a part of Dhantáwar where there still exist two small topes, of which one is situated within a mile of Mángali, the former capital of the country. The people of *Urasa* or *Varsa*, with those of *Gilgit* or *Gilit* (as it is called by themselves) would appear to be joined together in Pliny's *Arsa-galitæ*, who are named as neighbours of the *Peukolaitæ*. Mirza Mogal 'Beg places a tribe of *Urasis* on the Upper Kunar River; and Lieut. Leach locates a clan of the same name at the head of the Alingar river.

Thence to the S. E. over mountains and iron bridges at 1000 *li* (166 miles) to

No. 44—KIA-SHE-MI-LO, *Kásmira*,—Landresse. The capital rests to the westward on a large river (the Vitasta or Behat) where are four *Stupas* built by Asoka. (This is the present capital called *Srinagara*). To the S. E. of the new town at 10 *li* ( $1\frac{3}{4}$  miles) is the ancient town. (This is the present *Pándrethán*, a corruption of *Puránadhithána*, the "old capital," which is situated  $1\frac{1}{2}$  miles to the S. E. of the Takht-i-Sulimán. The present town of Srinagara was built by Pravarasena between A. D. 432—462. It was therefore a new town at the period of Hwán Thsáng's visit. M. Troyer in his disquisition on the Kashmiriau Chronology (Raj. Tar. Vol. II. p. 420) asks whether the Asoka of Kashmir, is the same as Asoka Maurya, the grandson of Chandra Gupta, and afterwards declares his belief that they were *different persons*. But the accurate Chinese pilgrim in his notice of Kashmir distinctly mentions that one of its former rulers was *Asoka, king of Magadha*. In fact we know from existing inscriptions, engraved with an iron pen on the rock for ever at Dhauli in Katak (Cuttak), at Junagiri in Surashtra (Gujrat), and at Sháh-báz-garhi to the N. E. of Pesháwar, that the whole of India to the north of the Narbada, from the Indus to the mouths of

the Ganges, was tributary to Asoka Maurya, the Sophagasenas of the time of Antiochus the great; *Subhaga* being only a synonyme of *Asoka*.)

Thence to the S. W. across the mountains at 700 *li* (117 miles) to

NO. 45—PAN-NU-CHA, a dependency of Kashmir. (This is not the Panjáb, as generally supposed; but *Panuch* or *Punach*, the *Punch* of the maps, a place which answers to the bearing and distance given by Hwán Thsang, and which was undoubtedly a dependency of Kashmir at the period of his visit.)

Thence to the S. E. at 400 *li* (67 miles) to

NO. 46—KO-LO-CHE-PU-LO, also a dependency of Kashmir. (The distance and bearing point to the neighbourhood of *Rajaori*, on the Tohi river. The second and third syllables, LO-CHE, are a transcript of *Rája*, and the last two, PU-LO, are a transcript of *pura*. We thus have *Rajapura*, a name synonymous with *Rajáwara*, but I am unable to offer any explanation of the prefix KO. *Rajáwar* was always a dependency of Kashmir.)

Thence to the S. E. across the river at 700 *li* (117 miles) to

NO. 47—THSE-KIA—to the E. of which was the river PI-PO-CHE, (the *Vipása* or *Byás*) and to the W. the river SIN-TU (the *Sindhu*, or Indus.) The distance and bearing bring us to the neighbourhood of Lahore and Amritsar. Now we know that the latter place was an old city named *Chek* before its selection as the head-quarters of the Sikh religion, and the excavation by Guru Rám Dás of the *Amrita Saras* or “pool of nectar,” from which the place took its present name.) To the S. W. of the large city was the old town of CHE-KO-LO. (This answers both in name and in position to the *Sákala* of the Hindus and the *Sangala* of Arrian. The mention of a *Stupa* here built by Asoka proves that CHE-KO-LO was a place of note within 50 years after Alexander’s death.)

Thence to the E. at 500 *li* (83 miles) to

NO. 48—CHI-NA-PU-TI, a place built by Chinese, where was the ancient domain of king KIA-NI-SSE-KIA. (The Chinese syllables appear to represent *Chinavati*, a place which still exists on the Chenáb river due W. from Amritsar about 90 miles. It is possible therefore that there is a mistake in the bearing of this place, “est” for “ouest.” The perfect agreement of the two names however—is almost too remarkable

for mere accident. If there should be no mistake in the bearing I would propose the capital of *Katoch* or *Katochin* as the representative of CHI-NA-PU-TI, and the fort of *Kangra* as the domain of Kanishka. In fact we know from Abu Rihán that Nagar-kot belonged to the descendants of Kanik or Kanishka; and it is possible that the name of *Kangra* may in this case be only a corruption of *Kanishka-garha*, or *Kanik-garha*. According to the Mogal author *Sanang-setsen*, *Kanika* was king of *Gachu* or *Gachi* (Foe-kue-ki, 248, N.); in which name I think I can recognize the *Katoch* or *Katochin* of the present day. *Jalandhara* is particularly mentioned as being in the kingdom of *Gachu*: and an inscription now existing in the city of *Kangra* calls the kingdom *Gachchhé-Raj*. Perhaps the *Gaj* river, which flows through the *Kangra* district, may also have a reference to the same name.)

To the S. E. of the great town (THSE-KIA) at 700 *li* (117 miles) was the monastery of THA-MO-SU-FA-NA, "forét obscure." (This is a transcript of the Sanskrit *tamasa-vana*, "dark jangal." The distance and bearing bring us to the neighbourhood of Sultánpur and Dakhani Serai in the *Jálandhar* Doab; to the W. of which places the whole country is covered with a dense jangal.)

Thence to the N. E. at 140 or 150 *li* (23 to 25 miles) to

No. 49—CHE-LAN-THA-LO, formerly Brahmanical. (This is undoubtedly the well known city of *Jálandhara*, one of the oldest places in India: It is the *Ku* or *Zulindrine* of Ptolemy.)

Thence to the N. W. across precipitous mountains at 700 *li* (117 miles) to

No. 50—KHIU-LU-TO, the boundary of India on the north, surrounded by mountains, and close to the snowy mountains. (Both distance and bearing point to the modern district of *Kulu* on the upper *Byas* river, which agrees precisely with Hwán Thsáng's description, as the whole district is surrounded by mountains, and the ancient capital of *Nagar* or *Makarsa* is not more than 20 miles from the perpetual snow.)

Thence to the N. over the mountains at 2000 *li* (333 miles) was the kingdom of MO-LO-PHO or SAN-PHO-HO. (This is most probably the kingdom of Great Tibet on the *Sanpu* river: in which case the bearing should be *east* and not *north*. As Hwáng Thsáng does not appear to have visited this place the error in the direction is pardonable.)

From KHIU-LU-TO to the S. at 700 *li* (117 miles) across high mountains and a great river to

NO. 51—SHE-TO-THU-LO, on the northern frontier of India. (This is a literal transcript of the Sanskrit *Satadru*, the *Zadadrus* of Ptolemy and the *Hesudrus* of Pliny. The bearing and distance point to the present *Lodiana* as the site of this town on the Sutlaj. *Lodiana* derives its name from the Afghan family of Lodi, which gave several sovereigns to Delhi: but in the *Rámáyana* I find that the ancient town of *Ilu-dhana*, the patrimony of the race of Ikshwáka, was situated in this position. I believe therefore that *Lodiana* was only a complimentary alteration of an older name. SHE-TO-THU-LO may have been the name of the town; but it seems more likely that it was only the name of the district lying along the *Satadru* or Sutlaj, as *Sindh* is the country on the *Sindhu* or Indus.

Thence to the S. E. at 800 *li* (133 miles) to

NO. 52—PHO-LI-YE-THA-LO, on the frontier of central India. (The recorded bearing and distance bring us to *Delhi*, the ancient *Indraprastha*. The Chinese syllables represent the Sanskrit *Vriha-sthala*, a place which is named in the Mahabharata as one of the five towns demanded as the price of peace between the Kauravas and Pándavas. In the Mahabharata the names are *Aristhala*, *Vrihasthala*, &c. which in the Veni-Samhára are changed to *Indra-prastha*, *Tilaprastha*, &c. It seems probable therefore that *Vrihasthala* is only another name for *Tilaprastha*, and *Aristhala* a synonyme of *Indraprastha*. Now *Tilaprastha* still exists as *Tilpat*, 6 miles to the S. E. of Toghkakabad, and 10 miles to the E. S. E. of the Kutb-Minár. I have a suspicion that the much disputed origin of the name of *Delhi* or *Dilli* lies in *Tilaprastha*. Sanskrit scholars refer the name to दिल्लीप, *Dilipa*, a name which is symphonious with तिलप. As ancient Delhi undoubtedly extended over the hills about Toghkakabad, Tilprastha, if not the actual capital itself, must have formed one of the suburbs of the city. That this identification is correct is proved by the following bearing and distance.

Thence to the E, at 500 *li* (83 miles) to

NO. 53—MOTHU-LO in Central India. (This is certainly *Mathura* as identified by M. Landresse. I believe that there are now no vestiges of the three *Stupas* built by Asoka.)



Thence to the N. E. at 500 *li* (83 miles) to

No. 54—SA-THA-NI-SHE-FA-LO. (This is undoubtedly the celebrated *Sthaneswara* or *Thanesar*, to the N. W. of Delhi. I believe it to be Ptolemy's *Batan-kaisara*, for which I propose to read *Satan-aisara*. It is now known as the *Kuru-kshetra* or "battle-field of the Kurus." The recorded bearing should have been N. W. instead of N. E. and the distance should have been somewhat greater.)

Thence to the N. E. at 400 *li* (66 miles) to

No. 55—SU-LU-KIN-NA, bounded to the E. by the Ganges, and to the N. by great mountains. To the E. of the capital is the river YAN-MEU-NA (*Yamuna* or *Jamna*,—Landresse) which flows through the kingdom. To the E. of the capital and to the W. of the *Jamna* was a *Stupa* built by Asoka. (This place would appear to be *Sulora* or *Sadhaora*, under the Siwálik hills to the westward of the *Jamna*, from whence Feroz Shah removed the well known pillar, now called Feroz Shah's *lát*, which bears an inscription of king Asoka.)

Across the river on the E. bank was

No. 56—MO-TI-PU-LO, the king of which was of the race of SHU-TO-LO (or *Sudra*). To the S. of the great town, at 4 or 5 *li* (about three quarters of a mile) stood the monastery of the patriarch KIA-NU-PO-LA-PHO, "lumiére de vertu," (in Sanskrit *Guṇa-prabha*); near which was the monastery of PI-MO-LO-MI-TO-LO, "ami sans tache," (in Sanskrit *Vimala-mitra*.) MO-TI-PU-LO would appear to be a literal transcript of *Motipura*, a very common name in India. From the position indicated by Hwán Thsáng this place must have been situated at or near the modern *Behat*, where Major Cautley excavated coins and relics of an ancient city at a depth of 17 feet below the present surface level of the country. The coins discovered there range from perhaps 200 B. C. to 400 or 500 A. D.

To the N. W. of this country, and on the E. bank of the Ganges, was the town of MO-IU-LO (*Máhila*) where rock crystal was found. It possessed a Bráhmanical temple and a holy reservoir on the Ganges, which the Indians called "la porte du Gange," (evidently *Haridwára* or Vishnu's portal, which is also called *Ganga-dwára*, or "Ganges portal." The mention that there was but one solitary Bráhmanical temple at this now priest-swarming place in A. D. 629—645, is highly interesting. I believe that *Haridwára* is a comparatively modern name;—as in the

*Megha-duta*, Kálidás mentions only *Kankhala*. May not Ptolemy's *Μαγγα* be *Γαγγα*, or *Ganga-dwara*?)

Thence to the N. at 300 *li* (50 miles) was

No. 57—PHO-LO-KI-MA-PU-LO, surrounded by mountains on all sides. (This would appear to be *Srinagara*, the capital of Garhwál. The Chinese name is perhaps intended for *Parakramapura*). To the N. of this principality, amongst the snowy mountains, was the kingdom of SU-FALANU-KIU-THA-LO, "famille d'or," (evidently the Sanskrit *Suvarnagotra*) where excellent gold was found. (This is most probably the district about Toling and Garu between the Upper Satlaj and Upper Indus, celebrated for its gold dust, and now called *Urna-desa* or *Un-des*, "Wool-country;" which, as described by Hwán Thsang, has Tibet on the E. and Khoten on the N. The district of PAN-PHO-LO, on the W. is probably *Ladák* or *Mang-yul*.)

From MO-TI-PU-LO to the S. E. at 400 *li* (67 miles) was

No. 58—KIU-PI-SHWANG-NA, 2000 *li* (333 miles) in extent. (The distance and bearing point to the neighbourhood of *Bijnor* and the ruins of *Hastinapura*. I cannot even guess what may be the Sanskrit equivalent of the Chinese syllables: perhaps KIU-PI may be *Kripa*.)

Thence to the S. E. at 400 *li* (67 miles) to

No. 59—O-YI-CHI-THA-LO, 3000 *li* (500 miles) in extent, with a *Stupa* built by Asoka. (This name appears to be a transcript of the Sanskrit *Uchchasthala*, which is most likely the modern *Uchchagráma* or *Unchagaon*, called *Bulandshahr* by the Musalmáns. The bearing would however point to the neighbourhood of Anopshahr and Chandasi; but the coincidence of name is I think too strong to admit of much doubt as to the accuracy of my identification.)

Thence to the S. at 260 or 270 *li* (43 to 45 miles) across the Ganges, and then to the S. W. to

No. 60—PI-LO-SAN-NU—2000 *li* (333 miles) in extent. Ruins of a *Stupa* built by Asoka. (According to the next mentioned bearing and distance from SENG-KIA-SHE, or *Samkissa*, this place must have been in the neighbourhood of *Karsána*, an old town near Khás-ganj. The Chinese syllables probably represent the Sanskrit *Pilusána* or "Elephant's ear-flap," which is a synonyme of *Karsána* or *Karisána*. It is curious that *kari* and *hastin*, names for an elephant, are derived from *Kara* (Greek  $\chi\epsilon\rho$ ) and *hasta*, both names for the *hand*, as well as for an *elephant's trunk*, on account of its being a handy member.)

Thence to the S. E. at 200 *li* (33 miles) to

No. 61—KIEI-PI-THA, anciently SENG-KIA-SHE, 2000 *li* (333 miles) in extent. To the E. of the town at 20 *li* (about  $3\frac{1}{4}$  miles) was a great *Stupa*. (SENG-KIA-SHE has been identified by Remusat with the Samkassa of the Pali works: but the position of this old and celebrated place was first pointed out by me. Its ruins, on the E. bank of the Káli-nadi, near Aghat-Serai, are still known by the name of Samkissa.)

Thence to the N. W. at somewhat less than 200 *li* (about 33 miles) to

No. 62—KO-JO-KIU-CHE, *Kanyakubja* or *Kanoj*,—Landresse. This city was also called *Kusumapura* or Flower-town. The king of the race of FEI-SHE (or *Vaisya*) was named KO-LI-SHI-FA-TAN-NA, “accru en joie.” (This is a transcript of the Sanskrit कल्याणस्फुटन, *Kalyana-sphuṭana*, “increase of pleasure or happiness.” As this king was a *Vaisya*, Hwán Yhsáng must have visited Kanoj prior to the conquest of the *Rathor Rajputs* in about A. D. 700.) To the N. W. of the town was a *Stupa* built by Asoka, and to the S. E. at 100 *li* (16 or 17 miles), on the bank of the Ganges, was the town of NA-FO-THI-PO-KIU-LO. (This agrees both in bearing and distance with the position of *Nanamow* on the Ganges. The Chinese syllables appear to be intended for *Navadhhipokara*, or *Navadhhipushkara*, the “new-chief-tank.” In *Nanamow* we have perhaps the first half of the name still preserved in a corrupted form, the latter half being changed.)

From Kanoj to the S. E. at 600 *li* (100 miles) across the Ganges, and then to the S.

No. 63—A-IU-THO, *Oudh*, Landresse;—5000 *li* (833 miles) in extent. To the N. of the town at 4 or 5 *li* (about  $\frac{3}{4}$  of a mile) was a great monastery built by Asoka; and to the W. of this was a *Stupa* built over the nails and hair of *Tathágata*. To the N. W. of the town at 40 *li* (nearly 7 miles) and to the N. of the Ganges, was a temple of A-SENG-KIA Bodhisatwa (in Sanskrit, *Asankhya*). (The distance and bearing bring us to the banks of the Ganges below Cawnpore, and close to Najafgarh. In this position there is the celebrated temple of *Néona*, a few miles from the Ganges; and on the E. bank of the river between Cawnpore and Najafgarh, there is also a much frequented place of pilgrimage, of which I have unfortunately forgotten the name.)

Thence to the E. at 300 *li* (50 miles) crossing to the N. bank of the Ganges, to

NO. 64—A-YE-MU-KIEI, 2400 to 2500 *li* (upwards of 400 miles) in extent. The capital was situated on the Ganges; and to the S. W. of it, also upon the river, was a *Stupa* built by Asoka. (The Chinese syllables perhaps represent अहिमुख, *Ahimukha*, “Sun-face” or “Snake-mouth.” The distance and bearing point to the position of *Dalamow*, a large town on the N. bank of the Ganges.)

Thence to the S. E. at 700 *li* (117 miles) to the S. of the Ganges, and to the N. of the YAN-MU-NA (the *Yamuna* or *Jamna*) to

NO. 65—PO-LO-NA-KIA, 5000 *li* (833 miles) in extent. The capital is situated at the confluence of two rivers. (This is clearly *Prayāga* or Allahabad, at the junction of the Ganges and *Jamna* rivers.)

N. B.—The total distance from Kanoj to Allahabad is about one-third too much. I suspect therefore that Hwán Thsang must have taken the river route, more particularly as both of the places visited were on the bank of the Ganges. Admitting this to be correct his distances will agree very well with the distances by water.

Thence to the S. W. through a great forest at 500 *li* (83 miles) to

NO. 66—KIAO-SHANG-MI, *Kausāmbi*, Landresse; 6000 *li* (1000 miles) in extent. Statue of Sakya by King U-THO-YAN-NA. (*Udayana*, The bearing should be N. W., for according to Profr. Wilson, *Kausāmbi* was upon the Ganges above Allahabad: and Fa Hian states that it was 13 *yojans*, or about 91 miles, to the N. W. of Benares. The modern *Karra*, with its extensive ruins, appears to be the most likely position of *Kausāmbi*, as its distance from Allahabad is about a mean between Hwán Thsang’s 83 miles of river (60 miles of land) and Fa Hian’s 21 miles, that is about 40 miles from Allahabad. Close to *Karra*, on the E. there are two villages named *Kusia* and *Kusia-kua*.)

Thence to the N. at 170 or 180 *li* (28 to 30 miles) to

NO. 67—PI-SO-KIA, 4000 *li* (666 miles) in extent. (The bearing and distance point to *Sálón* on the Sāhi river, an old town in which a few years ago was found a copper-plate grant of Govinda Chandra of Kanoj.)

Thence to the N. E. at 500 *li* (83 miles) to

NO. 68—SHE-LO-FA-SI-TI OR SHE-WEI; *Srāvasti*, Remusat and Landresse. In this capital reigned King PO-LO-SI-NA-CHI-TO. (This is the celebrated city of Ayodhya, on the Sarayu or Sarju river, the capital of King *Prasenajita*, the 61st Prince of the Solar race in descent from Rama.)

Thence to the S. E. at 500 *li* (83 miles) to

NO. 69—KIEI-PI-LO-FA-SU-TU, *Kapila-vastu*, Landresse. (The position of this celebrated city has puzzled every commentator; and yet, as the honored birth place of Sakya Sinha, it ought to be one of the best known places in India. The bearing and distance point to *Jannpur*, an ancient city possessing many Buddhist buildings, one of which, the *Uttála Vihára*, still exists as the *Atála Masjid*, the cloistered stories of the Buddhistical building having been left untouched by the idol breaking Musalmáns. This identification also agrees with the position assigned to *Kapila* by Fa-Hian, who places it at somewhat more than 12 *yojans*, or 84 miles, to the S. E. of SHE-WEI; or only 3 miles more than Hwán Thsáng's distance, their bearings being the same. But in addition to the agreement of both of these authorities, I will adduce the name of the place itself, as a conclusive proof of the accuracy of my identification. The present name of *Jonapura* was, we know, given to the city by Feroz Shah in honor either of his cousin *Jona*, or of his grandfather Fakhr-ud-din *Jona*. This was only a slight alteration of the ancient name of *Janampura* or *Janpura* "nativity city," a name by which the "birth place" of the holy Sakya was probably more widely known than by the *book-name* of *Kapila*. This identification also agrees with the statements of other Chinese authors, quoted by Klapproth, that *Kapila* was to the N. of Benares. MA-TWAN-LIN gives 1480 *li* (247 miles) as the distance, which would carry us to the loftiest peaks of the *Himálayas*. There must therefore be some mistake in his distance.)

NO. 70—LAN-MO, *Ramapura*, Landresse. (According to Fa-Hian this place was situated at 5 *yojans*, or 35 miles, to the E. of *Kapila* almost in the exact position of *Bhitari*, an ancient town, which still possesses an inscribed pillar of the Gupta family of about A. D. 430, just two centuries earlier than Hwán Thsáng's visit. The Chinese syllables are considered by Klapproth and others to be a transcript of *Rama*: but as we find MA-U-LAN used for *Maharana*, perhaps LAN-MO may represent *Rana*.\* Now the ruins of *Bhitari* are all ascribed to a nameless

\* *Rámagrâma* is no doubt the original of *Lan mo*;—in Pali, *Ramagamo*, in Siamese, *Ramakhram*. It was one of the eight cities or kingdoms among which the reliques (*sarira*) of Buddha were originally distributed, and the only one from which these were not removed to Rajagriha. Read in connection with Fa hian's account of *Lan mo*, the 31st chapter of the *Mahavanso* which leaves no room to doubt this identification. It is there stated to have been on the banks of the Ganges,—a name frequently applied to any considerable affluent of that river. But without doing great violence to the bearings and distances of Fa hian, *Lan mo* cannot be identified with *Bhetari* which is at least 40 miles too far south to correspond with the subsequent route of that traveller to *Vaisali*. Moreover *Lan mo*, as well as *Kapilavastu*, was situated westerly from *Kusinagara*, which Capt. C. identifies with *Kusia* on the high betwixt *Bettiah* and *Gorakpur*.—EDS.

*Ráni*, after whom the place may once have been named. Ptolemy's *Selampura* would however appear to point to the name of *Rama* in *Sri-Rampura*.)

No. 71—KIU-SHI-NA-KIE-LO, *Kusinagara*, Klaproth and Landresse. *Stupa* built by Asoka. To the N. W. of the town at 3 or 4 *li* (about half a mile) across the A-CHI-TO-FA-TI (or *Ajitavati*) anciently called SHI-LAI-NU-FA-TI "rivière où il y a de l'or" (the *Swarnavati* or "golden") and on the W. bank was the forest of SO-LO (or *Sál* trees, exactly where in Major Rennell's map I find a "Forest of *Sál* trees.") Here also was a *Stupa* of SU-PA-TO-LO, "bon sage," (or *Subhadra*). The distance next recorded from Benares points to the ruins of *Kusidá* on the Chota Gandak river, which are described by Mr. Liston in Prinsep's *Journal*, vi. 477. The very name is the same, and the ruined *tope* still existing there may be that mentioned by Hwán Thsang. But we have a still more conclusive proof in the existence of an image of *Buddha* at this place, which is still called *Mata Kumwr*, in Sanskrit *Mrita-Kumára*, or the "dead Prince;" this being, according to Fa-Hian, the very place where Sakya died, on the bank of the river HI-LI-AN, in Sanskrit *Hiranya*, or "golden," a synonyme of *Swarnavati*. Besides which Hwáng Thsang, (in F. K. K. p. 237. N.) mentions that there was a sculpture at this place, in a large temple, representing the death of *Sakya*, which is most probably the very sculpture described by Mr. Liston, as James Prinsep states that its compartments display the various acts of *Buddha's* life. Hwán Thsang also mentions a pillar at this place, which I should think might be discovered by a careful search. *Kusinagara* is probably the *Kassidia* of Ptolemy.

Thence at 500 *li* (83 miles) through forests to

No. 72—PAN-LO-NI-SSE; *Varánasi* or Benares, Landresse. A large town on the Ganges. To the N. E. of the town and to the W. of the river PO-LO-NI (the *Varana* or *Barna-nadi* to the E. of the city) was a *Stupa* built by Asoka. To the N. E. of the town at 10 *li* (about 1½ miles) was the "Deer-Park," and to the S. W. of the temple was a *Stupa* of Asoka. Beside it also was a *Stupa* where MEI-THA-LI-YE (or *Maitreya*) received the history of *Buddha*: and to the W. of this was the place where Sákya Bodhisatwa received the history of *Kasyapa*. (The name of *Varanasi* is derived from *Varana* and *Asi*, the names of the two small streams between which the city is situated. According to Fa Hian there was a temple in the midst of the "Park of the Deer of the

Immortal." In the F. K. K.—note 7. p. 307, Klaproth gives Hwán Thsáng's details at length, from which it would appear that the temple was on the bank of the Barna river. Following the distance and bearing before mentioned the temple must have stood near the village of Secrole or Sikror, where the *panch-kosa* or "five-kos" route of pilgrims crosses the high road to Gházipur. In that part of the *panch-kosa* there are numerous fragments of Buddhist sculpture and architecture. But the ruins around *Sárnáth* offer a much more probable position, as the remains of three existing topes correspond with the three that were erected on spots rendered sacred by three events in Sákya's life. These spots were 1st. That where Buddha seated himself and began to turn the wheel of the law. 2nd. That where he related his history to MI-LE or MEI-THA-LI-YE (*Maitreya*); and third. That where the serpent I-LO-PO asked Buddha at what period he should get rid of his serpent body. Of the three existing topes only two have names. The largest is called *Sárnáth* which is probably a contraction of *Sárangganátha* शङ्करनाथ the "Lord of Deer" a meaning which, if correct, must refer to the "cerfs de l'Immortal" of Fa Hian. I cannot help suspecting that Hwán Thsáng's temple was this very Stupa: for he states that the temple was more than 200 feet in height, and that the foundation was of *stone* and the superstructure of *brick*. Now this is a very accurate description of *Sárnáth*, of which the lower half is of *stone* and the upper half of *brick*; the height being nearly 130 feet above the country. With a gilt arrow on the top, such as the temple is said to have borne, the height would have been fully 200 feet. The second existing tope, 2500 feet due S. of *Sárnáth* is called *Chokandi*: but this name refers properly to an octagonal on its summit with four door ways, which was built in honor of the Emperor Humayun having once seated himself there. The third tope, situated 520 feet due W. of *Sárnáth* has no name now; but it is that which was half pulled down by *Jagat Singh*, the Dewán of Cheit Singh, Raja of Benares, to furnish materials for the walls of a tank in *Jagat-ganj*. The relics found in it were transmitted by Mr. Duncan to the Asiatic Society: but they are no longer forthcoming, which is very much to be regretted, for as the transcript published by Wilford gives one third part of the formula of *Ye dharmma*, &c. incorrectly, the probability is that the same proportion of the long inscription has been read incorrectly. Wilford in his usual loose manner always refers this inscription to the *Sárnáth* tope, but without any reason, further than

that it was found in the neighbourhood. In like manner the inscription on the London Monument might be called a record of the building of London Bridge.)

From thence down the Ganges to the E. at 300 *li* (50 miles) to

No. 73—CHEN-CHU, 2000 *li* (333 miles) in extent. The capital is situated on the Ganges. (The Chinese syllables probably represent *Chacha* or *Jajja*; and as the distance and bearing point to *Gházipur* I cannot help suspecting that the Mahomedan name is only a corruption of *Chachipura* or *Jajjapura*. We know that *Jajávati* or *Chachávati* and *Chachéri* or *Chachandi* were both seats of the Chandél Rajputs. Now *Chachipura* or *Gházipura* may have been another of their locations; but I have not been able to trace them beyond the Jaunpur and Azingarh districts.) To the E. of this town at 200 *li* (33 miles) was the monastery of A-PI-THO-KO-LA-NU “oreille non percée,” in Sanskrit *aviddhakarni*, a name of the Cissampelos hexandra, which most probably gave its name to the monastery. Thence to the S. E. at 100 *li* (17 miles), and to the S. of the Ganges was the town of MA-HA-SO-LO (probably some place on the *Máhi* river, perhaps *Mahasura* although I know not whether such a place exists on that stream. This is to the N. of the present course of the Ganges: but in my remarks on No. 77 I will give my reasons for believing that the course of the river, since Hwán Thsáng wrote, has gradually advanced to the S. about 20 miles.)

Thence to the N. E. across the Ganges at 40 or 50 *li* (7 or 8 miles) to

No. 74—FEI-SHE-LI, or *Vaisali*, Landresse. To the N. W. of the town at 5 or 6 *li* (about 1 mile) was the monastery where Ananda became an Arhan; to the S. E. of which was a *Stupa* built by king FEI-SHE-LI (*Visala* of the solar race, the 27th in descent from the sun.) To the N. W. was a *Stupa* of king Asoka, and the dwelling of PI-MA-LO-KI, “sans tache” (in Sanskrit, *Vimalaka* “the blameless.”) To the N. W. of the city was the ancient town of king *Chakravarti Mahadeva*, and to the S. E. at 14 or 15 *li* ( $2\frac{1}{2}$  miles) was a great *Stupa* where was held an assembly of Arhans 110 years after the *Nirvána*. (This was the *second* convocation described in the Mahawanso.) Thence to the S. at 8 or 9 *li* ( $1\frac{1}{2}$  mile) was the monastery of SHE-FEI-TO-PU-LO (perhaps *Swéta-pura*, “white town,” and to the S. E. of that at 30 *li* (5 miles) on the bank of the Ganges were two monasteries. (The town of *Vaisáli* has not yet been identified with any modern position. Formerly it was believed to be Allahabad; but since the publication of the narratives of



the Chinese pilgrims, its position has been looked for in the neighbourhood of the Gandak river. The recorded distances and bearings, but more particularly that of the capital of Magadha, which was across the Ganges to the south, point to the ruins of Bakhra and *Bassar*, about 20 miles to the N. of Patna. In *Bassar*, we still have the actual name of *Vaisáli*, whose citizens are called *Passalæ* by Ptolemy and Pliny. The ruins of *Bassar* are described by Mr. J. Stephenson (in Prinsep's Journal, iv.—128) where he expresses his belief, in accordance with the general opinion, that these ruins are the remains "of a large city, at a remote period inhabited by a numerous and civilized wealthy people." At *Bassar* there is a brick tope still standing 40 feet in height; and at *Bakhra* there is a similar brick tope with a stone pillar surmounted by a recumbent lion. The height of this pillar above the ground is only 32 feet, the circumference being 12 feet: but as the *Radhia* pillar is 39 feet high with a circumference of only 11 feet 2 inches, it seems probable that there must be at least 12 feet of the *Bakhra* pillar beneath the ground. An excavation down to the base of the column would almost certainly bring to light an ancient inscription. This might be only a repetition of those found upon other pillars: but it is quite possible that it might be a record of older date, perhaps of the second convocation which was held at this place, and which was commemorated by the erection of a *Stupa*.)

Thence to the N. E. at 500 *li* (83 miles) to

No. 75—**FE-LI-CHI**; in the north called **SAN-FA-CHI**, 2000 *li* (333 miles) in extent. The capital is called **CHEN-CHU-NU**. (The Chinese syllables represent faithfully the Sanskrit *Vriji*, वृजि, which is the well known name of a country, generally supposed to be in the neighbourhood of Mathura. The *Vriji* of Hwán Thsáng must however be the modern *Tirhut*, or *Trikutya*, of which one of the chief towns, situated in the position indicated, is named *Jenjapura*, no doubt the **CHEN-CHU-NU** of the Chinese pilgrim. The ancient name of this district was Mithila.)

Thence to the N. W. across mountains at 1400 or 1500 *li* (233 to 250 miles) to

No. 76—**NI-PHO-LO**, *Nepál*, Landresse; 4000 *li* (666 miles) in extent and surrounded by snowy mountains. (The distance is too great but the bearing is correct. As no details are given, Hwán Thsáng does not appear to have visited this country. His erroneous distance may therefore be pardoned.)

From *Vaisáli* across the Ganges to the S. to

No. 77—MI-KIEI-THO, *Magadha*, Landresse: 500 *li* (83 miles) in extent. To the S. of the Ganges is the ruined town of KEU-SU-MA-PU-LO, or *Kusumapura*, "flower town," also called PHO-THO-LI-TSU, (*Pataliputra* or *Palibothra*, TSU being a Chinese translation of *putra*, "son," Landresse. Following the indications of the Chinese pilgrim, Klaproth has identified this town with the modern Patna: but the great Geographer Rennell had done the same fifty years earlier, from the measurements recorded by Pliny, apparently on the authority of Megasthenes. That Patna is the modern representative of the ancient Pátaliputra is undoubted: but I do not believe that it occupies exactly the same position; for according to the distances of Fa Hian and Hwán Thsáng, it seems that Pátaliputra must have been 18 or 20 miles to the north of the present town of Patna. As an analogous illustration I may mention that the present city of Delhi, or *Shahjahánábád*, is 12 miles to the north of the Hindu city of only 650 years ago. But in this case the change seems to have been effected by the vanity of successive monarchs, who built palaces, forts, and bazars, in *their own names* to the N. of the old city until the present position was at length attained by Shah Jahán. In the case of Pátaliputra I believe that the change has been effected by the Ganges. In *approaching* Vaisáli Hwán Thsáng states that it was from 40 to 50 *li* (7 or 8 miles) in a N. E. direction from MA-HA-SO-LO, on the *southern* bank of the Ganges. Again, on *leaving* Vaisáli he first visits a *Stupa* 2½ miles to the S. E. from which he proceeds 1½ mile S. to a monastery, and thence to the Ganges, 5 miles more in a S. E. direction. From these two detailed statements it is clear that the Ganges flowed within 8 miles of Vaisáli, both to the S. W. and S. E. somewhere near the present Singhia. Now the very same position is indicated by Fa Hian's distance of 9 *yojans* (or 63 miles) from PA-LI-AN-FU or *Pátaliputra* to the "small hill of the isolated rock," which is called YN-THO-LO-SHI-LO-KIU-HO, or *Indrasilaguha* by Hwán Thsáng, and is placed by him close to the small town of KIU-LI-KIA, the *Girik* of Rennell's map, which is only 43 miles to the S. E. of Patna. The distance here is 20 miles *less* than the recorded one; whilst the actual distances of two different points on the Ganges from Bassar or Vaisáli are 20 miles *more* than the recorded ones. It seems to me therefore certain that the Gauges formerly held a more northerly

course by about 20 miles; and that the ancient Pátaliputra must have stood at the same distance to the N. of the present Patna. It is only by a supposition of this kind that the recorded distances of Fa Hian and Hwán Thsáng can be reconciled with the truth. The very fact that the town, which Fa Hian had seen flourishing in A. D. 399-415, was in ruins in A. D. 629-645, seems to point to its desertion from the encroachments of the river to the south. Since then 1200 years have elapsed; a period much more than sufficient for the production of the supposed change by the gradual and successive alterations of channel towards the south, a process which is still going on. I do not however attribute this change of course entirely to the *gradual* alteration of the channel of the Ganges; for it is probable that the mention by MATWAN-LIN, that about A. D. 756 "the bank of the HO-LANG or *Ganges* gave way and disappeared," refers to some *sudden* change in the course of the river. An extraordinary flood of the Gogra river would have been sufficient to have caused the whole amount of southing here contended for; in proof of which I will only cite the much greater change in the course of the Satlaj which took place about A. D. 1790. This was caused by a cataclysm of the river, which having been dammed up by a landslide near the hot springs of Seoni, 18 miles to the N. of Simla, suddenly burst through the obstruction, and swept irresistibly over the plains until it was stopped by the high bank of the Byás at Hari-ki-patan. The new channel became a permanent one, and the junction of the Byás and Satlaj, which was formerly at Ferozpur, has since then been at Hari-ki-patan, upwards of 30 miles from the old place of confluence.)

(From Pátaliputra Hwán Thsáng proceeds to Gaya, of which he gives many minute details, that could only be verified by personal inspection or by a very good map on a large scale. Some of them however may easily be identified: Such as the river NI-LIAN-CHEN-NA, to the E. of Gaya, which is clearly the *Nilajni* river of the Government lithographed map of the new road. Also the river MA-HO to the E. of which was a great forest, is certainly the *Mahona* river, on the E. of which Rennell places "Woods" extending for more than 20 miles. After some further details Hwán Thsáng mentions the town of KO-LO-CHE-KU-LI-SSE, "demeure royale," which is undoubtedly the ancient *Rajagriha*, or "royal residence." I remark here, as in No. 46, the occur-

rence of the prefix KO before the syllables LO-che or *raja*. As there is no doubt whatever about the correctness of the present reading of *Rajagriha*, my identification of KO-LO-CHE-PU-LO with *Rajapura* or *Rajawari*, must be equally correct. Not far from this was the small town of KU-LI-KIA or *Girik*, the *Giryek* of Capt. Kittoe; close to which was mount YN-THO-LO-SHE-LO-KU-HO, or *Indrasilaguha*, "Indra's rock-cave," which must be the cave mentioned by Capt. Kittoe as existing in the immediate neighbourhood of *Girik*.)

To the N. E. at 150 or 160 *li* (25 to 27 miles) was the monastery of KIA-PU-TE-KIA. (The bearing points to the town of *Behar*, in Sanskrit *Bihāra*, or "the monastery," but the recorded distance is double the actual one. Now as the next recorded distance, supposing *Behar* to be the place intended, is just one half of the real one, I believe that there must have been an interchange of the two distances, an inadvertence of such likely occurrence that I take but little liberty in adopting it. An example of a similar kind occurs in Pliny—I. vi. s. 21. where the distance between the Hydaspes and Hyphasis is stated at 29 miles and 390 paces, while the distance between the Hyphasis and Hesidrus is given at 168 miles. Here there can be no doubt of the interchange of the two distances. In adopting this correction, the monastery of KIA-PU-TE-KIA must have been only 70 *li* (about 12 miles) to the N. E. of *Girik*, which corresponds sufficiently well with the position of the present *Behar*, which in Rennell's map lies 13 miles to the N. of *Girik*. The name of the monastery in Sanskrit was perhaps *Kapataka*, "the dove-hued," or "antimony-colored," which is a good description of the dark metallic-looking stone of *Gaya*.)

(Thence to the N. E. at 70 *li*, or after correction as above, at 150 or 160 *li*, equivalent to 25 or 27 miles, and to the S. of the Ganges, was a large town. The bearing and distance point to *Shunar* on the Ganges. To the E. at 100 *li* (17 miles) amongst hills and woods, was the village of LO-YIN-NI-LA. This would appear to be the *Ruynullah* of Rennell's map, perhaps for *Rohinala*, situated at the junction of the *Dhania* river with the Ganges.)

Hwán Thsang here mentions no less than five kings of *Magadha* who had reigned previous to his visit. Their names are—

LO-KIA-LO-A-YI-TO,	or	<i>Lagraditya</i> .
FO-THO-KIU-TO,	,,	<i>Budha Gupta</i> .

THA-KA-TA-KIU-TO,	or	TAKATA GUPTA.
PHO-LO-A-YI-TO,	,,	Baladitya.
FA-CHE-LO,	,,	Vajra.

Two of these Princes, namely, Budha Gupta and Baladitya, are already known to us from inscriptions and coins, and a third, Vajra, is known from coins alone, but the others are mentioned nowhere else to my knowledge.

In 1842 I had already identified *Chandra Gupta*, or “moon-cherished,” with the YU-GAI, or “moon-beloved,” of the Chinese authors, who was reigning in A. D. 428. Afterwards in 1843, when I first procured a copy of the FOE-KUE-KI, I extended this identification to the line of Princes mentioned above, and at the same time I arranged the whole dynasty chronologically according to the various data which were then known. Thus according to the inscription on the gateway of the *Súchi* tope near Bhilsa, Chandra Gupta was reigning in the year 79 $\frac{3}{4}$  of the Gupta era—and, following the record of the Kuhaon Pillar, Skanda Gupta died in 133 of the same era: whilst, according to the Eran Pillar, Buddha Gupta was reigning in 165 of the Gupta era. Besides these three distinct dates of their own era, we have the year of YU-GAI, A. D. 428, already mentioned, and the period of Siladitya’s reign immediately preceding Hwán Thsáng’s visit. With these data to guide me the chronological arrangement of the different Princes of the Gupta dynasty already known to us from coins and inscriptions and from the faithful though brief records of the Chinese writers, was an easy task. As by this arrangement the accession of *Gupta*, the founder of the dynasty, appeared to have taken place in the first half of the 4th century of our era, it very soon struck me that the *Gupta era* was most probably the same as the *Balabhi era*; more particularly as it is certain that Ujain and Surashtra were subject to the Guptas, whose silver coins are of the same type, weight and fabric with those of the undoubted coins of Balabhi. This identification of the two eras appeared so probable that I at once adopted it. Lastly, in January 1847, on receipt of Reinaud’s “Fragmens Arabes et Persans, &c.” I found, to my equal wonder and delight, a decided proof that my identification of the two eras was correct. According to Abu Rihán al Biruni, who accompanied Mahmud Ghaznavi to India, the year 1088 of Vikramaditya, or the year 953 of Saké was the year 712 of the *Ballaba era*, and also *that of the*

*Guptas.* This is not the place for the discussion of all the points bearing upon this period of history. It will be sufficient to mention here only a few of the dates established by this discovery for the further verification of the truth of the Chinese Pilgrim's narrative. As the Balabhi era began in A. D. 319, Chandra Gupta's date of  $79\frac{3}{4}$  is equivalent to A. D.  $398\frac{3}{4}$ . Skanda Gupta's death took place in  $133 + 319 = 452$  A. D., and Budha Gupta was reigning in  $165 + 319 = 484$  A. D. Now, according to MA-TWAN-LIN, Siladitya died between the years 642 and 648, say in 645 A. D. and as Hwán Thsang says that he reigned 60 years, his accession must be dated in A. D. 585. We have thus a period of 101 years to be divided between the three reigns of Takata Gupta, Baladitya and Vajra, together with the latter portion of Budha Gupta's reign, that is between nearly few reigns, which yields the natural term of somewhat more than 25 years for each reign. For the period between 452 A. D. the date of Skanda's death, and 480 A. D. the probable period of Budha's accession, or for 28 years, we have the reigns of *Deva Gupta*, of the Asirgarh inscription, and *Lagraditya* of Hwán Thsang. Thus from A. D. 452 to 585 we have six Princes amongst whom to divide a period of 133 years; which gives an average of rather more than 22 years for each reign. But this average will be lessened by adding the two reigns of Kumara and Skanda: for as Chandra Gupta was reigning in A. D. 428 we may safely assume A. D. 430 as the period of Kumára's accession. We thus have A. D.  $430 - 585 = 155$  years, to be divided between 8 Princes, which yield upwards of 19 years for each reign,—a natural term within the limits of the European averages.)

From LO-YIN-NI-LA (or *Rohinala*) to the E. amongst great mountains and forests at 200 *li* (34 miles) to

No. 78, YI-LAN-NU-PO-FA-TO, 3000 *li* (500 miles) in extent. The capital is situated on the Ganges, and near it is Mount YI-LAN-NU, which vomits forth smoke so as to darken both the sun and the moon. (The bearing and distance point to the Fort of *Mongir*, but the Chinese syllables seem to represent the Sanskrit *Hirana-parvata*, or "red-hill," a name which may have been applied to it on account of the flames which must have burst forth occasionally along with the smoke mentioned by Hwán Thsang. The existence of two hot springs, the *Sita-kund* and the *Raki-kund*, within a few miles of *Mongir*, shows that

this part of the country was once subject to volcanic action. There cannot therefore be any good reason for doubting Hwán Thsáng's relation, more particularly as the present name of the place, *Mauna-giri*, or the "quiet hill," would seem to allude to a former period of volcanic noise and activity. I am aware that the Brahmans refer the name to *Mudga-giri*, which however can scarcely be the original of the present spoken form of Mongir.)

Thence following the S. bank of the Ganges to the E. at 300 *li* (50 miles) to

No. 79—CHEN-PHO, *Bhágálpur*, Landresse. The capital to the N. rests on the Ganges, and to the E. of it at 40 or 50 *li* (6 or 8 miles) S. of the Ganges was an isolated hill surrounded by water. (The ancient name of Bhágálpur was *Champapura*, and as the distance and bearing agree with those of Hwán Thsáng the identification of M. Landresse is undoubtedly correct. The isolated rock surrounded by water must be one of those in the neighbourhood of *Kahalgáon* (Colgong), although the recorded distance is much too small. I would propose to read 140 or 150 instead of 40 or 50 *li*: this distance would bring us to the well known rock of *Patharghatta*, below Kahalgáon.)

Thence to the E. at 400 *li* (66 miles) to

No. 80—KO-CHU-WEN-TI-LO, also named KO-CHEU-KO-LO, 2000 *li* (333 miles) in extent. On its northern side, not far from the Ganges, was a large brick tower. (The bearing and distance point to the ruins of *Gaur*, the former capital of Bengal. The Chinese syllables perhaps represent the Sanskrit कच्छवेत्र, *Kachchha-vetra*, the "reedy marsh," and कच्छगड, *Kachchha-gurha*, "surrounded by marshes," or *Kachchha Gaurha*, the "swampy Gaurh," to distinguish it from the hilly Gaurh near Kashmir. In the syllables KO-LO I recognize the name of *Gaurh*, गैड. The only apparent objection to this identification is the fact that *Gaur* now stands some 10 or 12 miles from the northern bank of the Ganges; whilst KO-CHEU-KO-LO would seem to have been on the southern bank of the river. But it is well known that *Gaur* was originally on the bank of the Ganges, and that the gradual desertion of the river has led to the ruin of the city within the last 300 years. It seems to me however highly probable that one of the principal branches of the Ganges once flowed to the northward of *Gaur*, through the channel now called *Kalendri*, which connects the *Kusi* and *Mahananda* rivers. If this

supposition of a northern channel of the Ganges flowing between Gaur and Malda should not be admitted, then Hwán Thsang's statement must be wrong, for I have no doubt of the correctness of my own identification of the places. A similar mistake is made by the most accurate of all travellers, Moorcroft, who says that Shah-dera is situated on the *left* bank of the Rávi.\* Gaur is probably the *Aganagora* of Ptolemy, situated just above the head of the Gangetic Delta. This may be the Sanskrit अगणगैड, *Aganya-Gaurha*, the "countless Gaurh," in allusion to the multitude of its inhabitants.)

Thence crossing the Ganges to the E. at 600 *li* (100 miles) to

No. 81—PAN-NA-FA-TAU-NA, 400 *li* (166 miles) in extent. To the W. of the town at 20 *li* was the monastery of PA-SHI-PHO (in Sanskrit *Pushpa*, "flower,") and close to the town was a *Stupa* of Asoka. (The Chinese syllables would seem to represent the Sanskrit पाम्पस्थान, *Pámpasthána*, or *Pámpathán*, "river-town," and as a *great river* was afterwards crossed to the eastward, the place must have been situated somewhere on the Brahmaputra river, at or near the present Chilmari.)

Thence to the E. at 900 *li* (150 miles) to

No. 82—KIA-MA-LEU-PHO, 10,000 *li* (1,666 miles) in extent. The people of this country were unconverted, and had built no monasteries. The King was a Brahman named KEU-MA-LO, and surnamed PHO-SE-KO-LO-FA-MA (that is, his name was *Kumára*, and his title was *Pushkalavarmma*,) or perhaps rather *Pushkala-brahma*, as *Varmona* is a Kshatriya's title.) His kingdom was the ancient *Kamrup*, the country of Ptolemy's *Tameræ*, and now called *Asam*, from the conquering Raja Chu-kapha, who took the title of *Asama* or "unequaled." The distance mentioned by Hwán Thsang points to the neighbourhood of Gohati as the position of the capital, which is perhaps the *Tugma Metropolis* of Ptolemy. It is clear that *Kamrup* comprehended the whole of what is now known as *Asam*, for Hwán Thsang proceeds to state that amongst the mountains to the E. there was no great kingdom; and that in two months the southern frontier of the Chinese

\* Travels, Vol. 1. p. 107. I have a suspicion that this is a mistake of the Editor, and not of Moorcroft himself—for Professor Wilson has certainly not done full justice to Moorcroft, no doubt owing to the confused state of the papers. Thus the description of the *piers* of the Kashmirian Bridges is transferred to the *pillars* of the Jama Masjid. It is no wonder therefore that Thornton was puzzled. A new edition of Moorcroft, *unmutilated*, would be of more value than any other single book of travels that I know.



district of *Shu* could be reached by very difficult and dangerous roads.)

Thence to the S. at 1200 or 1300 *li* (200 to 212 miles) to

No. 83—SAN-MA-THA-THO, 3000 *li* (500 miles) in extent: a low country on the sea-shore. Near the town was a stupa built by Asoka. (The bearing and distance point to *Sunargaon*, the ancient capital of the Dhaka district, which lies low and extends to the sea-shore as described by Hwán Thsáng. The first half of the name of *Sunargaon* or *Sundari-grāma*, seems to be preserved in the Chinese syllables SAN-MA. The greater part of the *Sundarbans* or *Sundari-vana*, “Sundari-jangals,” was formerly comprised in the Dhaka district. The town of *Sunargaon* was therefore probably so named from its being the capital of the *Sundari* district, which is no doubt the *Kirrhadia* of Ptolemy, or the country of *Kirátas*, किरात, barbarians living amongst woods and mountains.)

Thence to the N. E. on the sea-shore and in the midst of mountains and vallies was the kingdom of SHE-LI-CHA-THA-LO. (Unless there is some mistake in the mention of the sea-shore, this place must, according to the bearing and distance, be identified with *Silhet* or *Srihata*. But I would prefer reading to the S. E., which would bring us to *Chaturgrāma*, or *Chittagaon*, a district situated on the sea-shore, and abounding in woods and vallies. The name also seems to agree with this identification, as the Chinese syllables are probably intended for *Sri-Chatúra*.)

Somewhat farther to the S. E. in a corner of the great sea was the kingdom of KIA-MA-LANG-KIA. (The bearing, and the position in an angle of the sea-coast point to the neighbourhood of Cape Negrais, and the shores of Arracan. In fact the last two Chinese syllables seem to be only a transcript of *Rakhang*, which is the proper name of Arracan.)

Beyond that to the E. was the kingdom of TO-LO-PO-TI (most probably the ancient *Pegu*.) Still farther to the E. was the kingdom of SHANG-NA-PU-LO; (perhaps *Siam*, or *Syámapura*, the *Samarada* of Ptolemy.) Still more to the E. was the kingdom of MA-HO-CHEN-PHO (or *Mahachampa*, most probably the present *Kamboja*, of which the district along the sea-coast is still called *Champa*.) Thence to the S. W. was the island-kingdom of YAN-MA-NA. (The bearing points to *Java*, the *Yava* of Sanskrit, and the *Jabadii Insula* of Ptolemy.)

From SAN-MA-THA-THO to the W. at 900 *li* (150 miles) to

No. 84—TAN-MA-LI-TI, or *Tamralipti*, Landresse : 1400 or 1500 *li* (233 to 250 miles) in extent. The capital, situated on the sea-shore, enjoys much commerce both by land and water. Near it is a Stupa built by Asoka. (The identification of M. Landresse is certainly correct ; as both bearing and distance point to *Tamluk*, which is the modern representative of *Tamralipti*.)

Thence to the N. W. at 700 *li* (117 miles) to

No. 85—KO-LO-NU-SU-FA-LA-NA, from 4400 to 4500 *li* (733 to 750 miles) in extent. Near the town was the monastery of LO-TO-WEI-CHI, “argile ronge” (in Sanskrit *rakta*, or in Hindi *rátá*, red, and *achála*, earth :) not far from which was a Stupa built by Asoka. (The Chinese syllables appear to represent either the Sanskrit *Karana-svarna*, “the golden field,” or *Karna-svarna*, “the golden ear.” The bearing and distance point to the districts of Pachet and Birbhūm on the Damuda river, where Ptolemy places his *Sabaræ*, in which name we probably have the *Svarna* of Hwán Thsáng.)

Thence to the S. W. at 700 *li* (117 miles) to

No. 86—U-CHA, 7000 *li* (1167 miles) in extent. Stupas built by Asoka. On its south-eastern boundary and on the sea-shore was the town of CHE-LI-TA-LO (in Sanskrit *Jalasthala*, the present *Jalésvara* or *Jalésar*) much frequented by maritime merchants. (The bearing and distance point to the districts of Midnapur and Singhbhūm on the Sabanrika river, which have the town of Jaleswara to the S. E. as described by Hwán Thsáng. Perhaps the ancient name of the district is preserved in *Echagarh* on the Sanbanrika river, 120 miles to the N. W. of Jalesar.)

To the S. at 20,000 *li* (3,333 miles) was the kingdom of SENG-KIA-LO, where was the tooth of FOE, &c. (This is the Island of Ceylon or *Sinhala-dwipa*, which still possesses an elephant’s grinder, that is devoutly believed to be the tooth of Buddha. The distance is much exaggerated even by the longest land route.)

From U-CHA through a forest to the S. W. at 1200 *li* (200 miles) to

No. 87—KUNG-IU-THO, 1000 *li* (167 miles) in extent. The capital is situated on a steep part of the sea-shore. Language, peculiar : religion, not Buddhistical. Ten small towns. The bearing and distance

point to the district of Katak or Cuttack, and the neighbourhood of Kanârak, where the black Pagoda stands.)

Thence to the S. W. across a great desert and through a thick forest at 1400 or 1500 *li* (233 to 250 miles) to

No. 88—KO-LING-KIA. *Kalinga*, Landresse : 5000 *li* (833 miles) in extent. Few true believers (Buddhists), many heretics (Brahmanists.) To the S. near the town was a *Stupa* built by Āsoka. (The identification of M. Landresse is undoubtedly correct, although the distance is somewhat exaggerated. The name of the country is preserved in the *Kalingum promontorium* of Ptolemy ; and the chief town of the district, *Chicacul*, is Ptolemy's *Kokala*.)

Thence to the N. W. over mountains and through forests at 1800 *li* (300 miles) to

No. 89—KIAO-SA-LO, 6000 *li* (1000 miles) in extent. The king is a Kshetriya. The people are black and savage. (The bearing and distance point to the district of Gandwana, the present Nâgpur or Berar, of which the principal ancient cities were Garha, Mandala, and Ratanpur. The last of these answers to the position recorded by Hwán Thsáng. The name of Kosala is preserved by Ptolemy as "*Kosa, in qua est adamas.*")

Thence to the S. at 900 *li* (150 miles) to

No. 90—AN-THA-LO, *Andra*, Landresse ; 3000 *li* (500 miles) in extent. The capital is called PHING-KHI-LO. Language, peculiar ; manners, savage. The extensive and important Buddhistical ruins of *Amaravati*, to the W. of Nagpur. These ruins are still undescribed, a fact which reflects no small discredit both upon the British Government, which possesses the country, and upon the Asiatic Society which possesses Col. Mackenzie's MSS. drawings and inscriptions. The latter are particularly valuable and interesting, as they refer to a period prior to the date of Hwán Thsáng's visit, when Buddhism was struggling with Brahmanism but was still predominant. The most modern of these inscriptions says that "Place is not to be given to the disputer of Buddhism." It must therefore be older than A. D. 600—while the more ancient ones, from the shape of their characters, certainly reach as high a date as the beginning of the Christian era." The *Andræ Indi* are mentioned in the Pentingerian Tables, and the *Andhras* of Magadha are recorded in the Purânas. *Andhra* is also

one of the ancient names of Telingana, or the country between the Kistna and Godáviri rivers. This however answers to the Great Andhra of Hwán Thsáng, which is mentioned by Hwán Thsáng in the next article.

Thence to the S. at 1000 *li* (167 miles) to

No. 91—TA-NA-KO-THSE-KIA, also called Great AN-THA-LO; 6000 *li* (1000 miles) in extent. Inhabitants, black and savage. To the E. of the town on a mountain was the monastery of WE-PHO-SHI-LO, “montagne orientale,” and on the W. was the monastery of A-FA-LO-SHI-LO, “montagne accidentale.” (These two names are the Sanskrit *purvva-sila*, or “eastern mountain,” and *apara-sila*, or “western mountain.” This country, as mentioned above, corresponds with the modern Telingána, between the Godáviri and Kistna rivers, of which Warankul was the capital for many centuries. Hamilton erroneously states that Warankul was built in A. D. 1067, for it appears to have been the capital of the Adeva Rájás in about A. D. 800; and I have little doubt that it is the *Korunkula* of Ptolemy.)

Thence to the S. W. at 1000 *li* (167 miles) to

No. 92—CHU-LI-YE, from 2400 to 2500 *li* (400 to 417 miles) in extent. People savage, fierce and heretical. Temples of the Gods. To the S. E. of the town a *Stupa* built by Asoka. To the W. an ancient monastery, where lived the *Arhan* WEN-TA-LA “superieur,” (in Sanskrit *Uttra*. The bearing and distance point to the “neighborhood of *Karnúl* on the Tungabhadra River.”

No. 93—THA-LO-PI-CHHA, 6000 *li* (1000 miles) in extent. The capital is KIAN-CHI-PU-LO, *Kanjeveram*, Landresse. The language and letters are somewhat different from those of central India. The capital is the birth-place of THA-MA-PHO-LO (gardien de la loi) PHOU-SA (in Sanskrit *Dharmma-Pála Bodhisatwa*.) To the S. of the town was a great *Stupa* built by Asoka. (The name of the country is certainly the Sanskrit द्राविडा, *Dravira* or *Dravida*, of which the most celebrated city is *Kánchipura* or *Kanjeveram*. The language and letters are Tamul.)

Thence to the S. at 3000 *li* (500 miles) to

No. 94—MO-LO-KIU-THO, or CHI-MO-LO, 5000 *li* (833 miles) in extent. The people are black and savage. On the S. this kingdom is bounded by the sea, where stands the mountain of MO-LO-YE, to the E.

of which is Mount PU-THA-LO-KIA, from which there springs a river that, after winding round the hill falls into the sea. To the N. E. of this mountain is a town from which people embark for the southern sea and for Ceylon. (I am unable to offer any equivalent for the Chinese syllables, unless CHI-MO-LO be a transcript of *Komári* or Cape *Comorin*. There can be no doubt that the district intended is the ancient *Madura*, and the *Madura regia*, Pandionis of Ptolemy, now called the southern Carnatic: but the distances from *Kánchipuram* and from Ceylon (next mentioned) are exactly double the actual measurements.)

Thence to the E. at 3000 *li* (500 miles) to

No. 95—SENG-KIA-LO, *Ceylon*, Landresse. (The various particulars related by Hwán Thsáng agree with the details of the Mahawanso: such as the conversion of the people to Buddhism in the first century after the *Nirvána* of Buddha, and their division, two centuries afterwards, into two sects.)

From THA-LO-PI-CHHA (or *Dravira*) to the N. through a wild forest at 2000 *li* (333 miles) to

No. 96—KUNG-KIAN-NA-PO-LO, *Kankara*, Landresse; 5000 *li* (833 miles) in extent. To the N. of the town is a forest of TO-LO, of which the leaves are used for writing upon throughout India. To the E. of the town is a *Stupa* built by Asoka. (The Chinese syllables represent exactly the name of *Kankanapura*, the modern *Concan*, an extensive district on the W. coast of India. The distance from the capital of *Dravira* points to the position of the celebrated town of *Kalbarga*, which was the capital of a Hindu principality before the Mahomedan invasion. Perhaps *Mudgal*, which is called *Modogulla* by Ptolemy, may have been the capital of the Kankan in the time of Hwán Thsáng: although there can be no doubt of the antiquity and celebrity of *Kalbarga*. The TO-LO is clearly the *Táli* tree, the leaves of which are still used for writing upon. It is erroneously called the *Talipat* tree by book-makers, as *Tálipatra* means the "leaves of the Táli," and not the tree itself.)

Thence to the N. W. through a wild forest at 2400 or 2500 *li* (400 to 417 miles) to

No. 97—MA-HA-LA-THO, *Maharatta*, Landresse: 6000 *li* (1000 miles) in extent. The capital to the W. rests upon a large river. (Judging from the distance the chief city of Maharashtra must have

been at or near Burhánpur on the Tapti. This town is in the very heart of the old Mahratta country, and from its vicinity to the celebrated fortress of Asirgarh, I have little doubt that it was once the capital of the country. Its present name is derived from Burhán Nizám Sháh; but the town is mentioned by Ferishta as a place of consequence during the reign of Ahmed Sháh, the father of Burhán Sháh.)

Thence to the W. at 1000 *li* (167 miles) across the river NAI-MO-THO (in Sanskrit *Narmada*, the *Namadus Fluvius* of Ptolemy, and the *Narbada* of the present day, to

No. 98—PA-LU-KO-CHEN-PHO, 2400 to 2500 *li* (400 to 417 miles) in extent. The people live by sea-trade. (The position, on the northern bank of the *Narbada*, and in the vicinity of the sea, point to the seaport of *Baroch*, the *Barygaza* of Ptolemy and the *Brigu gacha* of the Hindus. The Chinese syllables seem to represent *Brigu champá*, in which the first half of the Hindu name is correctly preserved.)

Thence to the N. W. at 2000 *li* (333 miles) to

No. 99—MA-LO-PHO, 6000 *li* (1000 miles) in extent. The capital is situated to the S. E. of the river MU-HO. (This is undoubtedly *Malava* or *Malwa*, of which the ancient capital was *Dhár* or *Dhárana-gar*, situated to the S. E. of the upper course of the *Máhi* river, the *Maís* of the Periplus, as stated by Hwán Tsháng. But both the distance and the bearing are wrong; as the latter should be N. E. and the former should be only 1000 *li* (or 167 miles) which is the exact distance between *Baroch* and *Dhár*.) In all the five Indies, adds Hwán Tsháng, the two chief kingdoms for study are *Malwa* to the S. W. and *Magadha* to the N. E. The history of the country mentions that a king named SHI-LO-A-TI-TO (or *Siladitya*) reigned there for 60 years. To the N. W. of the town at 20 *li* (upwards of 3 miles) was a town of Brahmins. At the period of Hwán Tsháng's visit therefore Buddhism was still prevalent in *Malwa*.)

Thence to the S. W. embarking and then turning to the N. W. at 2400 to 2500 *li* (400 to 417 miles) to

No. 100—A-CHA-LI, or A-THO-LI, 6000 *li* (1000 miles) in extent. (This description seems rather vague: but by first travelling from *Dhár* to the S. W. to *Baroch*, and thence sailing along the coast till opposite

Satára, a distance of about 400 miles, would have been passed over. Satára may perhaps be the place designed by Hwán Thsáng, but without a second clue, it is impossible to determine this name with any precision.)

From MA-LA-PHO to the N. W. at 300 *li* (50 miles) to

No. 101—KHI-CHA, 3000 *li* (500 miles) in extent. Without a king, being a dependency of Malwa. (From its vicinity to the capital of Malwa, this place could only have been a very small principality, perhaps *Khachrod*, 56 miles N. by W. from Dhár.)

Thence to the N. at 1000 *li* (167 miles) to

No. 102—FA-LA-PI, 6000 *li* (1000 miles) in extent. Here is much merchandize from distant countries. Asoka built *Stupas* at this place. The king is a *Kshatriya* of the race of SHI-LO-A-TI-TO (or *Siladitya*) of Malwa. The king of KO-JO-KIU-CHI (*Kanyakubja* or *Kanoj*) named TU-LU-PHO-PA-THO (or *Dhruvabhata*) is also of the race of Siladitya. (Jacquet's identification of FA-LA-PI with the celebrated *Balabhi*, the ancient capital of Gujrat, is undoubtedly correct. Hwán Thsáng's bearing should therefore have been S. W. instead of N. The mention that the king of Kanoj was a *Kshatriya* is especially valuable for the history of India, for by a reference to No. 62, we find that when Hwán Thsáng was at Kanoj the king was a Vaisya. A change of dynasty had therefore taken place during the time occupied by Hwán Thsáng in travelling leisurely from Kanoj to Balabhi. There can be no mistake about the king's caste; for the Vaisya Raja was named *Kalyánasphutana*, whereas the *Kshatriya* Raja was called *Dhruvabhata*.)

Thence to the N. W. at 700 *li* (117 miles) to

No. 103—A-NAN-THA-PU-LO, *Anantapura*, Landresse. 2000 *li* (333 miles) in extent. Without a king, being a dependency of Malwa. (It is impossible to believe that any place to the W. of Balabhi could have belonged to Malwa. The bearing should therefore most probably be either N. or N. E. instead of N. W. This would point to the neighbourhood of Anhalwárapatan and Ahmadnagar. The former place however formed part of the kingdom of Balabhi: but it may have been temporarily annexed to Malwa at the period of Hwán Thsáng's visit.)

From FA-LA-PI to the W. at 500 *li* (83 miles) to

No. 104.—SU-LA-THO, *Surat*, Landresse: 4000 *li* (667 miles) in extent. The capital rests to the W. on the river MU-YI. Through

this country lies the natural road towards the western sea: and the people are fond of maritime enterprizes. Near the town is mount YEUSHEN-TO. The Chinese syllables represent the Sanskrit *Surashtra* in its spoken form of *Suratha*. M. Landresse is wrong in identifying this with Surat, which is a modern town. According to Hwán Thsáng the capital must be looked for in the neighbourhood of Junagarh, a place which we know to have been one of the chief cities of the peninsula of Gujrat.

From FA-LA-PI to the N. at 1800 *li* (300 miles) to

No. 105.—KIU-CHE-LO, 5000 *li* (833 miles.) Heretics, numerous: believers, few. The capital is named PI-LO-MA-LO. (Both bearing and distance point to the modern district of Jodhpur or Márwar, of which one of the principal ancient cities is *Bármér*, no doubt the PI-LO-MA-LO of Hwán Thsang, as its position corresponds exactly with the description. The name of the district would appear to have been *Gujara*, or *Gurjjara-rashtra*, the "country of Gujars." In Hwán Thsáng's time therefore this name could not have comprized the peninsula, which was then known under the name of *Surashtra*. It would be interesting if we could trace the period of the extension of this name to the peninsula. I have a suspicion that it must have taken place after the establishment of the Rahtors in Márwár, when the original inhabitants of *Gujara*, being dislodged and pushed to the south, sought refuge in *Surashtra*, to which they gave their own name.)

Thence to the S. E. at 2800 *li* (467 miles) to

No. 106.—U-CHE-YAN-NA, *Ujjayini*, Landresse, 6000 *li* (1000 miles) in extent. Stupa: the "site of Hell," built by Asoka. (This is no doubt the once celebrated *Ujain*, as identified by M. Landresse. "Hell" was the name of a prison built by Asoka before his conversion to Buddhism, and which he afterwards destroyed.)

Thence to the N. E. at 1000 *li* (167 miles) to

No. 107.—CHI-CHI-TO, 4000 *li* (667 miles) in extent. The king is a Brahman, and devoutly believes in the "Three precious ones." (The distance and bearing carry us into the heart of Bundelkhand, to the kingdom of *Chacháwati* or *Jajáwati*, and its capital *Kajuráha*, which are both noticed by Abu Rihán al Biruni. *Kajuráha* is no doubt the *Kragausa Metropolis* of Ptolemy. The mention that the king was a Brahman points to a period prior to the establishment of the Chandel



Rajputs, which we know must have taken place somewhere about A. D. 700.\*

Thence to the N. at 900 *li* (150 miles) to

No. 108.—MA-YI-SHE-FA-LO-PU-LO, 3000 *li* (500 miles) in extent. Heretics who do not believe in Buddha. (The Chinese syllables represent exactly the Sanskrit *Maheswarapura*, but I know of no place of this name to the N. of Bundelkhand. Perhaps *Bhuteswara*, on the Jamna, may be intended: for *Bhuteswara* and *Maheswara*, being both well known names of Siva, are of course interchangeable; and as the distance and bearing agree with those recorded by Hwán Thsáng, it is probable that my proposed identification may be correct: more especially as the Brahmanical celebrity of *Bhuteswara* agrees with the mention that the place was in the possession of "heretics" who believed not in Buddha.)

From KIU-CHE-LO (or *Gujara*, Márwár) to the N. through a desert and across the SIN-TU (or *Indus*) to

No. 109.—SIN-TU, *Sindh*, Landresse, 7000 *li* (1167 miles) in extent. The capital is PI-CHEHEN-PHO-PU-LO, (perhaps *Pushpa-pura*, or "Flower town," a very common name for Indian cities. It appears to be the *Pasipeda* of Ptolemy.) Asoka here built many *stupas*. (No distance is given, but as the city was situated on the Indus, the bearing is sufficient to indicate the town of *Alor*, which we know to have been the capital of Sind, within a few years after Hwán Thsang's visit. I should prefer rendering the Chinese syllables by *Viswa-pura*; but *Pushpa-pura* appears to be the more likely name, as it is a very common term for Indian cities. Thus both Kanoj and Pátaliputra were also called *Kusumapura*, a synonyme of *Pushpapura*, which in its Pali form of *Puppha-pura*, was the common name of Palibothra amongst the Buddhists.

Thence to the E. at 900 *li* (150 miles) passing to the E. bank of the Indus to

\* Lieut. Maisey in his account of *Kálanjjar*, (J. A. S. B.—1848—p. 188) erroneously states that the Chandel Rajas of Mahoba were of Brahmanical descent; hence, saye he, "the title of Brimh." He has apparently been misled by the vulgar pronunciation of *Barm*, which is the spoken form of *Varmma*, "armor," a name peculiar and appropriate to the Kshatriya class. वर्म, *Varmma*, has nothing in common with ब्रह्म, *Brahma*. If symphony alone is allowed to guide etymology, *bhram* or "black bee," may equally lay claim to a descent from *Brahma*; but, unfortunately for the bee, its name is spelt धमर, *Bhramara*. Both coins and inscriptions spell the name वर्म, *Varmma*.

NO. 110.—MEU-LO-SAN-PU-LO, 4000 *li* (667 miles) in extent. Numerous worshippers of the Gods : but few Buddhists. (There can be no doubt that the Chinese syllables represent *Mallisthanpura*, or *Mal-thánpur*, now *Multán*. The bearing should therefore have been N. E. and not E. The distance also is too little.)

Thence to the N. E. at 700 *li* (117 miles) to

NO. 111.—PO-FA-TO, 5000 *li* (833 miles in extent.) Four stupas of Asoka and twenty temples of heretics. (Judging from the bearing and distance the Chinese syllables may possibly be intended to represent *Pak-patan*, an old place also called *Ajudhan*, and which is perhaps the *Ardone* of Ptolemy. This identification is however only a guess ; for both Harapa and Chichawatin agree equally well with the position indicated, and as the Chinese syllables FA-TO most probably represent the Sanskrit *Vati*, perhaps Chichawatin may be the true position.)

From SIN-TU to the S. W. at 1500 or 1600 *li* (250 to 267 miles) to

NO. 112—A-THIAN-PHO-SHI-LO, 5000 *li* (833 miles) in extent. The walls of the capital, which is called KO-CHI-SHE-FA-LO (or *Kach-chésvara*) are close to the river SIN-TU (or Indus), and also not far from the shore of the Great Sea. Without a king, being a dependency of Sind. Here Asoka built six *Stupas*. The recorded distance points to the modern peninsula of *Kachh*, of which *Kotasir* is one of the principal towns. Its position agrees exactly with that given by Hwán Thsang, and the modern name is perhaps only a slight corruption of the ancient one, although a different meaning is now attached to it. The name of the district would appear to be *Adhipasila* ; the “king’s mountain,” or the “king’s rock.” I have a suspicion that the two names have been interchanged : *Kachcheswara* being the proper name of the country, and the original of *Kachchha* or *Kachh*, of the present day.

Thence to the N. at less than 2000 *li* (about 330 miles) to

NO. 113—LANG-KO-LO, in Western India : many thousands of *li* on every side. The capital is called SU-TU-LI-SHE-FA-LO. This country is on the shore of the Great Sea. It has no king, being a dependency of Persia. The alphabetic characters are like those of the Indians, but the language is somewhat different. In the town is a temple of *Máheswara*. (The bearing and distance both point to the island of *Astola*, the *Asthála* of Ptolemy, and the *Thára* of Edrisi. This name is easily

recognizable in the Chinese syllables, which are a literal transcript of *Astuleswara*, the "Lord of *Astula*," an appellation of Siva, as husband of *Astula* or *Durga*. The name of the district, LANG-KO-LO-WAS, is probably derived from *Lakorian*, an ancient town now in ruins, a little to the northward of Khozdar. The district would therefore correspond with the modern Baluchistan.)

Thence to the N. W. to

No. 114—PHO-LA-SSE, *Persia*, Landresse. Many tens of thousands of *li* in extent. The capital is called SU-LA-SA-TANG-NA. This country on the N. W. touches FE-LIN. (The name of the capital appears to have been *Surasthan*, no doubt the *Ram-Seristán* of Ibn Haukal, of which the ruins still exist on the Helmand, just above its junction with the Hámún. FE-LIN is of course Europe, or the country of the *Firingis* or *Franks*, called *Phi-ling* by the Tibetans, from whom the Chinese perhaps derived the name.)

From A-THIAN-PHO-SHI-LO (or *Kachchh*) to the N. at 700 *li* (117 miles) to

No. 115—PI-TO-SHI-LO, 3000 *li* (500 miles) in extent. Without a king, being a dependency of Sind. To the N. of the town at 15 or 16 *li* ( $2\frac{1}{2}$  miles) in a great forest, is a *Stupa* several hundred feet in height built by Asoka; and near it to the E. is a monastery built by the Arhan TA-KIA-TA-YAN-NA. (The bearing and distance point exactly to the ruins of *Naserpur* and *Nerunkot*, close to the present Haiderábád. The Chinese syllables perhaps represent *Patasila*, पाटशिल, the "extensive rock," or the "expanse of stone," a name of the same import as *Patala*, "the extensive abode;" the common acceptance of *Patala*, is पाताल, or "Hell," in allusion to its low position in the Delta of the Indus. The Tibetans however give it a much more natural etymology. They call the town, ཕྱོག་ལྷོ་ལྷོ, *Potála*, the "place of boats," or the "Haven." But as *Potala* was also the name of a hill, Hwan Thsang's syllables may be rendered *Potasila*, "the Boat-hill," which when applied to the rocky Nerunkot, would be as appropriate a name as *Potala* or "Boat-place." There can be no doubt that it is the *Patala* of the Greeks. Even now it stands at the real head of the Delta, at the point of divurgence of the Guni river, which must have been the eastern branch down which Alexander sailed. The determination of this point we owe chiefly to Hwan Thsang's distances.)

Thence to the N. E. at 300 *li* (50 miles) to

No. 116—A-PAN-CHHA, 2400 to 2500 *li* (400 to 417 miles) in extent.

Without a king, being a dependency of Sind. *Stupa* built by Asoka. (Judging by the bearing and distance the place intended must be the celebrated *Brahmanábád*, which was rebuilt as Mansura. It is the "Brahman city" of the historians of Alexander, and the *Harmatelia* of Diodorus, which I believe to be derived from the Sanskrit *Brahmathala*, in its spoken form of *Brahmathala*. The Chinese syllables would however appear to bear some resemblance to *Uchha* or *Uch*; but that town is more than 300 miles distant.)

Thence to the N. E. at 900 *li* (150 miles) to

No. 117—FA-LA-NU, 4000 *li* (667 miles) in extent. It is a dependency of KIA-PI-SHE (or *Kapisa*, now *Kushán*.) The language has a slight analogy with that of central India. It is said that on the westward amongst the mountains it stretches to KI-KHIANG-NA. (Hwán Thsang has now crossed the frontier of Sindh, and entered the territory dependent on *Kapisa* or *Kushán*. His bearing must therefore be wrong as well as his distance; for by following them we only reach the neighborhood of Aror, the capital of Sindh. But by comparing his further progress towards *Kapisa*, and by taking his distances and bearings from that place, together with the name of the district itself, it seems most probable that the country around the *Bolán* Pass must be intended. The Chinese syllables are indeed a faithful transcript of *Bolán*; and although the distance is just double that recorded by Hwán Thsang, yet the fact that the pilgrim was proceeding from Sindh to Kabul almost proves the correctness of my identification, as the Bolan Pass was the nearest route that he could have followed. But when joined to the absolute identity of name, I think there can scarcely be a doubt as to the correctness of the identification.)

Thence to the N. W. across great mountains and large streams, and past several small towns at 2000 *li* (333 miles) on the frontier of India, to

No. 118—TSAO-KIU-THO, 7000 *li* (1167 miles) in extent. Language and letters peculiar. *Stupas* built by Asoka. Temple of the God TSU-NA, who came from Mount A-LU-NAS (*Aruna*, the "red,") near *Kapisa*. (Taking the next recorded bearing and distance from HUPHI-NA or *Hupian*, TSAO-KIU-THO must be the district of *Arachosia*

on the *Arachotus* river. The Chinese syllables indeed seem to point to this name. The old capital of Arachotus or Alexandropolis, was situated on the Arachotus river; but its distance from Hupian is much too great. *Ghazni* would appear rather to have been the capital visited by Hwán Thsáng, as it lies on the high road to Kabul.)

Thence to the N. at 500 *li* (83 miles) to

NO. 119—FOE-LI-SHI-SA-TANG-NA, 2000 *li* (333 miles) from E. to W., and 1000 *li* (167 miles) from N. to S. The capital is called HUPHINA. The king, of the race of Thu-kiuei (or *Turk*, Landresse) is attached to the Three Precious Ones. (The Chinese syllables represent *Parashasthána*, the modern *Panjhir* or *Panjshir* valley, where Ptolemy places the *Parsii* and their two towns *Parsia* and *Parsiána*. The capital is undoubtedly the present *Hupian* near Charikar, which was the position of the celebrated *Alexandria ad Caucasum*, called by Stephen of Byzantium, *Alexandria Opiané*. I have discussed this subject in my article upon Ariano-Grecian Monograms published in the Numismatic chronicle of London.)

Thence to the N. E. over mountains and rivers, and passing by ten small towns, to the frontier of *Kapisa*, one reaches the great snowy mountains, and the PHO-LO-SI-NA chain. This is the highest peak of *Jambu-dwipa*. From thence a descent of three days to

NO. 120—AN-THA-LA-FO, the ancient country of the TU-HO-LO (or *Tochari*), 3000 *li* (500 miles) in extent. Without a king, being tributary to the Turks. (This place has already been identified by Professor Lassen with *Anderáb* to the N. of the Hindu Kush. The PHO-LO-SI-NA chain is clearly the *Paropainsus* of the Greeks, called *Parnessus* by Dionysius Periegesis. That Hwán Thsáng's appellation is the correct one is proved by the Zend name of Mount *Aprasin*, which is accurately preserved in the *Parrhasini* of Pliny, and in the *Parrhasii* of Strabo and Solinus. The celebrated Greek name of Parnassus appears to have been only a fond alteration of the true name by the soldiers of Alexander's army in remembrance of their own famous mountain.)

Thence to the N. W. through vallies and over hills and past many small towns at 400 *li* (67 miles) to

NO. 121—HUO-SI-TO, ancient country of the *Tochari*, 3000 *li* (500 miles) in extent. Without a king, being tributary to the Turks.

(This must be some place on the Ghorí river between Baghalán and Kunduz. The Chinese syllables appear to represent some name like Khosta, but as we possess no detailed maps of this part of the country it is almost impossible to identify this place, as well as several others mentioned by Hwán Thsang.)

Thence to the N. W. over hills and through vallies, and past several towns, to

No. 122.—HU-O, formerly belonging to the Tochari. Without a king, being tributary to the Turks. (This is most probably *Khulm*.)

Towards the E. at 100 *li* (17 miles) is

No. 123.—MENG-KIAN, formerly belonging to the Tochari. Without a king, being tributary to the Turks. (The bearing and distance point to the neighbourhood of *Yang-Arek*, near which are the ruins of an ancient town, which may probably be the MENG-KIA of Hwán Thsang.)

Thence to the N. is

No. 124.—A-LI-NI, formerly belonging to the Tochari. It lies upon both banks of the FA-TSU (or *Oxus*) and is 300 *li* (50 miles) in extent. (This is undoubtedly the *Walín* of Ibn Haukal, the *Urwalín* of Edrisi, and the *Welwaleg* of Ulugh Beg. According to Edrisi (1. 475) it was 2 days journey to the E. of Khulm, and 2 days to the W. of Téliká, which agrees with the position assigned to it by Hwán Thsang. This would place it about the mouth of the Kunduz river, where there still exists a Fort called *Kilah Zál*. Now Ibn Haukal writes the name *Zuálin*, as well as *Wálin*. It is probable therefore that Kilah Zál is the identical place mentioned by all these writers. Its position on the Oxus would of course secure for it the possession of land on both sides of the river, as stated by Hwán Thsang.)

Thence to the E. is

No. 125.—KO-LO-HU, formerly belonging to the Tochari. It stretches to the Oxus towards the N. (I believe this to be the modern district of Kunduz Proper, which is bounded to the N. by the Oxus.)

To the E. across a chain of hills and past several districts and towns at 300 *li* (50 miles) to

No. 126.—KE-LI-SE-MO, formerly belonging to the Tochari, 100 *li* (17 miles) from E. to W., and 300 *li* (50 miles) from N. to S. (The bearing and distance point to *Tálikán*.)

Thence to the N. E. is

No. 127.—PO-LI-HO, formerly belonging to the Tochari; 100 *li* (17 miles) from E. to W. and 300 *li* (50 miles) from N. to S. (This is perhaps the old city of Barbara, now in ruins, at the mouth of the Kokcha river.)

From KE-LI-SE-MO, across the mountains to the E. at 300 *li* (50 miles) to

No. 128.—SSE-MO-THA-LO, formerly belonging to the Tochari, 3000 *li* (500 miles) in extent. The rule of the Turks has very much changed the habits and locations of the people. (The recorded data point to the neighbourhood of *Tishkán*, on the high road between *Tálikán* and *Fai-zábád*.)

Thence to the E. at 200 *li* (33 miles) to

No. 129.—PO-THO-TSANG-NA, formerly belonging to the Tochari, 2000 *li* (333 miles) in extent. The king is firmly attached to the belief of the Three Precious Ones. (The bearing and distance point to *Fai-zábád*, the capital of *Badakshán*, of which latter name the Chinese syllables are only a transcript.)

Thence to the S. E. at 200 *li* (33 miles) over mountains to

No. 130. YIU-PO-KIAN, formerly belonging to the Tochari, 1000 *li* (167 miles) in extent. The language is slightly different from that of Badakshan. (This is probably *Yawal* on the Wardoj river.)

Thence to the S. E. across a mountain chain by a dangerous road, at 300 *li* (50 miles.)

No. 131. KIU-LANG-NU, formerly belonging to the Tochari, 2000 *li* (333 miles) in extent. Without religion, there being but few Buddhists. The people are savage and ugly. The king believes in the Three Precious Ones. (Judging from the data this must be the present *Firganue*, close to the mines of lapis-lazuli. In fact the Chinese syllables would seem to represent some name being similar to this one.)

Thence to the N. E. by a mountainous and difficult road at 500 *li* (83 miles) to

No. 132.—THA-MO-SI-THIEI-TI, or THIAN-PIN, or HU-MI, formerly belonging to the Tochari. From 1500 to 1600 *li* (250 to 267 miles) from E. to W., and only 4 or 5 *li* (about three quarters of a mile) from N. to S., and situated between two mountains on the river Oxus. The people have green eyes, different from those of all other countries.

(The bearing and distance point to the *Wákhán* valley, which agree exactly with the description of *Hwán Thsáng*; for from the *Sir-i-kol* lake to the junction of the *Shakh-dara*, the *Oxus* is 170 miles in length, measured direct on *Wood's* map; to which must be added one half more for the windings of the stream, making a total length of 255 miles. From *Ishkashm* to *Kundut*, the valley of *Wákhán* is from "a few hundred yards to a mile in width." The average width is therefore somewhat more than half a mile, as accurately stated by *Hwán Thsáng*. This is one more proof that the measurements of the Chinese pilgrim are generally correct. The name of *Hu-mi* is no doubt derived from the *HIEN-MI* tribe of *Tochari*, whose name is still preserved in *Amu*, the modern appellation of the *Oxus*. *Wákhán* is mentioned by *Ibn Haukal*, *Edrisi* and *Marco Polo*, and it is, I believe, the *Vanda-banda regio* of *Ptolemy*.)

No. 133.—*SHE-KHI-NI*, 2000 *li* (333 miles) in extent. The capital is called *WEN-TA-TO*. This country is to the N. of the Great Snowy Mountains. (*SHE-KHI-NI* is the *Shakhnán* of the present day, and the *Sakinah* of *Ibn Haukal* and *Edrisi*.)

To the S. of *Wákhán* and the Great Mountains is

No. 134.—*SHANG-MI*, 2500 to 2600 *li* (417 to 433 miles) in extent. The letters are the same as those of the *Tochari*; but the language is different. The king is of the race of *SHE*. The religion of Buddha is held in great honor. (This can only be the valley of *Chitral*, with the lateral vallies of *Kafiristan*. The name was perhaps derived from the Indo-Scythian tribe of *SHWANG-MI*.)

To the N. E. over the mountains by a dangerous road, at 700 *li* (117 miles) is the valley of *PHO-MI-LO*, (or *Pamer*, *Landresse*) which is 1000 *li* (167 miles) from E. to W. and 100 *li* (17 miles) from N. to S. and is situated between two snowy mountains. There is the great lake of serpents, which is 300 *li* (50 miles) from E. to W. and 50 *li* (upwards of 8 miles) from N. to S. It is in the midst of the *Tsung Sing* mountains. (This is the well known lake of *Sir-i-kol*, at the source of the *Oxus* and in the district of *Pamer*.)

To the S. of *Pamer*, across the mountains is the kingdom of the *PO-HE-LO* (or *Bolor*, *Landresse*) which produces much gold. The S. E. part of the district is inhabited. (This is the kingdom of *Balti* or *Little Tibet*, which is called *Palolo* by the *Dardus*. From this name



has been derived that of the mountain range of *Bolor*, and perhaps also that of *belor* or "rock crystal.")

Thence beyond the snowy mountains and glaciers is

No. 135.—KO-PHAN-TO, 2000 *li* (333 miles) in extent. The capital is situated on a high mountain, close to the river SI-TO. The king takes the title of CHI-NA-THI-PHO-KIU-TA-LO, "race du dieu du soleil de la Chine" (or *China-deva-gotra*.) The SI-TO, or *Sita*, is the river of Kashgar; and the district appears to be that of Sir-i-kol, of which Tag-armi is now the largest town.)

Thence descending the Tsung Sing to the E. and crossing other mountains at 800 *li* (133 miles) to

No. 136.—U-SAI, 1000 *li* (167 miles) in extent. On the S. it stretches to the river *Sita*. The letters and language somewhat resemble those of Kashgar. Buddha is held in honor. Without a king being tributary to KO-PHAN-TO. To the W. of the town at 200 *li* (33 miles) is a great mountain. (This appears to answer to the district of Yangi-Hisar. It is probably the *Auzakia* of Ptolemy.)

Thence to the N. over lonely mountains at 500 *li* (83 miles) to

No. 137.—KIE-SHA, *Kashgar*, Landresse: 5000 *li* (833 miles) in extent.

Thence to the S. E. crossing the river *Sita*, the Great Sands, and a mountain chain, at 500 *li* (83 miles) to

No. 138.—CHO-KEU-KIA, 1000 *li* (167 miles) in extent. The letters are the same as those of KIU-SA-TAN-NA, (*Ku-sthāna* or *Kotan*, Remusat,) but the language is different.

Thence to the E. across a chain at 800 *li* (133 miles) to

No. 139.—KIU-SA-TAN-NA (or *Kotan*, Remusat), commonly WAN-NA. The Hiung-nu call it IU-SIAN the other barbarians KU-TAN, and the YIN-TU, KIU-TAN. It is 4000 *li* (667 miles) in extent.

Thence at 400 *li* (67 miles) to

No. 140.—TU-HO-LO, or the ancient country of the Tochari. (This is no doubt the district of *Khor* in Great Tibet, for the chief tribe of the Tochari was the *Kuei-shang* of the Chinese writers, the *Korano* of the coins, and the *Chauranæi* of Ptolemy.\*)

\* Dr. Taylor identifies Ptolemy's *Chauranæi* with the *Garos* of Asam, although they are placed immediately to the E. of the *Byltæ*, or people of *Balti*, or Little Tibet. I observe with regret that Mr. B. H. Hodgson seems to admit the correctness of Dr.

Thence to the E. at 600 *li* (100 miles) to

No. 141—CHE-MA-TAN-NA, or land of NI-MO. (Perhaps *Chán-thán*, the district inhabited by the *Chata Scythæ* of Ptolemy.

*Verification of Hwán Thsang's view of Buddhism.*

It may perhaps be urged against Hwán Thsang that, as a zealous follower of Buddha, he has exhibited altogether a much too favorable view of the state of the Buddhist religion in India at the period of his visit. But fortunately, we possess the independent testimonies of two different authors, the one a Brahman, and the other a Musalman, whose statements fully corroborate the views of the Chinese pilgrim, and vouch for the entire truthfulness of his narrative. The Brahman is *Kalhana*

Taylor's identification of Asam with the Serica of the ancients. This is a point that in my opinion is wholly without proof, or even probability. It is indeed true that Asam and Serica both produced silk: and equally true is it that there was a river in Macedon and another in Monmouth, and that there were salmons in both, but this proves nothing: for Asam was certainly apart of "India extra Gangem," as was also Great Tibet, including the whole of the country on the Sanpú river. Thus *Eldána* is *Gáldán*, *Sagoda* is *Shigatze*, *Adisaga* is *U-Tsang* or *Lhassa*, and the *Daona Fluvius* is the *Dihong* River. The *Dabasæ* are the people of *Dábus*, or Central Tibet, that is of *Lhassa*, and the *Damasi Montes*, are the hills of *Dábus*. A glance at the map will show the correctness of these identifications; but we have also the fact that the kings of Great Tibet from B. C. 250 were *Indians* of the family of *Lichchavi* of *Vaisáli*. This alone was sufficient to warrant Ptolemy in including Tibet within "India extra Gangem." I cannot enter into any details here; but I may mention that the routes from India to Tibet appear to have remained unchanged since Ptolemy's time: for *Tosule Metropolis*, is most probably *Tassisudon*, the capital of *Botan*; and *Tugma Metropolis* must be the capital of *Asam*; whilst *Mareura emporium* is *Amarapura* the capital of *Ava*. The *Seres* were certainly the *Ouigours* whose name is preserved in the *Oichardes Fluvius* and *Oichardæ*, in the *Itaguri*, *Thagurus Mons*, and *Thogara*, all of which are only various spellings of *Ouiguri* or *Ouigours*. They were called *Kiao-chang* or "Waggoners" by the Chinese, which term we also find preserved in the *Essedones* of Ptolemy and *Ammianus*, in the *Heniochi* of *Pliny*, and in the *Harmatotrophi* of *Pomponius Mela*: all of which are only literal translations of the Chinese name. The *Seres* must not therefore be confounded with the *Sinæ*, for the latter were the people of *China Proper*, the former of *Chinese Tartary*. A few minor identifications may also be mentioned, such as: the *Psitaras fluvius* of *Pliny* is the *Su-Tarini*, or river of *Yarkand*: the *Sizyges* are the people of *Sui-Ching*:—the *Damnæ* are the people of *Manas*, the *Asmiræi* are the people of *Urumsî* or *Bish-balig*;—and the *Throani* or *Tharrani* are the people of *Turfán*.

Pandit, the author of the early portions of the Raja Taringini or Sanskrit history of Kashmir. According to him

In about A. D. 560, *Galúna* the minister of Vikramaditya built a *Vihára*, or Buddhist monastery. T. 3.—Sl. 476.

Between A. D. 594 and 630, *Ananggalekha*, the Queen of Durlabha, built a *Vihára*. T. 4.—Sl. 3.

Between A. D. 680 and 689, *Prakása-Devi*, the Queen of Chandra-pira, built a *Vihára*. T. 4.—Sl. 79.

Between A. D. 693 and 729, Raja *Lalitáditya* built a great *Vihára* and a *Stupa* in Hushkapura, and in another place he built a great *Chaitya*, as well as a *Vihára*. T. 4.—Sl. 188-200. He likewise erected a great copper image of *Buddha*. T. 4.—Sl. 203. His Prime Minister also, named *Chángkuna*, a Turk from Bhukhára, built a *Stupa*, a *Chaitya* and a *Vihára*. T. 4.—Sl. 211-215. And the Physician *Isanachandra*, the Minister's brother-in-law also built a *Vihára*. T. 4.—Sl. 216.

Between A. D. 751 and 782, Raja *Joyapira* erected images of the three Buddhas (the "three precious ones" of Hwán Thsáng) as well as a very large *Vihára*. T. 4.—Sl. 506.

Between A. D. 854 and 883, Raja Avanti Varmma, for the space of ten years, prohibited the slaughter of every living thing. T. 5.—Sl. 64.

In A. D. 933, Raja *Partha* with his family took refuge in the *Vihára* of Sri-Chandra, where he was fed by the *Srámanas*, or Bauddha mendicants. T. 5.—Sl. 427.

And between A. D. 950 and 958, Raja Kshema Gupta abolished the worship of Buddha and burned the *Viháras*. T. 6.—Sl. 72.

The Musalman Author is BELADORY, who states that

"The Indians give the name of *Bodd* to every object of their worship, and they also call an idol *Bodd*." Reinaud's *Fragmens*, &c. pp. 193, 194.

Again, after the conquest of Nirun in A. D. 711 "Mahomed bin Kasim was met by some 'Samanéens,' (*Srámanas* or Bauddha mendicants) who came to sue for peace." *Reinauds Fragmens*, p. 195.

From these passages of BELADORY we see that *Buddha* was still the chief object of worship in Sind some 60 or 70 years after Hwán Thsáng's visit; and that *Srámanas* and not *Bráhmans* were employed

by the people as mediators with the Musalman Conquerer. The statements of KALHANA are perhaps more interesting though not more decisive; for they show that Buddhism continued to be honored by kings and ministers until the middle of the 10th century, at which time the Buddhists were persecuted by Kshema-Gupta. It is true that several of the Kashmirian Princes also erected fanes to Siva and other Brahmanical deities. But this proves no more than that *Bráhmanism* and Buddhism were both flourishing together in Kashmir at the same time. Perhaps these Princes had the same feeling upon the subject of religion as the Frenchman, immortalized by Smollet, who made his obeisance to the statue of Jupiter in St. Peter's at Rome, saying, "O Jupiter, if ever you get the upper hand again, remember that I paid my respects to you in your adversity." Even so the Kashmirian Rajas appear to have halted between two opinions, and to have erected temples and statues of both religions, in the hope that one of the two must be right.

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*Chinese Map of India.*

As an appropriate accompaniment of Capt. Cunningham's interesting paper on the route of Hwán thsáng, the Editors insert the annexed Chinese Map of India, originally copied by M. Klaproth from the Great Japanese Encyclopedia for the illustration of the Foe koue ki. Although in some particulars it differs from the narratives of Hwán thsáng and Shy fa hian, being the compilation of some unknown Chinese geographer, who probably gathered his materials from many and conflicting accounts, it will be found both useful and interesting at a time when public attention is directed to China for the most authentic particulars of the early history of this country.

One of the principal difficulties in identifying the routes of these travellers arises from the uncertain length of their metrical standard the *li*, which has been variously estimated at from  $\frac{1}{8}$ th to  $\frac{1}{2}$  a mile. Nor is this difficulty altogether removed when the Indian measure, or *yojana*, is employed. For though it is probable that in ancient times the principal high-roads were accurately measured, yet the length of the *yojana* seems to have varied in different parts of India precisely as we find the

*kros* (of which it is a multiple) to vary at the present day. Thus, Captain Cunningham by comparing the distances of well identified positions in the north-western parts of India, has determined the length of the *yojana* to be there about 7 English miles : but on applying this standard to Fa hian's distances in Magadha, it will be found by nearly half too great. For if we protract that traveller's route from *She wei* (Oude) to *Pa lian fou* (Patna), and assume 7 miles for the length of the *yojana*, we shall place the site of the latter town somewhere in the neighbourhood of Burdwan. But if we determine the value of the *yojana* in Magadha in the same way as Capt. C. has done in the north-west, that is from the actual distances of well determined positions, we shall find it not greatly to exceed 4 or  $4\frac{1}{2}$  miles ; a value which corresponds well with all Fa hian's distances in Behar, and facilitates the identification of all his stages from Oude downwards. Thus the *direct* distance from *She wei* to *Kiu i na kie*, is by protraction, 30 *yojanas* ; measured on Arrow-smith's map (Oude to the banks of the Gandak), 120 miles ;—from Patna to Giriyeck, 9 *yojanas* according to Fa hian, or 40 miles on the map ;—from Giriyeck to *Kia ye* (which by the way, is neither modern Gaya nor Baudha Gaya, but an ancient town\* near Barabar), is a little less than 4 *yojanas* or 27 miles, bringing us exactly to the banks of the Falgo ; and so on.

That this valuation of the *yojana* is founded upon a true and ancient Indian standard may be inferred from the following remarks of Wilford. After quoting Pliny's account of the distance of Palibothra from the confluence of the Ganges and Jamna, he remarks that "Megasthenes says the high ways in India were measured, and that at the end of a certain Indian measure (which is not named, but is said to be equal to *ten stadia*), there was a cippus or sort of column erected. No Indian measure answers to this but the brahmaní or astronomical kos of four to a *yojana*. This is the Hindu statute koss, and equal to 1.227 British miles. It is used by astronomers and by the inhabitants of the Punjab ; hence it is very often called the Punjabi koss ; thus the distance from Lahor to Multan is reckoned to this day 145 Punjabi, or 90 common koss."† It is worthy of remark that the length of the *yojana* in

\* *Ram Gaya* ? may we commend the investigation of this point to Capt. Kittoe, whose intimate acquaintance with that neighbourhood points him out as best qualified for the task ?

† As. Res. Vol. V, p. 274.

the north-west, as determined by Capt. Cunningham from Fa hian's distances, namely, within a fraction of 7 miles, bears nearly the same proportion to the Magadhí *yojana* as the *common* does to the *Punjabí* koss. The learned Colebrooke makes the standard koss 2.25 miles, and the computed koss one half of that, or a mile and an eighth.

According to Chinese translators of Buddhist works there were three kinds of *yojana* employed in India; the *great yojana* of 80 *li*, used for the measurement of level countries, where the absence of mountains and rivers renders the road easy; the *mean yojana* of 60 *li*, used where rivers or mountains oppose some difficulties to the traveller; and the *small yojana* of 40 *li*, adapted to those countries where the mountains are precipitous and the rivers deep. This shows that we must not apply an invariable standard to the every portion of these pilgrims' routes; but rather seek to determine its local value, where practicable, by the distance of well identified spots in each neighbourhood.

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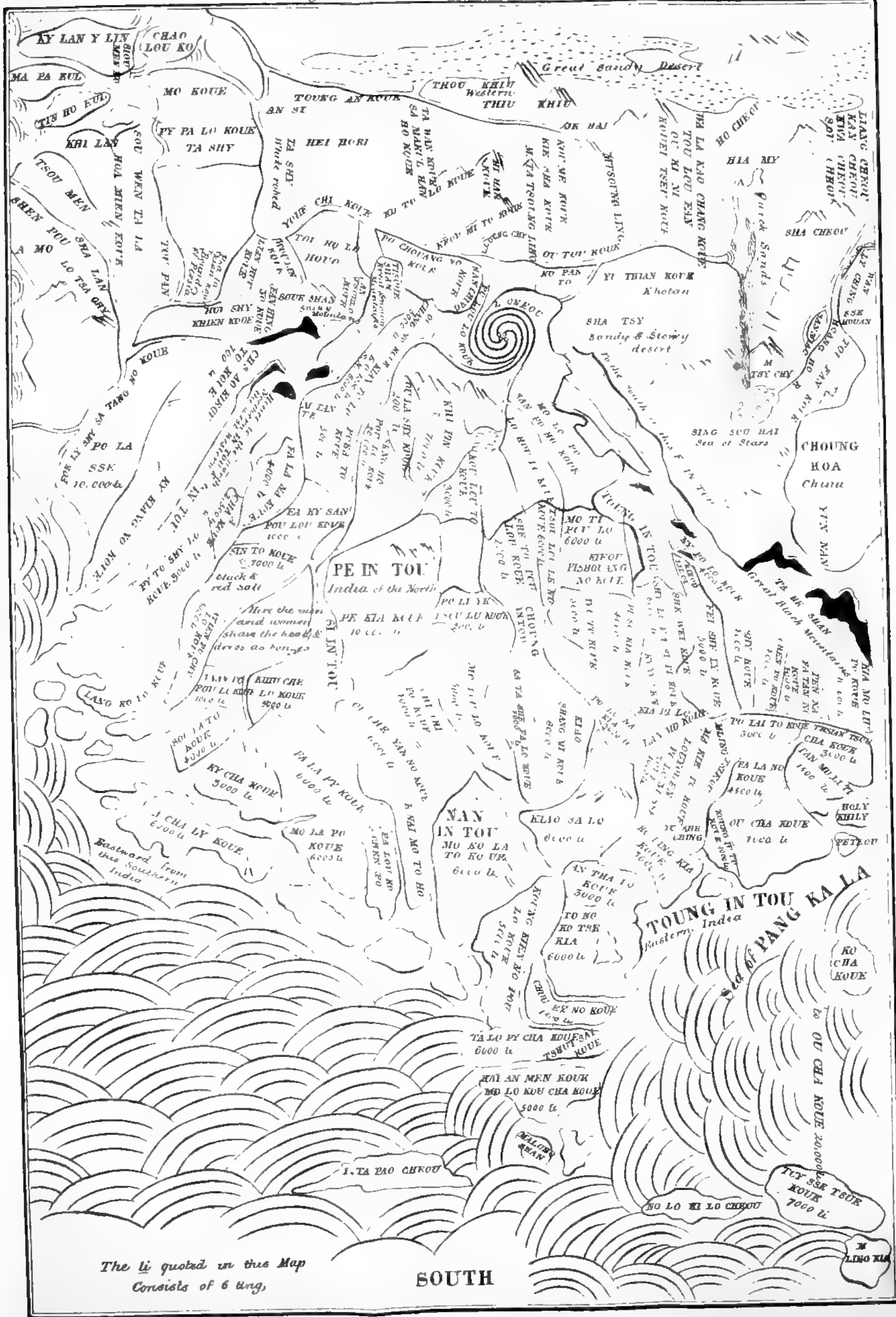
*An account of several Inscriptions found in Province Wellesley on the Peninsula of Malacca.—By Lieut.-Col. JAMES LOW M. A. S. B. and C. M. R. A. S.*

(A.) Consists of a group of seven inscriptions now extant on the rather weather-worn and sloping side of a granite rock at a place named Tokoon, lying near to the center of the Province, or almost directly east of Penang town. The whole probably appertain to one period and the same subject.

The rock was pointed out several years ago to Mr. Thomson the Government Surveyor by some Malays, but he examined it hastily, as it was covered with jungle and long grass, and it was not until a considerable time had elapsed that I accidentally learned from him its existence. I had before this passed for years consecutively close to the spot, yet such was the apathy of the villagers, or their ignorance, that no hint was given to me about the rock; and this induces me to mention that owing to this indifference and to the suspicious conduct of the native chiefs,

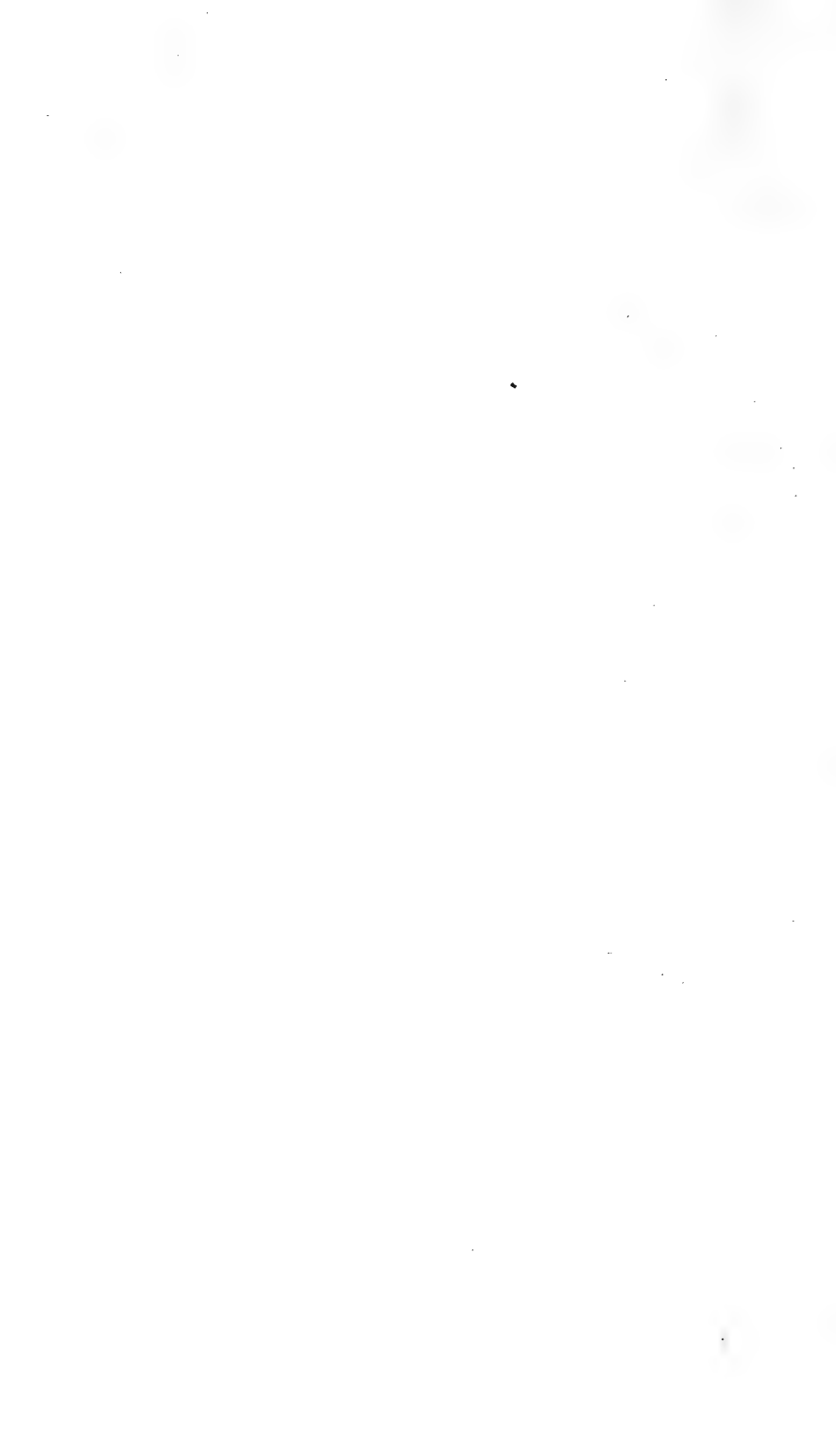
# CHINESE MAP OF INDIA

Showing the route of Hiouan thsang



The li quoted in this Map  
Consists of 6 tang,

SOUTH





I have been left almost entirely to rely on my personal research and that of persons trained by me for the purpose, when endeavouring during the past twelve or fourteen years to penetrate through the darkness which shut out from common view the archaiology of the countries around me.

I had some difficulty in reaching Tokoon, although mounted on my elephant, owing to several almost impassable jheels or payas, as they are here termed. My people had built a small hut of jungle wood and palm leaves, and after assuring myself of the value of the inscriptions, men were set to clear away the jungle and to dig up the ground to some distance around the rock. But I was disappointed in my expectation of finding ruins and other marks of temples and an ancient population.

The inscriptions were copied by me with the utmost care, the task having occupied the greatest portion of the mornings and evenings of three days.

I did not attempt to make a facsimile, as I had no proper materials, and had not succeeded with Capt. Kittoe's plan. But I can safely say that the approach to a facsimile is perhaps as near as it would be possible to make it. The letters are very, indeed unusually, large and thick, for ancient inscriptions, but this peculiarity rendered the task, comparatively easy. Finely powdered and very dry chalk was cast loosely over the inscription until all the letters were filled. The chalk was then brushed off the surface of the stone with a bunch of feathers, and thus the lines of words became clear and legible.

The length of the largest inscription is that of the paper on which it has been copied, and as now forwarded (about ten feet).

That the style of letter is of Indian origin seems to me quite obvious, but it contrasts a good deal with the inscription B. (fig.—.) Our Brahman and Buddhist Priests here are so stupid that I have not been able to derive any assistance from them, and although I can trace some of the letters, I think, to inscriptions published in the *Journal of the Asiatic Society of Bengal*, I have not ventured to attempt the decyphering of them.

(B.) I discovered this inscription while engaged in excavating some old ruins on a sandy side in the northern district of this Province. It has been engraved on a sort of slate and seems to form

part only of a much larger inscription, for that portion of stone which I have got, appears to have been the upper portion of one of those pillars which are set up in the areas of Buddhist temples. I have the pleasure of forwarding a facsimile of this record made with *clay*, which is perhaps, a novel mode. The clay was fine potter's earth and sand well beaten up along with chopped gunnee bag cloth. The stone was oiled and the clay was pressed on it and afterwards dried in the shade.

The Copy was made by me in the following manner. Finely pulverized and dry brick-dust was (as the chalk was in the former instance, the stone being then blackish,) thrown over the face of the stone, and then lightly brushed off with feathers. The letters now appeared sharp and distinct, over these was pasted (with wafers at the edges) a sheet or slips of the "stylographic manifold writer paper"—and the letters were lightly impressed on this paper with a soft pencil, and when the sheet was removed any slight omissions were filled in.

I have in vain tried to discover the remaining portion of the stone.

I may observe that a copy of this inscription was, so far back as 1836, forwarded by me to the lamented James Prinsep, who in his reply observes :—"I see it is legible enough. Thus, on the right hand side of the stone following the letters are Ma ha ta vika Buddha na ra kta vri-tti kanaya vrinni. On the left side, sarova smin sarova tha sarova sidvaya cha santa. On the body next to the Kulsa, va na tarchchaya tti karmma janchana kan me karino. If I had the facsimile instead of a copy I would have handed you the meaning at once. It is Sanscrit, not Pali, as we see by the *karmma*. The style of letter is nearly that of the Allahabad No. 2. Compare with the Hala Canara, published a few months ago." 13th June, 1837.

As I have not been able to get the numbers of the Journal for the above year, I cannot refer to this Hala Canara record ; I may however observe that although I have satisfied myself that the Sivaic worship prevailed on this coast somewhere about the 13th century, still I have reason to believe that the Buddhist religion was co-existent, or at least contemporaneous with it. Indeed, a mysterious kind of connection seems to have existed betwixt Buddhism and the cult of Siva, which it would be desirable to have traced to its beginning. To me it seems that the period most probably was that when schismatic Buddhists had already

overstepped the mere boundary of ratiocination and had fairly reconciled the two religions, at least for a while, and until the time when Buddhism was discarded altogether. The occurrence of the word Buddha in the inscription points to his worship, and the spire in the centre is the seven-tiered one of the Indo-Chinese Dagopas.

I have not by any means closed my researches, the obstacles to these, as I have elsewhere observed, being numerous, so that further archæological discoveries may possibly yet be made.

(C.)—Are Sanscrit verses, out of some book on religion most likely, in alto relievo, on the bottom and the four sides of a brazen ornamented dish, which was found by me amid some ruins of ancient temples in Province Wellesley. They were copied by a man of the Brahmanical tribe.

(D.)—Are impressions taken from two apparently Deva Nagri letters, imprinted on a large brick which I found in one of the ruins.

(E.)—Are two coins one of copper and the other of some mixed metal, which last decrepitates on being submitted to the blowpipe.\*

I found one of these in the Keddah country, close to the British frontier, and in the bed of a clear stream. My attention was attracted by quantities of broken pottery there; and after my people, about twenty in number, had laboured for several days in sifting and searching, I picked two or three coins *myself* out of one of the baskets, a circumstance which I am induced to mention in order to obviate any doubt which might arise regarding their genuineness. I visited the place a few months ago for a second search but found no more coins.

The second coin was found by me under the foundation of the ruins of a small brick building; this last not however appearing above the surface of the ground. The spot is in the northern part of the Province. There were several hundreds of these coins in a metallic cup. From the emblems on them I consider them Buddhist coins.

The figure on the coin I have conjectured to be that of some Hindu deity. But the chief Priest of the Hindu Temple at Penang insists that it represents a king. I cannot make out the obverse.

While about to close these notes the Journal of the Society for February last has reached me. In this number I observe† that in-

\* These two coins contain exactly similar impressions.

† Page 154.

quiries have been made regarding the inscription at Singapore described in the Journal, Vol. VI. p. 680, and that the Hon'ble Colonel Butterworth, C. B. supposes that I may have some portions of the stone on which it was engraved.

I was an unwilling and pained witness to the demolition of that memorial of long past ages, my petition to have it spared being met by the reply that it was in the way of some projected bungalow. On the explosion taking place I crossed the river from my office and selected such fragments as had letters on them. The Hon. the Governor, Mr. Bonham, sent to ask me to preserve a piece for him, and this is the portion alluded to by Col. Butterworth.

As the fragments were very bulky I had them, at considerable cost, gradually chisselled by a Chinese into the shape of slabs. But they are still ponderous. It happens however that the smaller fragments only contain the most legible (if the term is even here really applicable) parts of the inscription, the rest being nearly quite obliterated, and I have therefore selected them to be presented to the Society. It seems to me that this Singapore Inscription (to which I have alluded in a paper presently to appear in the Journal of the Eastern Archipelago) may probably date from an early century of our era, and I would merely here suggest that any one who may set about decyphering it may derive assistance by adverting to inscriptions which may have been discovered at the ancient Bijanagara in Orissa, or Cuttack, or wider still, along the coast of central Kalinga.

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*Note on the Inscriptions from Singapur and Province Wellesley, forwarded by the Hon. Col. BUTTERWORTH, C. B. and Col. J. LOW. By J. W. LAIDLAY.*

The great interest expressed by the late James Prinsep and other antiquarians in the remarkable inscription at Singapur induced me, as mentioned in a former number of this Journal, to apply to the present esteemed Governor of the Straits Settlements, the Hon. Col. Butterworth, C. B. to secure for the Society's Museum any fragments that might remain after the gothic exploit alluded to by Col. Low; a request he was pleased very kindly and promptly to comply with. Since then

Col. Low has forwarded several other pieces ; and though in possession of but a small portion of the original inscription, and that evidently not the most legible, I felt bound, in justice to the obliging donors, to bestow some labour in attempting to decypher at least its character.

In his brief notice of this inscription (J. A. S. Vol. VI. p. 680) Mr. Prinsep remarks : “ Numerous have been the enquiries about this inscription, numerous have been the attempts to procure a copy of it from some of the constant visitors to the Straits for amusement or the benefit of their health. By some I was assured that the letters were evidently European, and the inscription merely a Dutch record. Others insisted that the character was precisely that of the *Delhi* pillar, or that of *Tibet*. While the last friend, Lieut. C. Mackenzie, who kindly undertook the commission, gave it up in despair at its very decayed state, which seemed utterly beyond the power of the antiquarian ; and in this he was quite right. Nevertheless a few letters still remain, enough to aid in determining at least the type and the language, and therefore the learned will be glad to learn that Dr. William Bland, of H. H. S. *Wolf*, has at length conquered all the discouraging difficulties of the task, and has enabled me now to present a very accurate facsimile of all that remains any way perceptible on the surface of the rocky fragment at Singapur. The following note fully explains the care and the method adopted for taking off the letters, and I have nothing to add to it, but my concurrence in his opinion that the character is the *Pali*, and that the purport therefore is most probably to record the extension of the Buddhist faith to that remarkable point of the Malayan Peninsula. I cannot venture to put together any connected sentences or even words ; but some of the letters, the *g, l, h, p, s, y,* &c. can be readily recognised ; as well as many of the vowel marks.”

The condition of the inscription was, indeed, far worse than I supposed, and seemed to preclude all hope of decyphering the characters. By a fortunate expedient however, and by very patient study, I have been able to make out sufficient to determine its language and probable date with tolerable certainty. The method I adopted, and which may be useful in similar cases to others, was to strew finely powdered charcoal\* over the surface of the stone, and sweep it gently to and fro with a feather so as to fill up all the depressions, the very slightest of which

\* Animal charcoal is better than vegetable, as being specifically heavier.

was thus rendered remarkably distinct by the powerful contrast of colour. By this means and by studying the characters in different lights, I have succeeded in decyphering so much of three of the fragments as is depicted in plate III.

It will be seen from the plate that though many of the characters resemble the square Pali in form, and hence misled Prinsep to conclude that the inscription was in the Pali language, yet others, and these amongst the most distinct, bear no resemblance whatever to that type. We may safely infer therefore that the language is not Pali; an inference in which I am borne out by Mr. Ratna Paula, whose knowledge of that language renders his opinion conclusive. As the character could not be identified with that of any of the published Singalese inscriptions, I was induced to compare it with the alphabets of the Archipelago, and I find it to be identical with the *Kawi* or ancient sacred and classical language of the Javanese, specimens of which may be found in Welhelm von Humboldt *Ueber die Kawi Sprache*, vol. 2, and in Sir S. Raffles's *History of Java*. We have also in our museum a very fine inscription in that character, which has been taken by many for a peculiar form of Sanskrita. With the alphabet of this language, as gathered from similar inscriptions, I can identify all, or nearly all, of the characters; but of course no clue to the purport of the inscription can be obtained without some knowledge of the language itself.

Fig. 1, seems to have been from the upper part of the inscription, and is entirely omitted in Prinsep's lithograph as *effaced*. Figs. 2 and 3 I cannot identify with any portion of Prinsep's plate, much on the right hand side of which seems to have been so distinct, that I make no doubt had that portion been available, we might have easily transcribed continuous sentences.

The much larger fragment forwarded by Col. Butterworth, still remains to be decyphered; but I confess I feel little inclination for that barren labour until there appear some probability of the language being translated. Meanwhile we may conjecture with probability that the inscription is a record of some Javanese triumph at a period anterior to the conversion of the Malays to Muhammadanism, and the following notice of this monument in a work entitled "The Malayan Peninsula," by Capt. Begbie, Madras Artillery, may assist us in approximating its era:

Fig 1.



Fig. 2.

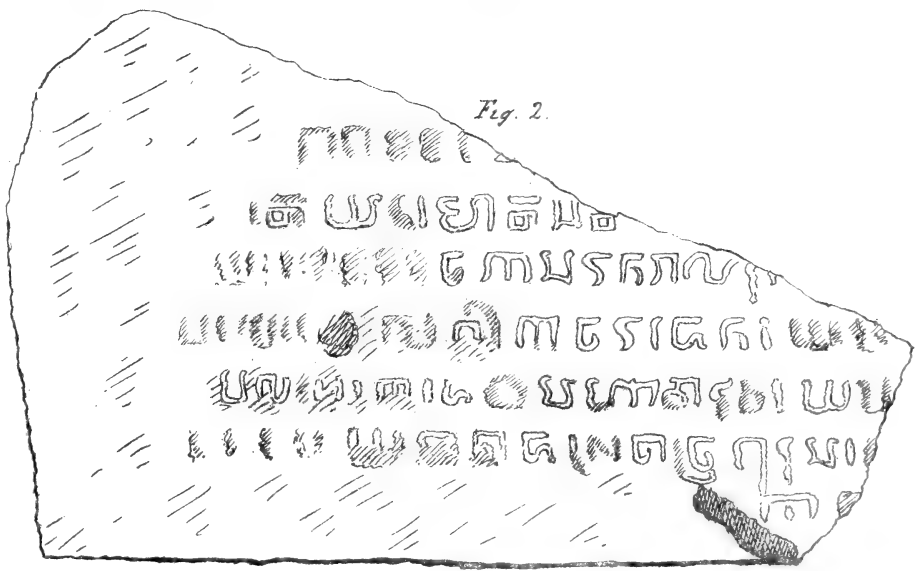


Fig 3.







“The principal curiosity of Singapore is a large stone at the point of the river, the one face of which has been sloped and smoothed, and upon which several lines of engraven characters are still visible. The rock being, however, of a schistose and porous nature, the inscription is illegible. It is said that Sir Stamford Raffles endeavoured, by the application of powerful acids,\* to bring out the characters with the view of decyphering them, but the result was unsuccessful. Where such an eminent person has failed, it may be thought presumptuous in me to hazard a conjecture on the subject of the language in which the inscription was penned, but I may perhaps be permitted to make an attempt to throw some light upon a subject so confessedly obscure. Resorting to the Malayan annals, which, clouded as they undoubtedly are by fable and allegory, yet contain many a valuable piece of information, we find therein mention made of three remarkable stones at Singhapura. (I omit the legends attached to the first two, as altogether inapplicable here.) The third, though first in order of record, I have reserved for the last to be brought forward, because I am inclined to think that the evidence is fully presumptive in favor of its being the stone now visible at Singapore; it is to be met with at pages 62 and 63 of the Annals.

“The preceeding pages inform us that in the reign of Sri Raja Vicrama, there was a redoubtable champion of the name of Badang. Several remarkable feats of strength are recorded of him, but I will merely select the one in point. The fame of Badang having reached the land of Kling, the Rajah of that country despatched a champion, named Nadi Vijaya Vicrama, to try his strength with him, staking seven ships on the issue of the contest. After a few trials of their relative powers, Badang pointed to a huge stone lying before the Rajah’s hall, and asked his opponent to lift it, and to allow their claims to be decided by the greatest strength displayed in this feat. The Kling champion assented, and, after several failures, succeeded in raising it as high as his knee, after which he immediately let it fall. The story then says that Badang, having taken up the stone, poised it easily several times, and then threw it out into the mouth of the river, and this is the rock which is at this day visible at the point of Singhapura, or Tanjong Singhapura.”

\* The stone is a hard siliceous sandstone, upon which this process, if ever adopted, would have no effect.

“After some other recitals, the annals state that “after a long time, Badang also died, and was buried at the point of the straits of Singhapura; and, when the tidings of his death reached the land of Kling, the Rajah sent two stone pillars, to be raised over his grave as a monument, and these are the pillars which are still at the point of the bay.”

“Now, the first two instances are totally destitute of presumptive evidence; the last is, on the contrary, full of it. At the mouth of the river there is a large rock, which is concealed at high water, and on which a post was erected four or five years ago by, I believe, Captain Jackson of the Bengal Artillery, to warn boats of the danger; this is the rock fabled to have been hurled by Badang. He is said to have been buried at the point of the straits of Singhapura, the scene of this wonderful exploit; and there, the very spot where this record is to be still seen, the Rajah of Kling, who had been so serious a loser by it, ordered his monument to be erected.” (page 355-358.)

In this idle legend, it is by no means improbable that the name of the reigning prince is preserved, although the attendant circumstances are altogether fabulous. The kingdom of Singapura was founded, according to Malayan accounts, in A. D. 1160; and from that time up to 1250, when the whole of the Peninsula was converted to Mahammadanism, was subject to frequent invasions from the Javanese. The Rajah Vikrama mentioned in the foregoing extract, reigned from A. D. 1223 to 1236, and his era is very likely that also of the inscription. At all events we may be certain that the present inscription is not less, and cannot be much more, than 600 years old. Its preservation for so long a period may be ascribed in a great measure to its protection from the action of the weather by the tropical vegetation which concealed it, perhaps for centuries. “You remember,” writes Dr. Montgomerie, “the situation of it on the rocky point on the south side of the entrance of the Singapore Creek. That point was covered with forest trees and jungle in 1819, and the stone was brought to notice by some Bengal clashees who were employed by Captain Flint, R. N. (the first Master Attendant;) the men on discovering the inscription were very much frightened, and could not be induced to go on with the clearing, which, if I recollect right, was completed by Chinese under the stimulus of high wages. What a pity ’tis that those who authorized the destruction of the ancient relic were not prevented by some such wholesome superstition!”

Of the remaining inscriptions furnished by Col. Low the first set (A) are in Pali, and are represented in figs. 1 to 7 of Plate IV. Figs. 1 and 2 seem to form a continuous sentence, सर्व्व अकामस्य लिपुष मठयसि तु मेने रमौनिभ (स्य) राजिन श (?) ठम (?) निश (?) of which Babu Rajendralal Mittra has been good enough to supply the following Sanscrit and English version.

सर्व्वं सकामस्य रिपुं मठयति तु मेने रमौनिभस्य राज्ञः शठमनिशं ।

*Translation.*

“I acknowledge the enemies of the contented king Ramaunibha and the wicked are ever afflicted.”

The inscriptions marked B were published by Prinsep in the 4th volume of the Journal from Col. Low's own fac similes, but without any attempt to translate them. The drawings, and especially the admirable clay impressions now sent, enable us to decypher the character without any difficulty and to supply a correct fac simile of the original. This method of taking impressions has I believe been employed by Capt. Kittoe also. It answers admirably; and though it represents the characters inverted, this inconvenience is met by observing their reflexion in a looking glass. The subjoined versions are likewise supplied by Babu Rajendralal :

Fig. 8.

महानामिकबुद्धगुप्तस्य उक्तमन्निकठस्य ।

“This is said by Mannikāṭha, the protector of all great Buddhas.”

Fig. 9.

सर्व्वेणायुःकारेण सर्व्वेस्मिन्सर्व्वथा सर्व्वसिद्धयोकाश्रन्तः ।

“In every form of life knowledge becomes manifest every where and in every way.”

Fig. 10.

रजानर्म्मयनिकर्म्म जन्मनःकर्म्मकारणं ।

“(That) *Karma* (religious action originating in the hope of recompense) which sports with passion, is the cause of transmigration.”

Fig. 11 is mutilated and unintelligible.

Of the monograms upon the Tookoon rock and upon bricks, we can make nothing, but we give fac similes of them in the plate.

The Sanscrit lines (C) on the brass ornamented dish, are as follow :

खवित १३९९

महाश्रमण ।

“Savita, 1399.”

“Mahá Sramana,” (repeated four times on the sides of the dish.)

सचञ्ची  
दशवलवीरशु  
रसम्प्रदायवीर  
वरवादमहा  
अमण ।

“Sri Mahá Sramana is acknowledged to be the mightiest of the mighty sect of Sri Dasavala” (a name of Buddha).

The copper coin is much corroded, but is easily recognised as ancient Ceylonese. The inscription श्रीमत्साहसमल्ल, Srimat Sahasa Malla, is legible enough, and enables us to identify the coin with one published by Prinsep in Pl. XX. Vol. VI. of the Journal. This prince reigned, according to the late Mr. Turnour, from A. D. 1200 to 1230; and his coins are, I believe, pretty numerous.

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*Gleanings in Buddhism ; or translations of Passages from a Siamese version of a Pali work, termed in Siamese “Phrá Pat’hom,” with passing observations on Buddhism and Brahmanism. By Lt.-Col. JAMES LOW, M. A. S. B. and C. M. R. A. S.*

“Several years after he had become a Priest, Buddha ascended to Tavatinsa,\* a mountain which touches with its summit the Constellation of the Alligator, in order to visit the spirit of his mother. He there solaced her with hopes of happy transmigrations when her allotted period in this heaven should have expired, and in order to prepare her for these, he desired her to repeat certain Bali formulæ, which he had brought from the earth for her use. They are as follow, being taken from the Bali work, Phrá D’hamma chetphrá Kamphi.

Phra Sanggha.  
Phra Wibhang.  
Phra T’harjanok.  
—— Po’.  
—— Kattha Wat’ho.  
—— Ya.  
—— Pa.

\* *Trayastrinsa*, in Sanscrit.

சுயம்சுயம்சுயம்

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On a brick.

சுயம்



“Buddha next weighed his mother in the balance against the Pal (personified), and having found the beam equipoised, he set forth on his return; just three months subsequently to his arrival, when Indra learned his intention he summoned to his presence Mattuli, and directed him to prepare a golden ladder, which might reach from the gate of his heaven down to Jumbo Dwip.”

This may remind us of the armillary sphere of Zoroaster and of Jacob's ladder. “On the 16th day of the eleventh month Buddha began his descent. The procession befitted the splendor and dignity of Indra's court. This Devatta himself accompanied it, bearing on his shoulder the holy Pat'ha or vase. The Brahmá, from the heavens of the Brahmá Pari Sachcha, the Brahmá Parohita, and the Maha Brahmá, also attended, sending forth loud blasts from their conch shells, or sanghó.

When the great Saviour reached the earth this grand cavalcade of ministering Devattas departed, and Buddha was welcomed back by a mighty concourse of all ranks of the people, eager to listen to his discourses on virtue and religion. Such is (observes the writer) the efficacy of the Pali, that several Buddhist Priests, who had retired to a cave in order to recite passages from it, were astonished to find hundreds of bats tumbling down dead from the roof. Their spiritual essences (for bats may contain migrating souls), thus purified by the holy word, soared to the heaven called Hemanaráté, where they became Devattas. Those who wish to listen to Bali discourses must perform ablutions, and dress in white garments. Then taking incense and sweet-scented woods (burning them) and having covered them with a cloth, they will perform the usual puja. After having heard the Pali they should take a vessel of water and pour out a libation upon the ground to Thorani, the goddess of earth.”

I described on a former occasion the places visited by Buddha,\* and the publication of the Mahawansa since that time, has elucidated the subject more clearly.

“Buddha, after arriving at the country Phaya Sali Sawat, the king of which entertained him munificently, entered a Buddhist monastery. Here he informed his brother-in-law Ananda that his hour was at hand, inculcating on him that he should not quit the world at the same time, but continue to establish the faith.”

\* T. R. A. S.

“When it became known that the divine Buddha was about to leave the world, the four elements forsook their tasks, the heavens and the earth shook, and Meru, that king of mountains, bent like a sapling before the wind, as if giddy with apprehension, while the rivers rushed along with unwonted force. Buddha at length went into the house of a goldsmith, who directed a feast to be prepared for him.” It appears that “this divine person while in some previous condition of existence had slain a Rakhasa named Mara, but in self defence. This wretch Mara having entered the assembly, changed his body into a poison and insinuated himself into a joint of pork which had been set before Buddha. The latter was aware of the trick, but as he courted his fate, he partook of the meat and soon after expired.”

Were it not that the Buddhists themselves do not countenance the supposition, we might be induced to conclude that Buddha had been poisoned by his enemies, the heretics.

“Thus Buddha entered Nivan,—the earth groaned from its inmost caverns, the holy Ganges wept with her waters,—the plains became parched with grief, the forests shed their leaves, and all nature felt the shock. This ever memorable event occurred in the kingdom of Samoula Raja (Samala?)

“Then came Indra, and the Devattas down to the spot. The Rishii also assembled along with the Naga and Nagi. Garuda was also there.

“The body of Buddha was now got ready for the funeral pyre. Ample rolls of white cloth, with sweet-scented woods were prepared and a Maratapa (q. a type of the sthupas?) or pyramidal *bier*, was constructed to hold the body.

“When fire was applied to the pile it would not burn—not even when held by Princes and Chiefs. A shower of the montha flowers fell from heaven. In the meantime Phra Katsop, (Kassapa, a favourite disciple of Buddha, who subsequently, as it is supposed, conveyed his doctrines to China,) arrived at the pile, when fire instantaneously burst forth from the body of Buddha, and consumed it with exception of the bones. A heavy rain then fell, and washed away the ashes from the bones. Samoula Raja placed the relics in a golden vase, and deposited them in a Chaitya (a pyramidal temple).

Soon after these events king Ajatasatru (Ajatasattu) of Rachakhrú (Rajagriha in Behar, he is said in the A. R. to be brother of



Crishna, or Bala,) invaded Kosinnarai (Kusinarake, Kusumapuri or Rajamatty where the Maha Raja often resided\* and said by Wilford to be Patna), where Samoula Raja governed. His, Ajatasattu's army was composed of the troops of one hundred and one countries."

[This hyperbolical mode of describing numbers is also common both to the Burmans and Siamese.]

"These forces posted themselves in seven lines of blockade around Kusinaraké, and Ajatasatru despatched a herald to demand the relics from Samoula Raja, or to stand a storm, should he refuse to deliver them up; and the latter was just preparing to march out of the town and give battle to the enemy, when Thoula, a Brahman, urged the great risk attending an attack on so superior a force, and the sin of waging war in such a cause, when much blood must be spilt. He then proposed to negotiate and bribe off the enemy, and as the king acquiesced, the Brahman conciliated Ajatasatru by giving to him a large portion of the relics."

I will stop here to remark that this Brahman must have been a Buddhist, if we are to judge from the *humanity*, not the policy of his advice.

"Four more kings arrived afterwards, and obtained relics and gifts; Indra descended on purpose to decide on the respective claims of these Potentates to the Dhatha, or Dhato, or relics.

Some time after the death of Buddha, Malí Raja, the king of a certain country, arrived at Kusinaraké, and solicited a portion of relics, but Samoula Raja replied that he had come too late, and advised him to gather some of the ashes. He took the advice, and having collected enough he returned home and deposited them in a splendid Chaitya."

\* A Buddhist Priest of Bankok gave me a description of the city of this name, which, he said is to be found in the Bali works Dhato Webhahang and Maha Parin Mirana. But he considered it as having been a Siamese city. They have indeed a province and city, so called, having taken the name from the Pali, and which they affirm was an independent Government before Siam became united under a king. I suppose it to have included the province of *Kanburi*, a place of some note in former days. The present city or town so named lies further south than the ancient one, the population having been driven south by the inroads of the Burmans. Kusinaraké is said to have been seven *yojanas* in length, with nearly the same breadth, was fortified, had *spires* on the walls, these last being 8 cubits high and was encompassed by a deep fosse. [*Kusinagara* was on the banks of the Gandak not far from Bettiah; *Kusumapwa* was another name for Pataliputra, or Patna.—EDS.]

It appears that there were eight kings who received relics. But the Brahman just alluded to, proved himself to be a zealous Buddhist, for he “secreted a relic in the tuft of hair on the top of his head.” “Indra perceived the theft and purloined the treasure, unknown to the Brahman; which he carried to Tavatinsa and assigned to it a chamber in a bright fane in the constellation of the Alligator. When the Brahman discovered his loss he raved and tore his hair, but tried to console himself by searching at the burning place in the hope of procuring a few cinders of the body of Buddha. But every remnant had been swept of by Mali Raja, with the exception of some very fine ashes. These had been licked up by a cow. The Brahman followed the animal and collected its dung. *This Brahman ever afterwards held cow-dung in veneration and often daubed it over his body !!!*”

If there be no other better reason for the Hindú practice of the present day of smearing the body with cow-dung, the above may not perhaps be an unpalatable one, although derived to them from an unorthodox source.

“Kasapa likewise concealed a relic in his mouth. Raja Naga also secured the left upper canine tooth, and constructed over it a magnificent Chaitya in his empire, Patala.”

Kusinaraké is described in the Pali, (but I have not seen the work, and here only rely on an extract given to me in Siamese,) as having extended seven yojana in length, and having nearly the same breadth. The gates were numerous. The walls were eight cubits high, and were surrounded by spiral turrets, and a deep fosse encompassed the whole. A king or raja named Moulara, founded the dynasty here, which was carried on through twenty successive reigns at the least, until the appearance of Buddha, when Baramma Chakka reigned (Vicramaditya, perhaps.)

This king possessed seven precious things or gems, which like those belonging to the court of Vicramaditya according to Wilford in his paper in the Astatic Researches, and which were necessary for his state. But the poet is omitted. These were.—A white elephant endowed with reason:—a horse of pure pedigree:—a Muniratanang:—the Chakka:—a Muntri or Prime Minister:—a General and a beautiful Queen.

“Ajatasatru inclosed the relics in a magnificent casket, and placing it in a superb howda on an elephant, retraced his steps.

“ This Raja had before the occurrence of these events been instigated by Devadatta, brother-in-law of Buddha, to conspire against the life of his own parents. Stung with remorse, he had vowed to proceed, after he should have obtained the relics, on various pilgrimages and wanderings in the desert and forests, to endeavour to atone in some degree for his wickedness.

“ The Raja had spent seven years in this manner when Indra despatched his Minister, Wessanúkâm, requiring Ajatasatru to return forthwith to his kingdom and not to molest the peasantry by quartering his followers upon them. His Majesty obeyed the high injunction, and returned to Rajagriha. He here proclaimed his intention to raise a glorious Chaitya in honor of Buddha to hold the relics he had obtained from Samoula Raja.”

Indra, whose presence appears equally indispensable where great Indian hierarchical events are to be celebrated and recorded as in the structure of its history and romance, “ descended from his bright abode, escorted by a glittering host of 99,991,909 Devattas, blowing trumpets and beating sonorous instruments. He soon fixed upon a spot for the relic temple, and by the efficacy of powerful spells, he surrounded the site with lines of defence composed of invisible elephants and of other wild beasts.”

“ Ajatasatru having found a propitious moment took a slab of precious stone and wrote or engraved thereon, “ *May a poor Prince find this.*” He then engraved the following sentence upon a plate of gold:— “ He who was poor did not see Buddha,—for this reason he was poor, although he reigned over an extensive empire.”

The slab and the plate were then placed below the golden box which enclosed the relics, and all were deposited beneath a splendid fane.

“ Ajatasatru, or Chatta-satru, died without leaving any legitimate children, and the kingdom of Rajagáhá or Rajagriha (or as it seems also to be here meant Inthapattha or Indrapreshta, or Indrapuri, or Ayodia, where had also resided a king of Pataliputra\*) had no legitimate ruler for the space of three lives.”

Awadi is another name given to this country.

“ Ajatasatru went to the infernal shades, because his evil deeds outweighed his good actions. Yama siezed him, and imprisoned him

\* Vol. XI. As. Res. p. 62.

in an adamantine apartment, which was guarded by whirling fiery chakras. There he remains in the hell Kumbhira. Devadhatta was precipitated into the hell called Airchi where he stands fast, being fixed by huge transverse iron spits.

“Ajatasatru could not escape the punishment due for his offences, notwithstanding his pilgrimages; and although he had directed to be constantly recited the Pali Sanghayanâi, and the Maha Chatta and P’hra D’hamma, and even had distributed all his treasure in charity.”

“In the year of Buddha 220 (or B. C. 323) the kingdom of Inthapatha was governed by a Prince named Raja D’hammasokarât, (D’hammasoka Raja or Asoka.) He was just and humane, so that the country flourished under his rule.\*

“This king having learned that relics of Buddha had been buried at some former period in his dominions, sent people in search of the building which had been erected over them, but no vestige could be found. At length an old Priest related that when he was a boy he had been sent by his father to make offerings of *flowers and fruits* at a temple, the site of which he then pointed out. His Majesty was highly gratified, but desirous of ascertaining the truth of the Thero’s account before he should act upon it, he ordered the holy B’hikhuní, or Sibyls to be assembled and consulted.”

I have witnessed this mode of trying to ascertain future events, practised in Canara, and the custom also prevails in Siam, where it was probably imparted by Brahmans. A sacred dance, in the instances which I saw, was performed, during which spirits were invoked to descend, and were further incited thereto, by offerings of *dressed* meat, and the burning of huge waxen candles and perfumes.

When the Siamese Priestess, or a young man dressed as one, under the name of T’haáu Phising, has continued to dance for a good while, or until it is believed the spirits are approaching, she encloses with her hands the flame of the candle, and when she ceases to feel any heat from it the inspiration it is supposed has begun. Her body is then agitated by

\* Much of what is contained in these accounts will be found closely to agree with the Mahawanso, but where synchronism exists, I have thought it best to give the whole, such being at least a verification from records preserved at a great distance from Ceylon of its history above named.

a holy frenzy, and when fully inspired, she predicts, as her consultors believe, the future.

I have elsewhere described the ceremony which I saw at Jemulabad in Canara.\* On reference to the Mahawanso (p. 34,) we find that Dhammāsoka in B. C. 321 had constructed splendid dagobas throughout his kingdom, and (in p. 35) that he went in procession on a great festival day, *to the temple built by himself.*

“ Besides the eight Priestesses thus summoned by Dhammāsoka, there were many astrologers in attendance. The united predictions of the whole were so favorable, that the king was confirmed in his belief in the Thero’s veracity. The Priestesses now led the way to the spot indicated and His Majesty instantly set a multitude of people to dig up the ground.

Before the day had closed, however, the greatest number of these labourers had died (magnified to 80,000) owing to their having been *too impure* in mind for so holy a task.”

“ The king desisted from his attempt and lamented over such a loss of human life. In this emergency he prayed to *Indra*, and this beneficent Devata sent down Phetsalukan his Minister, (the Harinar-guneshi of the Jainas, perhaps,†) who appeared in form of an elegant youth bearing his bow and quiver of arrows. The king admired the bow, and inquired to what country he belonged.

The disguised Devatta replied that he came from a great distance, and that his bow was endowed with miraculous power ; offering at the same time to exhibit these if his Majesty would direct people to dig again at the same spot as before, and refusing all offers of reward if successful. The king gladly renewed his attempt to excavate the ruins. The spirits which Indra on a previous occasion had set to guard the Chaittya now closed round in terrific array. But Indra’s minister told them to recollect that the same power which placed them there could remove them. Thus admonished they speedily vanished, and the Devatta returned to Indra’s heaven.

The king and his people dug again with increased vigor, and soon reached the cavity which contained the relics. And now a glorious apparition amazed the spectators. A Devatta, clothed in heavenly vestments and seated on a superb *horse*, richly caparisoned, arose from the

\* Paper in the *J. A. S.*

† *As. Res.* Vol. 2.

excavation, holding in his hands the golden vase. This he delivered to the king. The *lamps in the cavity* still burned brightly and the flowers bloomed and diffused their fragrance around.\*

When His Majesty had perused the inscription on the precious stone left by Ajattasatru, he angrily exclaimed :—

“ Am I then a poor man or prince, I the King before whom tributary nations bow the knee ? ”

He had no sooner finished this speech than he dashed the slab on the ground and broke it to pieces.

He next read the inscription upon the plate of gold, and regretted his haste in destroying the slab, while he admired the humility of the prince who had penned the inscriptions. †

When His Majesty had returned to the city, he called a council of priests, astrologers, and wise men or pundits, in order that they should fix upon an auspicious site for a magnificent Chaitya in which the regained relics might be placed. But this council did not feel competent to decide so momentous a case, and the king was at last obliged to go into the forest and consult the Tapassa Sokkhalibutta and Thera Malái. These holy persons informed him that there was a much holier Thera still, named Utt'hak'hút, whose abode was below the waters, and that it would be by his aid alone that the new Chaitya could be surrounded with the requisite invisible walls of defence. ‡

Raja Naga§ now felt his palace becoming warm, and immediately

\* This mention of a horse seems to me to have reference to the funeral customs of Tartary or Scythia.

† This is an important passage, as the Chinese and Trans-himalayan Buddhists insist on making Asoka a contemporary of Sákya Muni ; and in the འཇིགས་མེད་ཀྱི་མཛུགས་ (Hdsangs blun), 28th volume of the *Mdo*, there is a legend of his meeting Asoka when a child and receiving from him a handful of earth, as alms, in his begging pot. (Schmidt, *Der Weise und der Thor*, vol. 2, p. 217.) The same story is alluded to by Fa hian, Chapter xxxii. ; in commenting upon which in the recent reprint of that work, we have ventured to doubt if there exist any counterpart of this legend in Pali, or among the Buddhists of the south. It is impossible in the present state of our knowledge to account for the extraordinary anachronism of the Chinese who make Sákya the contemporary of Muh-wang (B. C. 1000—945) and of Asoka ; but it would be no difficult matter to show that their chronology contains in itself ample materials for its own complete refutation.—*EDS.*

‡ This Utt'hak'hút is doubtless the Assak'hutta Thero mentioned in the Milanda Raja-

§ “ Whose abode is in Patala.”—*As. Res.*

emerged above the earth to see who wanted his assistance, but he had hardly done so, when Supanna or Garuda pounced upon him, and was bearing him off in his talons towards Simphali, when a young priest clapped his hands so loudly that Supanna dropped Raja Naga, who was much bruised by his fall to the earth. But the priests quickly restored him with healing unguents; and being angry that the honor of having saved him belonged to a novice, they punished him by getting Dhammasoka to send him in search of Utt'hakhut.

“The young priest proceeded accordingly to the bank of the river (Ganges) and invoked the ancient man to come forth. It was not long before the sage appeared and displayed to the astonished youth a body shrivelled like a blasted sapling, and bending under the load of centuries. When the ancient learned that his aid was wanted, he took the sacred vase under his arm and proceeded to the palace of Dhammasoka. Here he found numbers of *Arahans* or Priests of the superior grade of merit waiting to receive from the King their wonted daily bounty or alms. These priests pointed out the sage to the King as an exceedingly holy person. But although his majesty was surprised at his withered appearance, he paid him no particular attention then. He was desirous however of putting to the test his reputed sanctity, and told his mahout that when the sage should appear next morning, he should push the war-elephant at him. Accordingly the mahout rushed next morning with the elephant upon the sage Tapassa, who quite unconcernedly turned his body a little so that the animal plunged his tusks into the ground, one on each side of him. The Tapassa then turned round, and patted the elephant thrice on the temples, when it was instantly changed into a stone figure. The King could not fail now to credit the power of the sage, and he therefore asked him to be his spiritual guide, also to restore the elephant to its original state, and assist in establishing the Chaitya. Utt'hakhut consented, and then drove off Garuda, so that Raja Naga might also grace by his presence the consecration of the new temple.

“All these preliminaries having been duly arranged, a Chaitya was built, consecrated and fortified, and a portion of the relics was buried underneath.”

“Dhammasoka now wished to bestow the remaining relics upon the Princes of other countries, who on being acquainted with his desire

quickly arrived and received them. On that day there was a terrible earthquake, and Meru waved to and fro like a tree before the storm. Indra attended the ceremony of division, and the Rakshas hurried to the scene in the hopes of being able to destroy the relics, and the Chaittya also. These Rakshas were preceded by a furious tempest; but Utt'hakhut perceived their advance, and having invoked the aid of Buddha, he wrapped the vase which he held under his arm, in a sheet, and threw it at their chief. The vase became a dog, which instantly clung to the Raksha's neck, and then dying produced so intolerable a stench that he fled howling through the world, calling aloud for help. But no one would assist such an evil-disposed race. However, the Devattas advised him to ask Utt'hakhut to take compassion upon him. The Raksha took this advice, and having been relieved from his misery, he became contrite."

The narrative here breaks off, and another, which apparently ought to have been first in order, commences.

"There was a king of the country of Thonthaburi, named Singharaa (Singha Raja) who had within his dominions a famous Chaittya, in which there had been deposited a tooth of Buddha."

This country is evidently Dantapura, and the king is Singha, or Sinha Raja, son of Wango.\*

"It happened that a king of Chattúbádí coveted this precious relic. He therefore despatched a large army against that country. But Singha Raja refused to give up the relic, which, besides its inestimable value, had, he urged, been *long* in possession of his family. He therefore signified to the Maha Raja that he would march out next day and give him battle, adding that His Majesty had no right to demand the relic. Next morning accordingly at dawn, Singha Raja mounted his huge war elephant, clothed in dazzling armour of proof, he shone like a star conspicuous at the head of his troops he advanced on the Maha Rajah's force, and he soon singled out the latter from his bright mail, and addressing him, inquired why he had invaded the country to obtain a relic, when he might have had a share had he gone to Kosinaraké when the relics were being divided?"

This appears to be a sort of anachronism, because if this was the tooth relic now preserved in Ceylon, it was conveyed there in A. D.

\* Described in the late Hon'ble Mr. Turnour's Mahawanso.



310, not as might be inferred from this account, within a life time after Buddha's death.

The Maha Raja replied that he was not at the time aware that Buddha had entered Nivan or Nirvana.

Singha Raja then invoked all the supernal powers to aid his arm, and directed his elephant to be furiously urged against the great king's. Both armies rushed to battle, and the two kings long contended hand to hand ; at length Singha Raja with one blow of his sabre rolled his adversary's head on the ground, the body remaining on the elephant. The troops of the Maha Raja now fled and were pursued with great slaughter.

“Three years after this battle a king of Hemantha Phara, confederated with the Princes of four other countries, who having united their forces to his, and thus formed an army of three hundred thousand men, marched to attack Singha Raja in order to compel him to deliver up the relic.

On arriving before Dantapura the allies encompassed it with trenches, and then sent a herald to summon the king to resign the relic. Singha Raja requested three days for deliberation, which were accorded.”

It would appear however that Singha Raja foresaw that resistance would cause the loss of his kingdom ; for, continues the account, the unfortunate Prince being thus driven to extremity and disdaining to fly or to yield up the precious tooth, determined to save his honor by perishing sword in hand. He visited his queen, called his children around him, and communicated to them his resolve.

Her Majesty impressed upon the king that resistance to such a power would be vain, and urged him to assume the garb of a priest and to fly with his family to another country, carrying with him the sacred relic. That opposition to such a host resembled an attempt to quench fire without water, or like an ember on which a deluge was ready to pour. His Majesty however continued firm, and observed that it would ill-comport with the dignity which had descended to him from his ancestors were he to shun the impending conflict without making an effort to defend his kingdom ; that the sword was in his hand and could not be sheathed.

He than solemnly enjoined the queen, that in case of his death (or defeat) she should disguise herself as a priestess and seek refuge in a monastery. Next, turning to his son Thont'ha Kuman and to his

daughter Hemachala, he desired them, in either of these events, to dress themselves like peasants to secrete the relic about their clothes and to *fly to the coast*. Here they should embark on board of a vessel and proceed to Lanka, the king of which country had long expressed an ardent desire to possess a relic. He added that the time had now arrived, as predicted by Buddha, when Dantapura was to fall to the arms of five invading kings. He then delivered the relic to the Prince and Princess, and prepared for battle. He first took the bath, then clothed himself in the refulgent armour which had before dazzled the eyes of his foes. On his head was a splendid tiara, and he held in his hand a ponderous mace. After a bloody fight in which the Singha Raja was slain, the enemy gained the day. The queen obeyed the injunctions of her deceased husband, while the prince and princess escaped in disguise to the coast, where they embarked in a vessel and sailed for Lanka (Ceylon).

It may be noticed in passing that Raja Singha does not hint even at the practice of burning widows, one which Buddhists must have abhorred. So that although we find in the Mahawanso that this tooth relic was carried to Ceylon by a *Brahman* Princess, she and her parents most probably were Buddhists. "After a voyage of three months\* a tempest assailed the ship and it foundered with all on board excepting Thont'ha Kuman (probably Dantakumara in Pali), and Hemachala who, still retaining possession of the relic, floated on cocoanuts to the shore.

They reached it at a place called the Diamond Sands (or that Sai Keo in Siamese) but I have not yet been able to procure a complete version of the original Bali work so cannot specify *its* title or the place here alluded to.

Here being afraid they dug a pit, and hid the relic and also concealed themselves for three days, subsisting on fruits and roots."

These Diamond Sands were probably those on the shore near to the present site of *Jagannath*, which latter has been supposed either to have been originally a Buddhist shrine, or to have been erected near to, or on the more ancient site of one. In the Mahawanso (p. 24,) we find it stated that "the right canine tooth relic was brought to Ceylon by a *Brahman* Princess from Kalinga in the year B. 853 or A. D. 310." The account now digresses a little and is tinged with the marvellous.

\* This must be an error.

“There was at the period of this shipwreck a celebrated priest called Barómmat’het Thero or Thera, who resided on the hill, Assakano, one of the lowest ranges of Meru. He happened to be deeply abstracted in devotional contemplations, the force and efficacy of which were such that they lifted him up into the air. While thus soaring aloft, his eye was arrested by dazzling rays of light which were cast upwards from the *Diamond Sands*. Whereupon he instantly descended and called to the Prince and Princess to come out of their place of concealment. They related to him their sad tale, which induced him to descend into the kingdom of Raja Naga. But the snake-king on his approach rolled himself away beyond the Chakkawan, or horizon. The Thero however, compelled the Naga’s subjects to bring him back. It seems that this Raja Naga had purloined the relic unknown to the Prince and Princess, but the Thera obliged him to deliver it up. He then returned to the Diamond Sands and restored it to the brother and sister, informing them at the same time, that a vessel would touch there in three days and convey them to Lanka, and bidding them invoke him should they encounter any accident. The vessel, as predicted arrived, and a flag being hoisted on shore, a boat from the vessel landed and took off the Prince and Princess. A few days only had passed in the voyage hence towards Lanka, when a furious storm assailed the vessel, at the instigation and desire of Raja Naga, who wanted to regain the relic. The captain of the vessel then invoked the Devattas, but without effect, so that he began to suspect that the storm was owing to the presence of the Prince and Princess (who were strangers to him), and he was on the point of throwing them overboard. But they called on the Thero, who soon appeared in the form of Supannó, or Garúda, and assuaged the gale.\* The captain or commander of the ship and his crew worshipped him, and then he departed. The vessel reached Lanka in three months.”

Fa Hian relates in his account of his voyage home from Ceylon that the brahman merchants of the vessel he sailed in wanted to get rid of him in the same manner and for a similar reason.

It is probable that the two vessels above alluded to came from Tamaliti. We cannot account for the voyage having lasted three months, unless by supposing that the time occupied in escaping to the coast is included in it.

\* Garuda is himself fond of occasionally rather of raising than abating a storm.

The Siamese have placed the Diamond Sands near Ligor, and the ignorant amongst them, including most of the priests, consider this history as one of that country; and some of the latter were much mortified when I pointed out the absurdity of the supposition. The accounts however which they have of the history of Buddha and of Buddhism, afterwards closely accord with the Ceylonese Mahawanso, and other Indian Pali writings.

“When the ship cast anchor at Lanka the commander took his passengers on shore at a place where there was a temple called *Lohak Phra Satsi*, and where presided the chief priest or Sanghara, whose name was Thassakam Phra Múni, and who was allied to the royal family of Lanka. This priest hospitably received the strangers. When night arrived, an extraordinary light spread over the temple, and the astonished priests found that it emanated from the place where the Prince and Princess reposed. The latter then disclosed their names and the cause of their arrival, saying that they must deliver the relic into the hands of the king. A young priest was therefore despatched to acquaint his Majesty with the fortunate occurrence, who happened to be then eight yojana distant on a hunting excursion.\* He no sooner however received the information than he was seized with a holy fervour, and dismounting from his elephant he walked seven of the eight yojana† to his palace, and was lamed by the exertion. The royal pair, a brother and sister, were now presented to him, and he allowed them a retinue of 500 persons and a suitable establishment to uphold their state.

By his Majesty's orders a brick and mortar Chetti or Chaittya, or pyramidal building, was constructed and was adorned inside‡ with precious stones. The relic brought by the Prince and Princess was then deposited in it with great solemnity.

Three years had passed away when the king of Lanka perceived from an ancient prophesy that in seven years from that date a certain king, Dhammasoka Raja, would erect a temple at “*The Diamond Sands.*” He likewise recollected that there were two Dona of the relics of Buddha still concealed in the country of Raja Naga. He therefore direct-

\* Yet the killing of animals was forbidden by his faith.

† This cannot be the yojana which is reckoned at 9 miles.

‡ The receptacle for relics probably.

ed a holy priest to go and bring their relics, but the messenger had no sooner reached Raja Naga's palace, than the latter whispered to his brother\* to fly with the relics to Meru and hide both himself and them. This being done he told the priest that he knew not where the relics were. But the observant priest had noticed the Raja's brother putting the relics into his mouth or swallowing them on his departure, the more effectually to conceal them. He accordingly followed him to *Merú*, where he found him coiled up and fast asleep with his jaws wide open. He drew forth the relics without awaking him, and returned with them to Lanka. Soon after this Raja Naga arrived in the form of a handsome youth, and solicited a few relics from his Majesty, which were bestowed upon him accordingly."

His Majesty now ordered a golden ship to be made. It was one cubit long, and one span broad. The relics were put into a golden cup, this was placed in a vase, and the whole were put into the golden ship.

A wooden ship was next built having a breadth of beam of seven long cubits."

(The length, judging by such a breadth would be about 200 feet.)

"When built this vessel was loaded with bricks and mortar, and abundance of provisions and necessaries, with gold and silver, were placed on board. Four golden jars were made for the occasion, and they were filled with the poison of snakes.

T'hont'ha Kuman and Hemachala, being desirous of revisiting their country, the king of Lanka sent along with them ambassadors to one of the five kings, (he) who now ruled there, requesting him to show every sort of attention and respect towards them. Two hundred young men and one hundred damsels† were also embarked, and many learned priests availed themselves of this opportunity of spreading their religion (the Buddhist.)

The vessel reached the Diamond Sands in five months,‡ and the Prince and Princess then went on shore accompanied by the priests (of Buddha.)

\* Nephew in the Mahawanso, pp. 188, 189, where a longer account is given. It is moreover stated that the enshrining of these relics took place in Ceylon.

† Labourers apparently.

‡ This might have been an alteration by the Siamese, perhaps in order to make it appear that Ligor was the destination of the vessel, but more probably it is merely a clerical error.

The golden ship and its holy contents were carried in procession upon the heads of thirty men, to a spot which the astrologers had fixed on.”

(These astrologers were, we may believe, Brahmans, for this tribe had not then become prominently distinct as religionists until a much later period, and many were Buddhists.)

“A square excavation was then dug to the depth of a tall man’s height, and proportioned according to the instructions contained in the sacred books. Water was next poured into the vase so as to float the golden ship, and the whole, as before enumerated, were deposited at the *bottom of the excavation.*”

In a former description the relics were placed in the centre of the building. In the Mahawanso they are noticed as occupying a compartment of the famous Anarudha temple, on a level with that ledge or part of the basement where flowers were offered; being thus considerably above ground.

At each corner of the square a jar or vase (emblematical perhaps of the four elements) was placed underneath and filled with the venom of snakes. Four priests of known sanctity consecrated the spot, and a tablet of stone with an inscription upon it was fixed upright in the *pit*, its front facing the north.\* Its import was that “The King of Lanka has ordered this inscription in the language of Lanka [Magadhí?] to be placed under the Chaityya as a memorial of the erecting of the same; and of there having been four holy priests sent by him to superintend its construction and consecrate it in due form.”

The materials were then landed, the pit was filled up with stones; and on this foundation the Chaityya was quickly built.

The vessel now set sail for Dantapuri, which it reached in a little more than three months.† The ambassadors of the king of Lanka landed here along with the Prince and Princess. The two latter were treated (by the ruling Prince) with much distinction, and remained in that country.

The ship returned to Lanka in forty days.‡

\* This I take to be a clerical error, and that N. E. if not E. was the direction.

† An exaggeration for the purpose before noticed, if not a clerical error.

‡ This is nearer the mark, perhaps, therefore the foregoing lengths of voyages are clerical errors. Perhaps the stay at the temple is included in the time so stated.

*An Account of Dhammāsoka, Raja of Awadi.*

B. C. 321. “King Dhammāsoka Raja, the lord of earth and sky, governed the country of Awadi with strict justice ; and pursued the humane and munificent course which great Princes ought to follow.

In the midst, however, of prosperity and abundance the kingdom was suddenly afflicted by a sweeping pestilence. The king consulted his astrologers, and they advised him to emigrate with his people to another quarter. His Majesty accordingly set out with all his family, and he was followed by the largest portion of his subjects. Of these followers thirty-one thousand were able-bodied men, [31,000,]\* who had their wives, children and effects with them.

This body journeyed to the *southward*, and wandered about for seven months, when it formed a temporary encampment in the jungle. Houses for the priests were here constructed, especially for two (principal ones) named Buddha Kamphean, and Achan Buddha Sākon. A temple was likewise erected here and a tank dug.†

Several years prior to these events Raja Naga had paid a visit to the temple at the Diamond Sands, and as a memorial of his having done so he left a precious stone fixed in the fork of a tree.

This temporary residence of the king was not far distant from the above temple, although he was not aware of it. Indra therefore felt himself called on to lend his aid. By his order his minister having assumed the appearance and dress of a peasant, stationed himself near to a spot where a hunter was watching to kill deer for the king’s table.‡ He contrived to bring one before the hunter, who wounded it with an arrow. It went slowly away and the hunter followed it to the Diamond Sands, where it left him benighted. He mounted a tree for protection during the darkness, and early next morning he was forcibly attracted by the glare of the jewel left by Raja Naga. He speedily secured the rich prize and returning presented it to the king, and described the nature of the place where he had found it. His Majesty

\* Which would give a total of about 155,000 in all, so that if this account be true, and if it was the famous Asoka who is here brought forward, we may suppose that he only changed his capital for a while for a more healthy spot.

† I cannot find any thing in the Mahawanso respecting this wandering of Asoko.

‡ The eating of animal food had not then been prohibited.

sent there an *artist* to make a sketch of the temple, and the vicinity, and finding both inviting proceeded in person to the spot. He marched with a large retinue and arrived in seven days at a place where *water and fish were abundant*.<sup>\*</sup> Next day he mounted his horse and reached the *Golden Sands*. Here he and his people were encountered by huge crows, which tried to drive them away. His Majesty during the ensuing night had a dream in which Devattas appeared to him, and said that underneath the temple were relics which had been deposited there by order of a king of Lanka. Next day the king directed people to dig into the Chaitya, but the crows (or spirits in their shape) compelled them to desist. The king therefore returned to his camp.

It is related that the younger brother of this Raja lived in Lansaká, and that sickness still prevailed amongst his own subjects. The son of the Raja died here, which added to his afflictions. A year afterwards the Maha Thera arrived at the camp, and the king having inquired from whence he had come, he replied that he had been engaged during the previous seven years, in the traversing various regions, disseminating religious instruction to their inhabitants.

His Majesty, again accosting the priest, observed that the spot where his camp now was had been found unhealthy, and requested that his lordship would favor him with the best advise as to where he should remove. The Thera then sprinkled holy water about the camp and the contagion ceased, and he afterwards advised His Majesty to remove and settle at the *Diamond Sands*. Accordingly Indra sent Maha Túli to attend to the wishes of Dhammásoka Raja.

It happened that at this time Raja Naga with seven heads and as many tails, guarded the Chaitya. But no sooner had the king, accompanied by Maha Túli and a large retinue approached close to it, that this mighty snake king was observed to be majestically disentwining himself from the huge folds with which he had encompassed the relic shrine.

As he wound off, he left a deep impression on the ground; which His Majesty perceiving, he directed stakes to be driven into the line at intervals, and it was within this circuit that he *subsequently founded a city*.

The king now ordered six thousand (6000) men to prepare bricks, and large parties to dig up the soil and clear away the forest.

\* Some river or lake.



Dhammasoka reigned (or staid) quietly here for seven years ; but still mortified and unhappy because he had not been able to reach the relics, for he desired to place them in a more splendid Chaitya.

[I may here remark that the disinterring of relics appears to have been a favorite act of piety, and curiosity, combined, on the part of successive kings or dynasties.

In this way perhaps, the remains of many temples dedicated, if we are to credit the Chinese travellers Fa Hian and others, to the third Buddha or Kassapo, may have been swept away. At any rate many of the oldest Chaityas in honor of Buddha the 4th, the present one, may thus have been destroyed.]

“His Majesty accordingly offered a high reward to any one who should find the relics and disinhume them. But this proved of no avail.”

I do not know what to think of the recital closely following the above. It is doubtless the same in the Pali, as names in it are preserved, at least Bali words according to Siamese pronunciation.

“It so happened that in this dilemma a Butrá or Putrá of the king of Róm, named Kakabhasa, who happened to be trading to the country of Takkasíla, encountered a violent storm. He had five hundred souls on board, who supplicating the gods, were rescued from death. The ship with much difficulty reached close to the *Diamond Sands*, and observing signs of population cast anchor with a view to refit.

The king recollected of having once heard that the people of Róm were deeply skilled in working spells, and acting under the belief that they were, he asked the commander of the vessel to assist him in driving off the spirits which guarded the Chaitya.

The commander having adopted precautions by erecting a stockade at the mouth of the river for his own security in a strange region ; and having first had his ship repaired by his Majesty’s artificers, prepared to exorcise the spirits.

The king now refrained from all food which was of the sorts not allowed to priests, dressed himself in white garments, and slept under a canopy of cloth, and indeed conformed to all the rules for proceeding on such occasions as is contained in astrological books.”

When the procession arrived at the temple the crows began their attack, but the first charm set them to flight, and with them vanished

and departed all the other spirits. The relics and jars were then easily dug up along with the gold. The king inquired of the Roman if he might take the gold, when the latter replied that it should not be separated from the relics during their stay on the earth. To impress His Majesty with his veracity, he took a bambu four cubits long and thrust it into one of the jars, when many snakes instantly raised their heads aloft. He next took another bambu and pushing it into the same jar the snakes disappeared.

The king had prepared a temporary abode for the relics and jars, consisting of nine several successive stories.\*

It was now determined to erect another Chaitya, and a spot for it was accordingly selected.

The ground for the foundation was a square of eight large cubits [48 feet each side] and it was excavated to the depth of eight cubits," [12 feet, for I suppose it to be the short cubit, as the large one is not mentioned.] "At the *bottom* of this foundation a small cavity was constructed of bricks and mortar two cubits deep" [breadth not specified, say 3 feet square], "and water tight (after being shut up).

When all had been arranged the two chief priests before named raised up the golden ship on their heads, while each poison vase was carried by thirty men. Then three priests, assisted by the Roman commander, consecrated the Fane, and deprecated wrath and every ill on the head of the sacrilegious wretch who should dare to molest the holy precincts. They prayed that the water in the reservoir should ever continue to float the golden ship, that the candles and incense should never cease to burn, nor the flowers to bloom, until the expiration of the five thousand years of the era of Buddha should have expired and a new era have begun. Thákáphásá or Kákábhásá now directed all the people to remove to a little distance, after which he recited the one hundred and eight Bali invocations; these being over, the spirits which had been scared away speedily resumed their posts."

I may merely notice in passing that the boat is the type of the earth, the Argha of the Hindús, or rather are we not to consider that they had it from the Buddhists, as the latter may have derived it either directly or indirectly from the Egyptians, amongst whom it was the cymbium.†

\* Seven is the most common number.

† Indian Antiquities of Maurice.

Osiris, according to Plutarch, was the Commander of the Argo, and was represented by the Egyptians by a boat carried on the shoulders of men.\*

This *Ossa Navicularis*, as Mr. Maurice observes, was carried at Egyptian solemnities by 80 men. Then there was the mystical boat of Isis, which according to Lactantius was adored in the same country. It was the cup of the sun in which Hercules they say traversed the ocean. The Suiwi again worshipped Isis in form of a ship.†

A golden float, crescent-shaped, but less round, was an emblem of the ark.‡ Iswara is called *Argha-natha* or the Lord of the boat-shaped vessel.‡ There was also the *Vitzliputula* of South America, who was carried in an ark like Osiris and the Jurar of Peru boasted of their descent from the sun and moon, that is from Noah, and the ark worshipped in conjunction with these luminaries.§ Faber says that the ark was frequently described by the antients as the allegorical consort of the principal Arkite Deity.||

The *Argha* is with the Hindus a type of the *Yoni*, the cymbium of the antients, and in it were made offerings of fruits and flowers.¶ It means a cup or dish, boat-shaped, used for offering fruits or flowers to deities.\* A third part of the worship of Bacchus consisted in carrying about an ark.†

A mare was a symbol of the ark, and we find a horse coupled with the relics in the excavation of one of the *Chaityyas* just described; a horse was one of the most usual symbols of Noah.‡

“The Phœnician word *Aron* denotes either an ark or a coffin. In scripture it is the ark of the covenant or a boat, which last was borne aloft on the shoulders of the priests exactly in the same manner as the *Baris* of the Egyptian *Ogdoad*.§ We cannot I think wonder at this last resemblance, seeing that Moses had just left the practice behind him

\* *As. Res.* and other works—Wilford quoting Tacitus.

† *Key to Hindu Chronology*.

‡ Wilford.

§ *Faber's Cabiri*, Vol. I. p. 170, and Franklin quoting him.

|| *Do. Do.* p. 79.

¶ *J. A. S. B.* Vol. VIII. p. 274, et seq.

\* *Ibid.*, Vol. VI. p. 521, et seq.

† *Faber's Cabiri*, Vol. II. pp. 332, 333. ‡ *Ibid.*, Vol. I. p. 100. § *Ibid.*, Vol. I.

in Egypt, unless we first doubt if he had fairly repudiated the God of the Egyptians. He retained many of their practices undoubtedly when they did not militate against his monotheism.

“But” observes this erudite author, “the ark was considered in the light of a coffin, as it was supposed to contain the *relics of universal nature*.” Here is a curious coincidence with the Buddhist custom just detailed by our Pali author.

The Malays of the Keddah coast of the present day use a painted boat at marriage ceremonies. The bridegroom and bride are placed in it, and it is carried in procession on the shoulders of men.

This seems to me to be clearly a remnant of their original worship, which I have found to have been chiefly that of Siva;\* thus so far proving the connexion betwixt Mahadeva and the Argha.

The Arn Breith, or Car of the ancient Irish was, according to Faber, “the ark of the covenant.” The antients in memory of the ark carried about a small navicular shrine, and sometimes even built their temples in the form of ships. Then we have the gothic Skidbladner, a ship,† and Col. Valency describes an ancient Temple near Dundalk in Ireland in the shape of a galley.

In the Bali work Milintha I find three kinds of religious edifices mentioned;—

Parib’ho’k’ha Chetí, built it is supposed at the spots where Buddha had halted during his journies for refreshment.

In these parts of Buddha’s dress and other things are kept as relics.

Dhattu Chetí, Dagobas, for the relics of Buddha, or shiral buildings,

Dhammá Chetí, being an edifice in which the sacred books were to be preserved.

The Chetí or Chaittya, is truly a Mausoleum, varying from a dome to bell-shaped, or to a truncated cone, or a building more or less pyramidal, and almost, perhaps, always, placed on a square pedestal. Where the type originated I will not pretend to say, but there is a wide field for conjecture in the regions of western mythology.

The Chettí, is the Manakyaala,—the Tope, the Burj, Dagob, Dagoba

\* An account of some of the Indo-Chinese nations (Journal of the Indian Archipelago) by me.

† Faber’s Cabiri, Vol. I. p. 219, apud Coll. de rebus Hiber. of Vallery, Vol. V. p. 460.

of Sanscrit, the Dhatugurbha and the Sthupa. The *Triloca* makes it like a Drum, with a swell in the middle.

Tibetan Dagobas are generally square based pyramids, but some have conical and others circular bases.

In the Calcutta Journal for 1819, a writer (Manatho) states that the ruins of a mighty temple then existed near Mirzapore in the district of Benares, and that it seemed to be upon the same plan as the temple of Boro Bodor in Java. There were also two statues there. Query—Has this temple been explored?

In the Pali work *Ratana Kalapa*, we have under the head of Chetí or Dagobas,

1. Upachara Chetí, eight cubits (long ?)
2. Patimar D'hatú, 12 do.
3. Semo Sanghang, 4 do.
4. Uposatha, 11 do.
5. Chetí Buddhó Dhatú, 16 do.

“When the foundation had thus been prepared a pit was dug (in front of) the Chaitya to the depth of four cubits and a half. Into this there was let down a pillar of stone six cubits long, about  $1\frac{1}{2}$  measures [or 8 feet] of which remained above ground.\* This upper part faced the *Esané* or north-east, and at intervals of a cubit, two other similar stones were placed in the same manner. Eight pillars were likewise erected around the temple so disposed as to correspond with the four cardinal points and their subdivisions.”

In the cave of Islamabad a Mausoleum was found in a compartment of the depth of three cubits, and three cubits in breadth or diameter. In it were images, a vessel of brass and two bones.† Thus proving that it was of Buddhist origin, although this does not seem to have been a Dagoba.

“A rod of iron was set upright from the centre of the offset of the intended spire, and the latter was then built around it. The whole building was composed of brick and mortar, and was plastered with stucco. The total height of the Chaitya was upwards of thirty-six large cubits [200 feet.]”

It is rather singular that the Indo-Chinese Buddhists yet persist in

\* I am not quite satisfied as to these measurements, they are stated rather obscurely.

† As. Res. Vol. IX.

this dangerous custom of supporting one half only of their Dagobas with iron rods, and this too while they have learned enough of science as to lead them to place on the pinnacles of these rods small glass phials as nonconductors. Their preservative properties would I should suppose be of small amount.

“The stucco having been put on the Dagoba was gilded from top to bottom, and the four chief priests constructed eight figures of Arahān (the head of a powerful Buddhist sect), and placed them in the area of the temple in the attitude of adoration of Buddha. Representations of elephants were likewise made and fixed with their heads directed *from* the temple.”\*

“The Prince of Rome now set sail and departed.”

“When the people of the neighbouring countries heard of the fame of this new Chaityya they flocked to it in order to make offerings. They came in carriages and on elephants,” (and in other ways) “and some even cast gold under the ground for those who should afterwards find it. The Princes of these states also brought their offerings, and before departing they erected small Chaityyas, but not having any surrounding pillars (*pariwenas*.)

“The king of Lanka being desirous of knowing what had become of the temple at the Diamond Sands, despatched P’halítí and Phálabúi, who were men of rank, to that place. They were provided with gifts of gold, silver, and precious commodities for Dhammásoka Raja.

When they had waited upon this king they acquainted him that the two young Princes of Lanka had quarrelled at a *cockpit where white men were present*, (probably Turks or Arabs,) and that both had died of the wounds they had received, and their father the king had sent their ashes and bones with a request that His Majesty would allow these to be disposed of thus. They were all to be pounded up with mortar into a paste, and of this two busts or images were to be formed, one of Phrâ Sri Dhatta” [or Buddha, when a Prince,] another of his consort Bhimb’ha, and a third of his son, Rahúra. Two figures were also to be made resembling the deceased Princes, one of which would occupy the right hand, and the other the left hand of the image of Phrâ Sri Dhatta. They also expressed the king’s desire, that an

\* I shall also given along with these fragments of Indian History, a few notes respecting Buddha and these Arahans, or Arahats.

image of Buddha of the same materials, and one of each of the two descriptions of lions, should be formed, and that the before mentioned images having been added to them the whole should be placed in a Vihan or temple to be specially built for the purpose, and that when all this had been effected, the circumstances should be recorded upon a tablet of stone. To these requests Dhammásoka readily assented and they were accordingly complied with."

It was a great oversight of the Buddhists when they first admitted images, not of Buddha, into their Vihans. I say not of the 4th Buddha, for his statue must have been coeval nearly with *his* worship, and it is probable that statues or images of previous Buddhas existed. Although as he had been a Prince and a mortal his votaries could hardly have required to be so reminded. I am not aware of the precise period when subsidiary images were introduced, but I suspect that if Buddha had, as Fa Hian's account would imply, and the Buddhist scriptures forcibly insist on an immediate predecessor (Kassap'ó,) whose Chaityas were even then extant, the admission of such images most probably took place before Sakya Muni appeared.\* In whatever manner, or at whatever period it really happened, the existence of any images in the temples beyond those of Buddha, no doubt greatly helped the Brahmins, not only when they began to scan the path to hierarchical pre-eminence, and to sap the foundations of Buddhism, but when they eventually had established a body of heretics or schismatics within even its own Vihans ready to tolerate if not to adopt a more extensive polytheism, and thus to render the final subversion of Buddhism easy and certain.

\* In the gorgeous description contained in the Pali Mahawanso of the relic receptacle of the Mahá Sthupo. "At the farthest points of the four sides were represented (depicted) the four great Mythological Kings [Query—*Heroes apotheosized?*] Dattarattho, Virulo, Verúpakkho and Wessawanno, also 33 Dewos and 32 Princes, 28 chiefs of Yakkhas. This was in B. C. 127. These were subordinate to a golden image of Buddha, and near to it stood one of Mahábrahmá, bearing the parasol of dominion. (One) of Sakko, the inaugurator with his Chank, Pinchasikho with his harp in hand, Kalanago and his band of singers and dancers, [which however priests are forbidden to listen to or to look on,] the hundred armed *Maro* (death.)<sup>1</sup> The description of the relic chamber, however, differs from the accounts which have just been given, in which last the relics are placed deep under ground for the sake of concealment, apparently, whereas in the Mahá Sthupo they were enshrined in a receptacle considerably above the level of the ground.

<sup>1</sup> Turnour's Mahawanso, transl. p. 182.

In the various accounts above given in the text of the erecting of Chaityyas we cannot fail to remark the care taken on every occasion to record religious events on stone or metal, and these accounts would have been some proof of this custom even if we had not known of the numerous Buddhist inscriptions, which are extant, especially those of the very Prince last named, Asóka [unless there were two of that name] which have of late years been brought to light by our indefatigable orientalisists in India.

“After a while Phrâ P’hutthi Monthéan, a holy priest of Buddha, arrived from Lanka in a vessel bringing with him a pipal tree, which he privately planted unknown to anybody. Another personage after this sailed to the Golden Sands, but was wrecked there and lost most of his effects. But he built a Chaityya and a Vihan before he departed.” [The Siamese call him Nai song chóm.]

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*Narrative of a Journey to Cho Lagan (Rákas Tal), Cho Mapan (Mánasarówar), and the valley of Pruang in Gnari, Húndés, in September and October 1846. By HENRY STRACHEY, Lieut. 66th Regt. Bengal N. I.*

*Askot—10th September 1846.*—At this place I met two fakirs late from Mánasarówar. No. 1, a surkhi-colored *Sunyási*, deponeth that walking over Lípu-Dhúra into Taklákot, he was forthwith apprehended, abused, beaten, and put in confinement for that night: the next morning he was brought up and scrutinized before the Sirdar of the place, who at last allowed him to proceed on his pilgrimage, but under the surveillance of a *Hunia*,\* who accompanied him to the lake, whence he was marched straight back again after performing his ablutions, permission to make the *Parkarma* (religious circuit), or to go on to Kailás, being steadily refused. The *Sunyási* was rather an intelligent, smart and decent looking person; which qualities, I presume, rendered him the more obnoxious to the “suspicion of being suspected” for a Sikh or Feringí spy; he was also guilty of a fine black beard—a distinctive mark of the “out-side Barbarian,” which the *Hunias* of Gnari have held in great fear and aversion ever since the invasion of

\* An inhabitant of Húndés.



their country by the bearded Sikhs in 1841. The hurried way in which Deponent was hustled through Pruang prevented his observing anything worth record.

Fakir No. 2.—A *Jogi*, black with dirt, and half fool; he accordingly met a better reception than the *Sunyási*, and was allowed to extend his pilgrimage to *Kailás* without hindrance; yet he was a year in *Byáns* before he could effect his entrance into *Pruang*; for last season there was an absolute interdict against all *Fakirs*, and a companion of the *Jogi* then returned in despair, without accomplishing the object for which he had come from the uttermost parts of India. Deponent says that *Hundes* is a “*Bahut sundar jagah; per nahín,—ghás nahín,—síwá pathar aur baraf kuchh nahín!*”\* beyond which he can give no lucid information.

These pilgrims are said to be the only two who have succeeded in reaching *Mánasarówar*, viá *Byáns*, during the last two years;—encouraging for me, the third!

*Kela, 15th Sept.*—15 days from *Almora*, might have been done in 10, but for the great heat in the low vallies and a touch of sickness (partly caused by that) which precluded much exertion, detaining me also three days at *Petoragarh*. The valley of the *Káli* proved not quite so bad as my apprehensions; the first part is certainly low and hot enough, the jungle dense and rank in the extreme, grass and wild hemp ten feet high, through which we had to butt, heads down, in places where the path had not been cleared; *Sal*, *Sissoo* and *Toon* trees, with wild *Plantains* and *Cucumbers*, denoting a very tropical climate. But this does not extend much beyond the middle of the second stage; at *Dhárchula*, (2750 feet above the sea, b. t.), the valley expands into a pleasant level, well cleared of jungle, and cultivated with rice. The scenery hereabouts is fine, the valley flanked by noble hills, on the west side by the base of *Chipulá*. Thence on to *Kela* is not quite so clear and open, but the ground rises gradually into a cooler climate; the road all the way easy. *Relagárh*, a ravine with a small stream, forms the boundary between the *Rájbári* of *Askot* and the district of *Kela*.

The village of *Kela* comprises a good extent of well cultivated land, terraced out of a huge hill side that rises in a steep uniform slope for

\* i. e. very beautiful place, no trees, no grass, nothing but rock and snow.

thousands of feet above the confluence of the Dhauli or Gori (the river of the Dárma valley), with the Káli; the houses, or huts rather, seem very few and mean. The opposite side of the valley in Dóti,\* is of the same character.

Here I find Durgá Datt *Patwári*,† (Governor, that is,) of Kela, Dárma, Chaudáns and Byáns; one *Khasia*‡ and three *Bhótia* districts, containing altogether some fifty villages—on a salary of *five* rupees per month; an *erratum*, one would suppose, for fifty.

The *Patwári* informs me that there has been a murrain among the cattle in Dárma this year, which has carried off all the kine, and half the goats and sheep; from the reports which have reached him, he judges that there are not a dozen *Zhobus*§ left in the whole of Dárma, and that I should probably be unable to get half that number for my expedition across the snow. *Láta*, *Budha*|| of Baund, a village of Dárma, reported that they had 52 head of cattle in his village last year, and the murrain has destroyed every one of them. The danger of infection still lurking in the villages precludes the introduction of fresh stock from Húndés this year. Under these circumstances I must abandon my intention of going through Dárma, as a few baggage cattle are absolutely indispensable for a prolonged expedition across the passes, in which, as we have to avoid villages and inhabited places, myself and party must subsist solely on what provisions, &c. we can take with us. They say also that the road up to Dárma is in a very bad state, and in one or two places rendered all but impassable by landslips; not that it becomes me to be particular in that respect; my difficulties lie the other side of the snow.

I had expected to get a tent from the *Bhótias* here, but I am now told that the people of Dárma and Byáns have no such luxuries, being content with what shelter they can extemporize with blankets amongst their *Karpach* (sheep saddle bags).

\* The Province of Nipál which borders on Kumáon.

† Superintendent of a district in Kumáon.

‡ The Hill-people of the lower Himálaya.

§ The cross-bred kine between the *Yak* of Tibet and the Indian cow.

|| Commonly pronounced *Búrha*, the Headman of a village, or more frequently, a set of villages. This term is equivalent to *Kumin*, *Syána*, and *Tokdar*, and is chiefly used in the eastern *Pergunnahs* of Kumáon. The tenure connected with these titles is called *Búrha chári*, *Kumin-chári*, &c.

The *Jwáris*\* have very fair tents, of cow-hair cloth, in one of which I found good accommodation (for myself and half a dozen Bhótias) in my expedition across the Jwár Pass, last June. The Byánsis certainly have less need of these things, as their traffic lies mostly among the villages of Pruang, and but a short distance from their own homes. Tent, or no tent, I now proceed through Byáns, going by Kunti and the western pass, thence making the lakes (if nothing go wrong), and returning through Pruang, by Lípu Dhúra, the eastern pass, into Lower Byáns. My first plan had been to go by Dárma and return by western Byáns, in order to see both of the Bhótia valleys; but the season is now so far advanced, that unless my journey on the other side were curtailed of its fair proportions, there would be an even chance of my finding the Western Ghat of Byáns impassable from snow, by the time of my return, whereas Lípu Dhúra will be safe probably, for the next month or two.

Patwári says that the remnant of the Sikh invaders of Gnari, who made their escape into Kumáon, came over Lípu Dhúra in the month of December 1841. All the other Gháts would have been absolutely impassable at that time of year.

Receive a letter from Hirdu Budha, Thokdár† of Chaudáns, to the effect, that hearing I am going to Dárma, he requests that I will abandon that route and come his way instead; no reason whatever is offered for the said request. But the Patwári explains that the Bhótias of Dárma, Chaudáns, and Byáns have heard that the *Sáhíb Lóg* frequently drop a good deal of money in visits to Jwár and Niti,‡ and often ask him why he does not exert his influence to bring part of this lucrative traffic their way.

16th September.—Descend from Kela, cross the Dhauli (now unfordable) by a *Súnga*,§ and enter Chaudáns, up a long and steep ascent, the distance from Kela to Titila, though no more than  $4\frac{1}{2}$  miles by the Map, occupying me  $5\frac{1}{2}$  hours, of which half an hour may have been rest. The hill enveloped in clouds, and myself drenched with mist and rain, I could see little or nothing of the coun-

\* Inhabitants of Jwár, the Alpine valley of the Góri.

† Head of a hill district.

‡ A village of Garhwál giving its name to one of the passes into Tibet.

§ A timber-bridge of a construction common in these mountains.

try, but an entire change of climate and botany indicates a much higher elevation than Kela, and to my great relief, rice cultivation has disappeared. Hirdu Budha tells me that nothing now remains of the old Fort, if ever there was one, (the Titlakot of the map) on the top of the hill, one or two hundred feet above the village of Titila.

The people of Chaudáns are all Bhótia, carrying on a limited traffic with Pruang viâ Eastern Byáns.

On the road to-day I met many Dunáls, men of Dúng, a *pati* or subdivision of Dóti opposite this, bringing salt and borax from Byáns. They are not Bhótia, but Khasia, i. e. people of *Kias-des*, which in days of yore included all the hill country of which the inhabitants were of mixed caste, and impure to the genuine Hindus of Lower India; but the Khasias themselves now rather affect to reject the name, and pass it on to the Bhótias, who bear much the same relation to them, that they do to the pure Hindus, the Bhótias being a cross-breed, probably, between the Khasias and the Hunias of Húndés.

Thermometer at 5½ P. M. 58°, boiled at 198°. Elevation of Titila 8000 feet above the sea. The village of Sosa is some 250 feet lower. Rain at night.

17th September.—Leave Titila, and after a march of 4½ miles by the map, occupying near 6 hours, encamp on the Syankwangárh, now a considerable stream, under the village of Bunbun, at the foot of Rholing-Dhúra, the crossing of which constitutes the greater part of this march. The ascent is long but easy, probably three thousand feet in perpendicular elevation, though the summit of the pass may not be more than 2000 feet higher than Titila (owing to some intermediate descent of the road), or 10,000 feet of absolute elevation. The whole hill is clothed with very fine forest, mostly Horse-chestnut trees, with undergrowth of *Ningála* (*Arundinaria falcata*?) much resembling that on the Munshári side of Kálámundi,\* on the road from Girgáon, (the summit of which is 9200 feet above the sea,) and these two are by far the finest specimens of forest that I have met with in these hills; the Horse-chestnuts being tall, straight and clean timbers of considerable size. The north side of Rholing-Dhúra is of the same character as the south, with a descent of some three thousand feet to Syankwangárh. My encampment here may be 750 feet lower than Titila, i. e. 7250

\* A pass and range between the valleys of the Gori and Rámangá.

feet above the sea, and the village of Bunbun a little above the Gárh, 7500 feet.

Thermometer 60° at sunset. Thick clouds and mist all day, rain at night.

18th September.—Morning so rainy that my companions advise a halt, to which I object; leave Syankwang, and in three quarters of an hour reach the village or hamlet of Gala, 1½ miles distant, where, after all we are stopped by the rain, which increases with promise of continuance, and the Nirpania-Dhúra ahead is said to be steep and very troublesome in foul weather.

Gala is a mere hamlet with two or three houses, at present uninhabited, and a few fields cultivated by the Zemindars of Rúng, a neighbouring village. The vacant cottages accommodate myself and party much better than the *cutcha* hunting run up for me at Syankwang, which would have been miserable quarters indeed in this weather. It is fortunate that I would not take the advice of my friends to stay there this morning.

Thermometer outside at 4 P. M. 55°. I judge the elevation of this place to be about the same as Bunbun, 7500 feet.

The rain continues all day and all night without intermission.

19th September.—Still raining and the whole hillside completely enveloped in cloud.

Sumhyáki, son of Hirdu, the Tokdar, who has accompanied us from Titila, with laden sheep, &c. for Pruang, objects to proceed in such weather as this; so do I. We heard the sound of a considerable landslip somewhere in the vicinity this morning. In heavy rain the passage of Nirpania-Dhúra is rendered unsafe by showers of stone, which it is difficult to see and avoid when the air is obscured by mist.

Patwári Durgá, a well educated man in the Hindu fashion assures me that *Húndés*, the “snow country,” is a mistake, originated if I remember rightly, by Professor Wilson, and since currently adopted.

The true name is *Húndés*, हुणदेश, from हुण, the “*Hun*,” aboriginal inhabitants of the country north of the Himálaya, and not derived in any way from हिम, *Him*, snow. Mention of the country and people is to be found in the *Mahábhárat*, *Márkandya Purána*, and other of the Sanskrit books which treat of the mythological history of this part of the world: both *Hun* and *Tátúr* appear as allies of the “*Rákshasa*,”

(now *Rákas*) in their battles with the gods or demigods, about the Indian Olympus, Kailás. The great Hungarian scholar, Csoma de Kőrös, I have heard was endeavouring to trace the origin of his own nation, the European Huns, in this quarter.

Our word *Tibet* (of which *Thibet* is a gratuitous corruption) was introduced to Europe I believe by Marco Polo, and to India probably by the Mahomedan invaders and rulers from the North; it appears more than once in the Geographical statements of Abul Fazl, Ayin Akbary; and the word is probably of Turki origin, "*Tibbit*," being the term now in use with the Usbeks of Yárkand for *Pashm*, the wool of the shawl goat. I am not aware of any authentic instance of the acknowledgment of the name Tibet by the natives of the country. Turner says distinctly that it is called by the inhabitants "*Pue*," or "*Pue-Koachini*," i. e. snowy region of the North. "The land of Tiburut," in the letter of Soopoon Choomboo to Warren Hastings, dated 16th November 1781, (Turner, Appendix III.) is clearly the work of the Persian translator, whose style is conspicuous throughout that composition; and Turner's allusion (in a note to his introduction) to "the pronunciation of this name in Bengal, *as well as Tibet*," though seeming to imply the use of the word by the nations of the latter country, may with probability be ascribed to the same origin as Soopoon Choomboo's expression, as it may be observed that Turner frequently applies to persons and things of Tibet Hindustani names which must have been derived from his interpreters. Continued rain all day and night.

*20th September.*—This morning looking a little clearer, or not quite so foul, I prepared to start, but by the time we were ready the rain had set in again as hard as before, and put a stopper on the intended move.

Weather continued bad all day, but towards sunset, the dense envelope of cloud and mist began to break a little, disclosing glimpses of blue sky, also of a very dismal looking snowy ridge to the east, Namjung and Lingaru, inferior spurs of the great mountain *Ápi*, on the opposite side of the river. A fine starlight night succeeded, with unclouded sky, inspiring hopes for the morrow.

*21st September.*—Fair weather at last, and we resume our journey. I did not find the passage of Nirpania-Dhúra quite so troublesome as the accounts of my native guides had led me to anticipate, but a little experience of this part of the Himálaya soon accustoms one to very

queer places. The ascent is tolerably steep, the path mostly in steps, but in good order. The proper name of this ridge appears to be Gala, a base-spur from the snowy mountain, which the map (incorrectly I believe) calls Gula-Ghat; the eastern extremity of it where crossed by the road, is subdivided by two shallow ravines into three minor ridges, the first from Chaudáns, called Yergnáchim; the second Birdong, thence is a good view into the valley of the Káli up to Budhi; and the Bird Tyungwe-Binaik, which is the boundary between Chaudáns and hyáns: these differ little in height, and may average 3000 feet perhaps above the village of Gala, i. e. 10,500 feet absolute elevation above sea level. The name Nirpania\*-Dhúra has been applied to this hill by the Khasias, because, in dry weather, no water is to be found on it, and the ascent is rather thirsty work. The ascent of Nirpania from the south merely leads to an equal descent on the north side, some 3000 feet down to Golám-Lá, this side of the Najangár; and the path here is, if any thing, steeper, in narrow steps all the way, looking rather precipitously into the bed of the Káli, which is many thousand feet below. The summit of the pass must be near a mile in perpendicular height above the river. Half way down to Golám-Lá is a small resting-place for goats, &c., called Dandanhyár, a miserable little ledge on the hillside, in a jungle of wild hemp, dock, and nettles. The hill is too steep and rocky to be very well wooded, though it is not deficient in vegetation. I observed some indifferent specimens of Silver Fir, (*Picea Pindrow?* or *Webbiana?*),† by the Bhóteas called *Woman*, with the exact pronunciation of that English word.

Cypress (*Cupressus torulosa*), by the Khasias called *Saro*, by the Bhóteas *Tangshin*, a name which in other districts I understand they apply indiscriminately to any tree of the Fir or Pine species.

Yew, (*Taxus baccata*), Khas: *Thunir*, Bhot: *Nhárey*.

Birch, (*Betula bhojpatra*), Bhot: *Shak-shin*.

Rhododendron, (*R. campanulatum*.) Khas: *Buronj* or *Buráns*, Bhot: *Tak-shin*.

Bamboo-cane, (*Arundinaria falcata?* Khas: *Ningála*, Bhot: *Kwey*.

\* "Nir," without; "pani," water.

† For the few Botanical names mentioned in my Journal, I am indebted to Major Madden, of the Artillery, at Almora; but mistakes in the application of them (if any) are entirely my own.

Sycamore, (*Acer Sterculiaceum*,) Khas : *Kamiah*, Bhot : *Kan-shin*. From the knotty parts of this tree, they make the coarser sort of tea-cups used in Hundes and Bhot,\* termed *Lahauri Doba*; the better sort, *Talua Doba*, are made from the *Patgnalia*, another of the maple tribe (*Acer oblongum*), which grows on the Southern hill ranges, such as the Gágar,† &c., and is very abundant at Naini Tál.

White Dog-rose, (*Rosa sericea*,) Khas : and Bhot : *Sephala*, the leaves of which are rather fragrant, like sweet Briar, the fruit a large round Hip, edible, (but not worth eating.)

A ground-Raspberry (*Rubus nutans*) Bhot : *Sinjang*, and the fruit *Sinjang Lo*, orange-coloured, with a pleasant acid flavor; the plants I saw grew on the ground like strawberries.

An Orchis (*Satyrium Nepalense*) Bhot; *Phung*, with small rose-coloured flowers rather fragrant; the Bhotias sometimes eat the root, raw or cooked.

On the descent of Nirpania, I saw some monkeys which the Khasia Hindustanis of my party asserted to be the same as the *Langúr* of the plains. I venture to doubt this, as these animals, (Bhot : *Kholi*) appear to have tufts at the end of their tails, and make a grunting noise, unlike what I remember of the *Langúr*, though otherwise they are much the same.

The march from Gala to Golám Lá, not more than 5 miles on the map, took us near 6 hours, exclusive of stoppages for rest, &c.

Golám Lá, a mere encamping-ground, marked by a large (Gneiss) rock standing out of the hillside, overhangs the confluence of the Nájan-gár with the Káli, which is from 1,500 to 2000 feet below; the declivity almost precipitous. The Nájan-gár comes from a great snowy mountain visible through the head of the glen; this is marked Gula-ghat on the map, but Sumhyaki, Sayána‡ of the Titil-sosa, calls it Yirgnajang, which has some affinity to the name of the river rising from its base. The Nájan-gár is a most impetuous torrent, falling in cascades rather than rapids, over a very steep rocky bed, through a deep ravine flanked with precipitous mountains.

Steep and lofty mountains rise immediately on the East side of the

\* Cis-alpine Himálaya, inhabited by Bhótias.

† The outer high range in Kumáon proper, overlooking the plains.

‡ (Sage.) Head-man of a hill village.



Káli, reducing the valley to a mere gigantic ravine; which is the character of it, in fact all the way from Relagar. Opposite to the Nájan-gár, an inferior spur with a little comparatively level ground on its top, affords a site to the village of Thin, now apparently deserted. Behind this rises the ridge of snow seen from Gala; Namjung, on the left, close over the Káli, and Lingaru to the right, some 18,500 feet high. The great Peak of Ápi behind, though 22,799 feet in height, is quite concealed by the proximity of its lofty base. The Thampagár, immediately south of the hill of Thin, rises from a glacier under Lingaru, plainly distinguishable from Golám Lá, by its form, dirty color, and situation below the lowest limit of the snow which lies on the ridge above.\* These glaciers are well known to the Bhotias, under the term *Gal*, a non *gal-endo*, perhaps, as they never melt like the superior snow.

The Peaks of Byáns-Rikhi I think, are visible up the valley of Byáns: only partially snowed though near 20,000 feet in height, which is owing to the steepness of their rocky summits, I imagine.

Clouds and a little rain in the evening; Thermometer at sunset 60°; night fine.

22d September.—Morning fair, Thermometer at 7½ A. M. 52½°; boiled to 198°; elevation of Golám Lá 8000 feet. The village of Thin, on the other side of the river, is about the same height.

Leaving Golám Lá, we descend a thousand feet or so, by a steep path, and cross the Nájan-gár, by a small Sánga, a mile above its confluence with the Káli. The stream is unfordable at present, rather on account of its great fall and rapidity of current, than for the volume of water; in the mile between the bridge and the confluence the fall must be 500 feet. The path continues, often in steps, and rather precipitously, round the shoulder of Pomayyar, a base-spur from Yirgnajang, thence descends and crosses the Málpagár, a small fordable rapid, close to its confluence with the Káli. Just above this point, on the side of Pamayyar, is Jambe-Odyár, a large cave, said to be capa-

\* It is surprising that the existence of these Himalayan Glaciers, with which the snowy range here *abounds* in all directions, should be questioned or doubted even now, in the 30th year of British possession of Kumáon; it is equalled only by the perpetual snow line on the southern face of these mountains being fixed by Humboldt at 11,700 feet, an elevation at and *above* which we have luxuriant vegetation, and flourishing agricultural villages.

ble of giving shelter to five hundred laden sheep and men in proportion ; being out of the way I did not see it. Another great ascent from Málpagár ; the path still precipitous and in steep steps, along the side of Chantirong : the summit, Umdognyir, a minor rocky projection not half way up the mountain side, reaches an elevation of 9,500 feet perhaps, some half a mile vertically above the river. Thence a descent again, not over easy, to the bank of the Káli, a mile or two along which brings us to Lámáre, a small level encamping-ground, close on the river side, with boulders of rock, (*Lá ?*)

The Káli here may be 100 feet across and looks as though it would be fordable but for the violence of the current.

A man from Kunti says that snow has fallen in his village lately, and that the Kunti passes have probably got more than enough of the same.

This day's march, about 5 miles by the map, occupied me  $6\frac{1}{4}$  hours, besides half an hour for rest, &c. In the lower parts of the ground, near the bed of the river, I found the sun very hot.

Thermometer at sunset  $61\frac{1}{2}^{\circ}$ , boiled at  $198^{\circ}$ , (same as Golám Lá) elevation 8000 feet ; evening cloudy with a little rain.

23d September.—Leave Lámáre, path easy, ascends a little, and continues above the river bank under the side of Yirtáshin ; a mile on crosses a small gár,\* the Tákhti, and at two miles descends to the Palangár, a considerable rapid crossed by a Sंगा near its confluence with the Káli. This gár comes through a deep ravine from Tokong, a snowy ridge, of which the opposite side gives rise to the gár of Shela in Dárma, and there was once a pass this way, but dangerous, and disused since lives were lost there some years ago. This Tokong must be a secondary spur from Yirgnajang, the Gula Ghat of the map.

The valley of the Káli now expands a little and gives site to the village of Budhi, (the first and lowest of Byáns, and the single village of Sub-Alpine Byáns, as it might be termed) on the right bank, above the confluence of the Palangar. Here I see a good-sized Walnut tree (*Juglans regia*) by the Bhotias called *Kás-shin* ; a large Barberry, Khas : *Chotra*, Bhot : *Náchi-shin* (*Berberis aristata*), fruit worthless ; sweet red-flowered Buckwheat (*Fagopyrum vulgare ?*) Khas : *Ogal*, Bhot, *Palti*, and the bitter white (or yellow) flowered sort

\* Mountain-stream.

(*F. esculentum* ?) Khas : *Phápar*, Bhot : *Bhey* ; Turnips, Khas : *Salgam*, Bhot : *Chankan* ; Amaranth, red and white ; and Tobacco in flower. The above crops are well advanced but not quite ripe yet : the two last (Amaranth and Tobacco) do not grow above this.

The people of Budhi are all Bhotias, but in site and climate the village belongs rather to the Sub-Alpine regions, like Chaudans, though it lies north of the great snowy mountain *Ápi*. Its elevation is 8750 feet.

Immediately above Budhi a steep hill ridge advances from the mountain side on our left (N. W.) and extends across the width of the valley, leaving but a narrow passage for the river, close under the mountains on the opposite bank. The ascent, though considerable (some 1750 feet) is tolerably easy, by a fair smooth path, much better than any part of the road this side of the *Dhaulti*, the lower boundary of Bhot, in this quarter. The summit, *Cheto Binaik*, at an elevation of about 10,500 feet, is the entrance to upper *Byáns*.

On the ascent of the hill some alteration is apparent in the style of vegetation ; new species of Fir and Pine take the place of other trees, and the undergrowth of weeds, &c. diminishes. At the top the change of scenery and climate is complete, sudden and most agreeable, from the narrow dark ravine of the lower *Káli*, with its damp and stagnant atmosphere, to an open sunny Alpine valley, with a fair expanse of comparative level. The lower parts of the valley towards the river are occupied with villages and cultivation ; thence forests of Fir, Pine, and Birch, slope up to the base of the surrounding mountains, which rise on all sides in noble castellated walls of rock crowned with snow, and towering into the clouds ; the extreme snowy summits are hidden by the prominence of their lofty outworks. If perfection of climate and scenery could compensate for inconvenient seclusion and uncivilized condition of its people, this place would afford a most delightful summer residence ; the top of the hill, or the northren slope of it facing the *Bhótia* valley, would give many fine sites for a house or standing camp.

A gradual descent leads over sloping upland clothed with fine close turf, on which *Chanwrs*\* and *Zhobus* are grazing ; then through clean open forest of silver Fir (*Picea Pindrow* or *Webbiana*, Bhot : *Woman*, and Pine (*Pinus excelsa*) Khas : *Raisalla*, Bhot : “ *Lam-shin*.”

\* Indian name for the *Yak* of Tibet.

Weeds and jungle give place to flowers and neat shrubs; a fine Larkspur; Juniper (*Juniperus squamosa*) Khas: *Padbank*, Bhot: *Pámá* (in Jwár they call this *Bil*); another sort of Juniper with sharp thorny leaves exuding rank turpentine, (*J. religiosa*) Bhot: *Lhálá*, a willow-leaved shrub, the branches covered with small round yellow berries, a strong (edible) acid, (*Hippophaë salicifolia*) Bhot: *Tárwa-chuk*.

The road passes through Gárbia, the first village of Upper Byáns; the houses are mostly two-storied but ill-built affairs, and disfigured with a quantity of poles stuck about them (for ornament or superstition?) in all directions; they are flat-roofed. The elevation of Gárbia is, according to Webb, 10,272 feet.

The fields here contain Barley (*Hordeum ceeleste*) Khas: *Ua-jo*; Bhot: *Chámá*; Wheat, Bhot: *Náphal*; Turnips, and the two Buckwheats, all ripe or ripening.

A little beyond Gárbia stands the remnant of what was once the village of Chindu, now one or two houses, and a few fields, standing on the top of a narrow shelf of ground which the encroachment of the river is fast driving to the wall of rock behind. The base of this valley (like that of upper Jwár) is formed by an accumulation of old alluvium and debris from the surrounding mountain-sides, in strata of considerable aggregate thickness and loose consistency; through which the river appears to have cut its present channel, three or four hundred feet below the site of the villages, and to the great danger of those which are too near its bank. The Cheto hill above Budhi is in fact the abrupt termination of this elevated bed of detritus, forming southward an acclivity of 2000 feet or more (in vertical height); to the east and north-east, where the river breaks through, it appears in cliffs and landslips many hundred feet high.

From Gárbia the road descends to the bed of the river, and crosses by a substantial Sanga, a little above the confluence of the Tinkar, which is a large stream (not much inferior to the main body of the Káli) coming in two branches from the east and north-east.

We encamped on level ground by the river side, a little above the bridge and under a steep bank, on the top of which is the village of Changrew.

The Káli now turns abruptly to our left (N. W.), through a defile of steep rocky mountains, the natural grandeur of which is raised to sub-

limity by the veil of clouds that obscures the more distant and lofty parts, and so increases the apparent magnitude of the whole.

Thermometer at 4 P. M.  $60^{\circ}$ , boiled at  $194\frac{1}{2}^{\circ}$ ; elevation 10,000 feet. Changrew perhaps may be at the same height as the summit of Cheto Benaik, 10,500 feet.

The Bhótias of Chaudáns, who accompanied me thus far, here took their leave. I found them a civil and cheerfully working set of people, and had no trouble whatever from them. Sumhyaki is a stout, amiable and modest youth, deserving of more encouragement than the bottle of rum and handful of tea which I was able to give him. The men of upper Byáns were assembled to relieve the Chaudánsis, and equally ready to give every assistance, with Zhobus, ponies, and porters for my baggage.

Patwari Durga Datt having inducted the *Buddhas* and *Sayánas*, old and wise, into some idea of my designs on the lakes, they volunteered assistance, but also their own plan of operations, which after much discussion, I was obliged to reject as incomplete and unsatisfactory, their idea being to smuggle me past Taklakhar to Mánasarówar, and thence straight back again, which would involve much risk of stoppage on the way out, before reaching the Lakes at all, and leave Rákas Tál, and its communication with the Sutlej (if any) unexplored. Not till late in the evening, I got hold of the right man, Rechung or Rechu, Padhán of Kunti, from whom I derived information which decided me in adhering to my original intention of going his way. According to Rechu, there are two Passes at the end of the Kunti valley; Lánkpya Dhúra, on the extreme North West, and Mankshang, a little lower down and more easterly; both of them affording direct communication to the South and West shores of Rákas Tál, and round that lake, either way, to Mánasarówar, without passing through such populous places as Pruang. The Lánkpya Pass, in Rechu's opinion, is not stiffer than the "Lípu Lekh" of eastern Byáns; though he can't speak to the state of the snow upon it at present, as none of his people have crossed the pass since the bad weather, in which snow fell in the village of Kunti, and which proves to have been identical with the continuous rain which detained us at Gala on the 18th, 19th and 20th instant. The Kuntiyáls are the only people here who know any thing at all about the passes of western Byáns; all the other Byánsis are

absolutely ignorant, even of the names of the Dhúras,\* their traffic lying almost exclusively with Pruang viá the Lípu Pass, which is a more convenient route for all the lower villages.

Thermometer at sunset  $56^{\circ}$  ; clouds and a little rain at night.

24th September.—Thermometer at sunrise  $47^{\circ}$  (water the same temperature) ; weather fair.

The Bhótias being rather dilatory in mustering one or two requisites that I want for the Passes and Húndés, I have to halt this day.

In the morning I paid a visit to Changrew, up a steep hill, which forms a sort of elevated terrace at the foot of the great rocky mountain Kelirong, within the angle made by the confluence of the Tinkar with the Káli. The acclivity is clothed with Pine, Juniper, Dogrose, &c. &c. Changrew is much the same sort of village as Gárbia; its elevation, according to yesterday's estimate (500 feet above my camp on the river bank) 10,500 feet; it is unfortunately situated on the top of very unsafe ground, which is gradually descending by a huge landslide into the bed of the Tinkar, every year carrying away some yards of the village lands. The Tinkar below, is a good sized stream, at this time of year requiring a sánga for the passage of it. Six or seven miles up this river, and under Kelirong, is the village of Tinkar, and beyond that a pass of the same name (here at least,—the Dhúra probably has a proper name of its own), which communicates with Jidikhar, one of the villages (and as the "*Khar*" imports, once a fort) of Pruang, on the Karnáli, a few miles below Taklakhar. A mile or so above its termination in the Káli the Tinkar receives a tributary of some size, the Nampa-gár, which comes from the East and South-East out of two glaciers, the Southern one visible from Changrew, at the base of the snowy mountains Nampa and Ápi. Changrew and Tinkar belong geographically to Byáns, and are inhabited by Bhotias, the same in every respect as the other Byánsis, and sharing in the traffic with Pruang by the Lípu Pass. It was a mistake leaving this little valley to the Gorkhas, when the rest of the district was brought under British rule; the true frontier line was the range of snowy mountains on the East, Tinkar, Nampa, and Ápi, on the other side of which lies the district of Márma, the northernmost division of Dóti, and the inhabitants of which, like those of Dúng, next south, are Khasia and not

\* Dhúra—a high mountain-pass.

Bhótia. A case occurs on the opposite frontier of northern Garhwál, not unlike this of the Tinkar valley, but otherwise disposed of. "Nagpoor occupies the Dooab between the Mundakhnee and Alaknunda, branches of the Ganges uniting at Roodur-Pryág. From Tirjoo-ke-Narain near Kedarnath, however, there stretches down from North to South a high range of mountains lying a few miles to the west of the Mundakhnee, and the intervening space is occupied by two or three Khalsa villages of Nagpoor, but chiefly by the Suda-burt puttees of Purkundee, Bamsoo and Mykhunda, rent-free endowments of the Kedarnath shrine. In former years of the British rule, there arose some doubt whether this tract of country, being west of the river, did not properly belong to the Raja of Gurhwál's reserved territory, but as it was proved always to have formed a constituent part of Pergunnah Nagpoor, the claim of the Raja was disallowed." (Batten's Report on the Revenue settlement of Gurhwál, Appendix, para. II.)

Jashpál Budha of Changrew appears to be one of the most decent and intelligent of the Byánsis. He considers it the misfortune of his village that it was excluded from the British territory, though their condition has been a good deal improved, he says, since they have been allowed to pay their revenue dues to the Gorkháli Vakíl at the Bágeswar Fair (an arrangement suggested by the late Commissioner Traill I believe), instead of suffering the visitations of a Tehsildár; but he complains that no abatement of the Government demands has been made for the loss of whole fields of their village by landslips.

The district of Márma lies to the south (by east) of Byáns, as Dúng does from Chaudáns. There was formerly a pass from the top of the Márma valley into the valley of the Tinkar by the Nampa Dhúra and Gár; but this has become impracticable, and the Márma people going to Pruang (with which they have some little traffic) have now to come round through Dúng and Chaudáns, for they are also snowed up on the north and north-east, having no practicable passes that way into Pruang. Márma has iron and productive copper mines: the people bring copper pots, &c. to Dharchula for barter with the Chaudánsis and Byánsis: they have a Rájbar; his son, Amar Sing, has come to Dharchula occasionally.

Beyond Márma again, eastward and separated by snowy mountains (which are also impassable, I suppose, else the Márma people would go

that way, as being the more direct into Pruang) lies the district of Dhúli, which is the Alpine part of Bázingia, having direct communication and considerable traffic with Pruang viâ Jidi-khar.

Dhúli, is said to have but one single village of Bhótias, all the rest of the people being Khasia.

Bázingia is ruled by a Raja, now Gajráj Sing, who married a daughter of the Maháráj Ráj Rájindra s(h)áh Bikram of Nipál.

Beyond Bázingia, still further east, are Humla (north) and Jumla (south) through which flows the Karnáli after leaving Pruang ; and in Jumla it receives another branch, the Beri (or Bheri) whence the united river goes by the name of Beri-karnáli.

Dense clouds and rain all this afternoon ; the hut of bare mats which the Bhótias have made for me (very clumsily) is by no means comfortable in this weather. Rain continues all night.

25th September.—Morning still cloudy, but rain stopped. We continue our journey towards Kunti. The road turns off to our left (N. W.) following the course of the Káli, and passing over some very rough and steep ground, a ruinous bank of landslip formed by the channel which the river has excavated through the loose strata of the valley bottom. The mountains rise close on either side in fine precipitous walls of rock, the clay slate formation common to these Alpine regions, the stratification of which has been violently disturbed, contorted, and broken into thousands of castellated crags, the variety of the colors, many shades of red, grey and purple, adding to the picturesque effect. The mountain to our right is Kelirong ; in the map its upper part is called Byáns Rikhi, and the lower part Kourtekh. Byáns Rikhi is the proper name, not of the mountain, but of the gentleman supposed to dwell on the top of it, who appears to be identical with the great *Rishi* or sage Vyása or Vyás-deva, reputed author of the Mahábhárat, and sundry Puráns, &c., and *Byáns* seems to be nothing else than the modern form of the old Sanskrit name *Vyása*.

Hirkun (or Hurkun) Budha of Gárbia, Tokdár of Byáns, who accompanies me as Cicerone, &c. asserts that some of the Bhótias have climbed up this mountain for three days and not got to the top (the elevation of which is near 20,000 feet.)

Hereabouts are Jákti on the N. East, and Siti on the S. West bank of the river, hamlets cultivated by the Garbiáls ; they have suffered much from landslip, and are not permanently inhabited.



Crossing a small Gárh, Hangehu, which rises from the base of Kelirong, we pass through Tala-Kawa, a hamlet of one or two houses, the land cultivated by the Gunjials, for which they pay *rakam*\* to the Gurkháli government. It is a very picturesque place, with a pretty expanse of open fields bordered by copices of Pine, but the corn, now under the sickle, is very poor looking stuff. Here the gooseberry makes its appearance, by the Byánsi Bhótias called *Guldum*, which is also the Hunia name for the Bisehir grapes (and the Apricot too); the Jwári name for the gooseberry is *Sirgochi*: also the wild Apple Tree (*Pyrus baccata*) bearing a very small red crab, no bigger than a wild cherry. Both of these fruits are quite worthless.

The hamlet of Tala-Kawa, is a mile or two higher up, round the corner, on the road to Lípu-Lekh, which here turns off to the right.

Hereabouts we met a nondescript sort of person, late from Pruang, a native of Lamjung, in western Nipal on the river Gandaki, called also the Káli and the Sáligrámi. Below Lamjung is Betia, above it is Shámá, an Alpine district inhabited by Buddhist Bhótias, and communicating by snowy Passes with Húndés, which is there, as here, level table-land. This gentleman was not wanting in assurance, but could give no very clear account of himself, or of the countries through which he had travelled. He called himself a pilgrim, but looked more like a "Chevalier d'industrie." With difficulty I extracted a few particles of information from him; he says that the two principal communications between Nipal and Húndés are by Kirong in the western, and Nyánám in the eastern quarter, the former of which (also written Keero) is known to Indian Geography and is about north of Khátmánúdu; and the latter should be either another name of Kutí, which is the Lhassam frontier village on the road from Khátmánúdu to Digarcha, &c. or else some place close beyond, that though I cannot find such a name in any other authorities. From the "Geographical Notice of Tibet" (J. A. S. No. 4, 1832) by Csoma de Kőrös, I afterwards found that *Myán-am* is the name of the district. These are frontier posts, commanding the Passes of Nipal, each in charge of two *Zungpun* appointed from Lhassa, and acting jointly like the *Grapan* of Gnari. Deba Phundu, the late Zungpun of Pruang, is now gone to Kirong in the joint office. Kirong must be lower than Pruang, as it has trees and other signs of a

\* Revenue.

more temperate climate. *Kham* is a country of great extent, north and east of Lhasa ; the present Zungpun of Pruang is a *Khampa* (a man of Kham) from some place 20 days north of the capital, south of Digarchá, and Lhasa is the country of *Lho*, the people (*Lhopa* or *Lhoba*) Buddhist Bhótias, of Tibetan character, ruled by their own Lamas. This is the country, which, after the Hindus, we call Bootan, Bhutan, the country of the Daeb or Deb Raja, or the Deba Dharmma, the same visited and described by Turner, who unaccountably omits to give the proper name of it. "Lulumba," as Kishen Kant Bhowse has it, Asiatic Researches, 1825, Vol. 15, Art. III, is merely "Lho-lungba," i. e. "the country of Lho, and the "Lobath" mentioned in Soopoon Choomboo's letter to Warren Hastings, 16th November 1781. Turner, Appendix III. is probably a corruption of the same by the Persian translator. The "Kumbauk" there mentioned along with "Lobah," and alluded to by the same name, in other parts of Turner's account, is also, in my opinion, a similar confusion of the country, "*Kam*," with its inhabitants, "*Kham-pa* (the latter corrupted to "Kumbák.)

By the valley of the Karnáli, there are no great snowy ridges to be crossed between Humla and Pruang ; so that the route is much easier and practicable, longer than the other in the range of the Nepalese and British Himálaya ; nevertheless, in the height of winter the Humla Pass gets snowed up and becomes difficult or dangerous.

Descending from Tala-Kawa, the Kunti road crosses the Káli, the smaller branch of the river from the N. East, by a small Sanga 150 yards above its confluence with the Kunti-Yánkti, which is the larger branch from the north-west. The Káli at this point has a bed 150 yards wide, but contracting into much narrower limits a mile further up, and the stream is now all but fordable, though in the height of the rains it swells so much as to carry away the bridge here, and the road then has to cross higher up. The Kunti-Yánkti is a third larger than the Káli, both in size of channel and volume of water, and nearly four times the length from source to confluence ; notwithstanding which the eastern and smaller branch has given its name to the united river. The name of the Káli is said to be derived from the Kálápáni springs, erroneously reputed the source of the river, but in fact unimportant tributaries merely ; and both are so called from the dark color of the water ; but even in this respect the Káli is exceeded by the Kun-

ti-Yánkti; such are the foolish contradictions of Hindu Geography. This eastern Káli, however, is now the actual boundary between the British and Nepalese territories, and according to the Bhótias of the place, has always been so; therefore the map also, though theoretically right, is practically wrong in giving the name of Káli to the western river, the Kunti-Yánkti, and drawing the red boundary line along it.

Having crossed the Káli, the road now enters on a fine expanded valley of considerable length. At this end the flat and habitable, if not culturable ground at the bottom must exceed half a mile in breadth; it consists of the same accumulated alluvium and débris that I noticed at the entrance of the valley between Budhi and Gárbia, through which the river cuts a deep and modern-looking channel, leaving, mostly on the east bank, pretty extensive levels for villages and cultivation, but the fields do not appear thriving; the surface of the ground is very stony and the soil probably not so fertile as to compensate for the backwardness of climate and lazy slovenly tillage of the Bhotias.

The first village here is Gungi; the houses, as usual here, ill-built, flat-roofed, two (and some three) storied.

In the fields are Pháphar cut, and wheat ripe; wild plum trees, *Bongbale*, with fruit like that of the English sloe, and apple trees, covered with miserable little crabs. The north-east end of the village land has been devastated by a great landslip which came from the neighbouring mountain, Tipai, 3 years ago, covering the fields with a flood of stony débris.

On the opposite side of the river is the village of Napalchu, situated on the Per-Yánkti, a deep gár coming from Namjung (the 2nd of that name) a snowy mountain to the south-west.

From Kelirong we hear the sound of an avalanche, *Hünra*, which the Byansis call *Rhi*.

Two miles further on is Nabhi, a village like the others, with a good expanse of ripe wheat in the fields; and opposite to Nabhi, Ronkali, on the Dangnung-Yankti, which comes from a snowy ridge on the south-west, Ronkongper, through a deep ravine, dividing the mountain side. A pass across the Ronkongper, now dangerous and disused, once led into the Pelangár below Budhi; it was by this route that Byáns was entered by Rudurpál, former Rájbar of Ascot, and by him

subdued and annexed to the Ráj of Kumáon under the Gorkhas. The Dangnung is a good sized Yánkoti, with several Sángas thrown across it for the intercommunications of the village, which lies on both sides of the stream; and a bridge over the Kunti river connects Nabhi with Ronkali. An immense flood of débris brought down by the Dangnung, and by a huge landslip from Sildu, the mountain immediately north of it, has driven the Kunti river close under an advancing spur of the opposite mountain, here a wall of bare rock, the passage round which is rather precipitous, but not particularly difficult or dangerous, the road being built up with some care. Indeed it has appeared to me all along that the Chaudans and Byáns Bhótias have their roads and bridges in much better order than the Jwáris, and the natural difficulties of Upper Chaudans are perhaps greater than those of Jwár, always excepting the road from Milam to Dúng, an impracticable landslip, than which nothing can be worse.

Two miles more along the river bank lead to our encampment on Mangdang, a small level under the mountain Chachala, cultivated by the people of Rongkoli; opposite is Relákáng, a similar hamlet of the Nadhiyál, at the foot of a low hill spur which advances into the valley from the mountain Shángdoli, well wooded with Pine and Birch. This hill and a huge rocky mountain Nahl, on the right hand, intercept further view up the Kunti valley north-west.

This day was cloudy, but without rain. Thermometer at 4½ P. M. 56°; boiled at 192°, elevation of Mangdang 11,750 feet.

*26th September.*—Morning fair, Thermometer at sunrise 47.

Down the valley is a very fine view of the great snowy mountain Ápi, and as we ascend towards Kunti, the Peak of Nampa is disclosed adjoining Ápi on the north-east, the whole an immense mass of pure snow, without-flaw for a mile of vertical height, and now beautifully illumined by the rising sun. I have not yet seen such a fine specimen of perfect snow on the face of the Himálaya. Half a mile from Mangdang the road crosses the Nahl Yankoti, a small stream from the mountain of that name; on the opposite side of the river is Ganka, a stream rising in a glacier under a snowy mountain. The valley of the Kunti now contracts in width, the lower slopes of the mountains on both sides leaving little or no level ground at the bottom. The road goes along the east bank of the river, over steep and rough accumula-

tions of débris from the hill side above ; the Kunti here is shallow, but rapid, and 50 or 60 feet wide ; the water much discoloured, either in fact or in appearance, from the dark slate or limestone rocks over which it rushes.

We cross the remains of an old snow bank in the bed of the river, the first met in this journey.

The Pine trees are now getting scarce ; Birch continues and other shrubs ; Red Currant (*Ribes glaciale*), Bhot : *Mángle*, fruits small and insipid ; Black Currant (*R. acuminatum*), Bhot : *Dongole*, fruit equally worthless, said to be very abundant under Ápi and Nampa ; Tarwachuk (*Hippophaë salicifolia*) the berries of which are a palatable acid when quite ripe, otherwise disagreeably sour ; Dog-rose, white and red (*Rosa sericea and Webbiana*), *Sephala and Gor-Sephala* ; the Viburnum (*V. cotinifolium*), Khas : *Gúiyah*, Bhot : *Kotoble*, with purple berry, which grows in the lower hills also at considerable elevation ; and Wormwood (*Artemisia*), Bhot : *Pankima*, scenting the air with its fragrance.

Cross Nampa (the 2d) a small gárh from glacier, and snowy mountain of the same name ; see marks of the Brown Bear, *Barji*. Further on cross two or three small streams coming from the mountain Shakhshiram, and on the opposite side of the river are two larger Gárh's, Selasiti and Khárkulum," from mountains of the same names.

Here we are met by some of the men of Kunti come out for *Istikbal*, Kiti joint-Pudhán, with Rechu (who has accompanied us from Chingrew), Tanjan, brother, and Tashigal, son of Rechu, the two last young men and boy, clean, well dressed and smart looking, with a pony gaily equipped in embroidered saddle cloth and bell-collar ; they are as decent looking as the best of Jwári Bhótias, and a marked exception to all the rest of the Byánsis that I have seen, who are shabby and dirty, "usque ad nauseam ;" but they are merely got up for occasion I suppose, and will soon relapse into the general degradation of dirt.

The valley now opens again ; the mountains on our right hand recede a little and then come round with a fine theatrical sweep to the northward, enclosing a good expanse of tolerably level ground around the village of Kunti. On the other side of the river, the Pechko comes through a deep ravine from a glacier, under Gyúe Dhúra, by which

there is a pass into Sela of Dárma ; this route is practicable and still in use ; cross Hikong, a stream coming from a glacier under the snowy mountain Kariye, through a very deep channel in the low ground of the valley bottom, which, the same here as lower down, consists of deep accumulations of *débris* from the surrounding hill sides.

The Kunti crops, Ua-jo and Phápar, are just reaped : the barley was somewhat damaged by the snow which fell here for three days, the 18th to 20th instant, and yet they say the injury has been less than what they usually experience from frost, which most years sets in, at this village, before the harvest is reaped. Pass through the village of Kunti, the houses ill built, in 2 or 3 wretched stories, resting against the slope of the hill side, and cross the Hiánre, which is a stream like the Hikong, coming from the mountain Gúnye through a deep ravine in the lower ground ; it drives several watermills, Gháto, erected along the bank, the machinery consisting of a single horizontal wheel with oblique floats, or vanes, against which the stream is directed through a small wooden trough, and this construction is probably preferable to that of two movements, vertical and horizontal ; the loss of power in the oblique action being no worse than the excessive friction in the others, and the single wheel more economical and lasting ; the whole concern is contained in a mill house (Ghato-chim) some 6 feet cube.

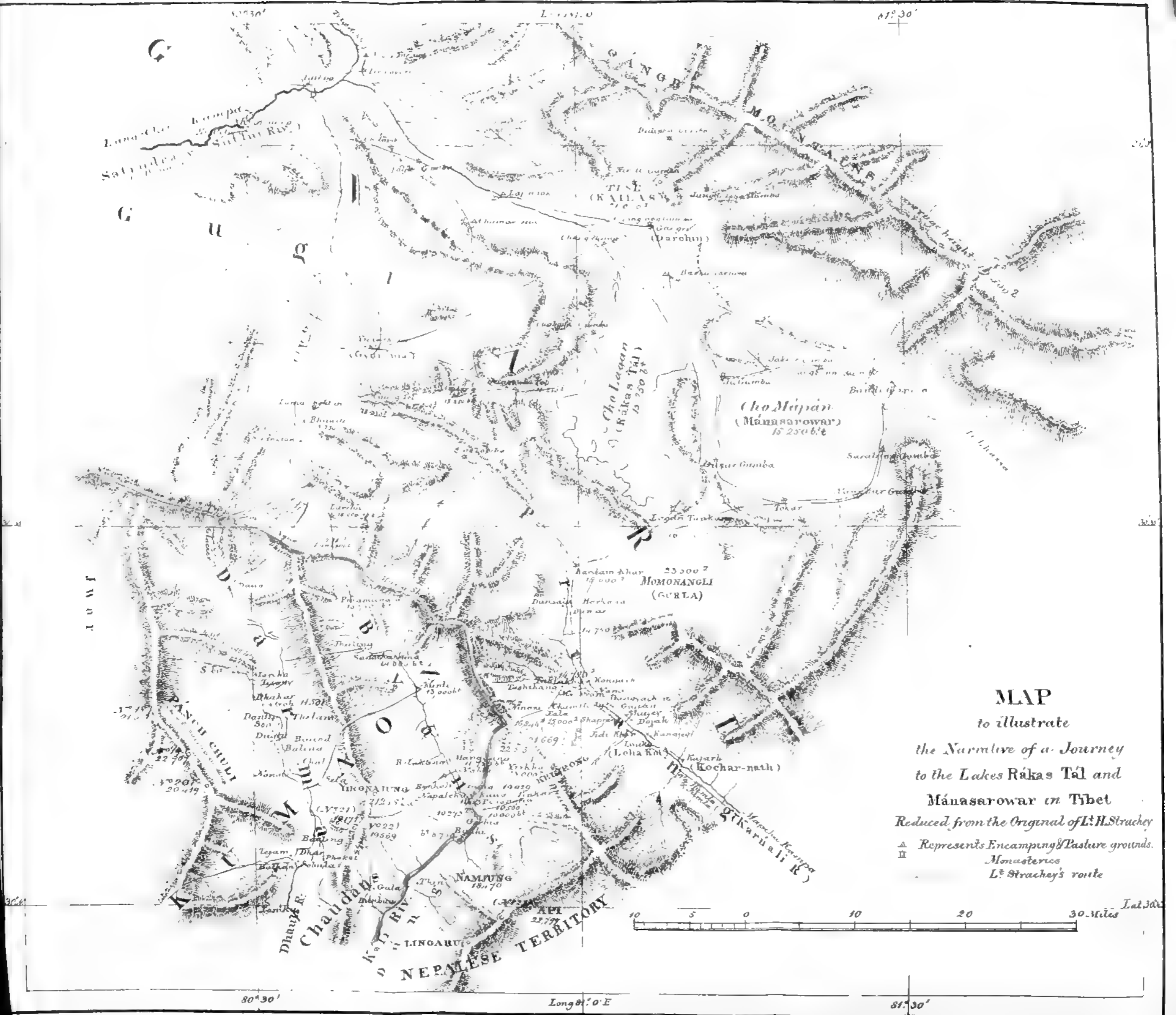
The proprietors of these mills take 2 seers of flour from each 20 Náli (about 30 seers) of grain ground for their neighbours.

Thermometer at 4 P. M.  $57^{\circ}$  ; boiled at  $190^{\circ}$  ; elevation 13,000 feet, which probably exceeds that of any other village in the British Himálaya.

The appearance of Kunti agrees with my estimate of its elevation ; the mountain sides round about have a scanty covering of brown ill looking grass with a little Juniper and Dáma, the height of a thousand feet or so, above which is bare rock and thin snow. On the other side of the river the mountains throw out some inferior spurs of hill, on which are scanty Birch trees, degenerating to mere shrubs, and the highest of them not 500 feet above the level of the village.

Evening cloudy, with a little rain ; Thermometer at sunset  $47^{\circ}$  ; not particularly comfortable in my hut of bare mats.

*(To be continued.)*



**MAP**  
 to illustrate  
 the Narrative of a Journey  
 to the Lakes RAKAS TAL and  
 MANASAROWAR in Tibet  
 Reduced from the Original of L<sup>t</sup> H. Strachey  
 ▲ Represents Encampings & Pasture grounds.  
 II Monasteries  
 L<sup>t</sup> Strachey's route



80° 30'

Long 81° 0' E

81° 30'

Lat. 30°





PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY, 1848.

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At a meeting of the Asiatic Society of Bengal held at the Town Hall on Wednesday evening, the 5th of July, 1848, J. W. COLVILLE, Esq., President in the Chair,

The accounts and vouchers for the preceding month were submitted. The proceedings of the last meeting were read.

*Dr. J. McClelland and Lieut. J. H. Maxwell* having been duly proposed and seconded at the May meeting, were ballotted for and elected members.

*Mr. Edward Colebrooke*, Pleader Sudder Dewanny Adawlut, was named for ballot at the August meeting, proposed by Mr. Colvin, seconded by the President.

Read letters—

From A. Allen, Esq. Officiating Secretary to the Government N. W. Provinces, dated Agra, 31st May, forwarding copy of a Journal of the passage from the Dharee falls to the Herenphal (Nerbudda), by Capt. Fenwick, late of the Nizam's service.

From the same, dated 28th June, received the 5th July, forwarding an account of observations made by Lieut. R. Strachey, Engineers, on the motion of the glacier of the Pindur in Kumaon.

From Capt. Thuillier, regarding the form of publication of the Meteorological Register kept in the Surveyor General's Office, also forwarding the Register for June.

From Mr. Hodgson, Darjeeling, enclosing copy of a letter to Capt Cunningham on Himalayan Geography.

From the same, a memorandum on the Tibetan type of mankind.

From Mr. Frith, identifying the insect, of which a drawing was lately received from Brigadier Stacy, as the larva of a species of *Locusta*, Gen. *Acanthodes*.

From Capt. Hutton, notes on the nidification of Indian birds.

From Capt. Kittoe, forwarding a Sanskrit inscription from Behar, with note by Mr. Laidlay.

From Capt. A. Cunningham, the sequel of his essay on the route of the Chinese pilgrim Hwan Thsang through Affghanistan and India, during the first half of the 7th century.

From Colonel Low, communicating four essays and papers :—

1. An account of inscriptions from the Malayan peninsula.
2. Translations from Bali works.
3. Gleanings in Buddhism.
4. General observations on the contending claims to antiquity of Bráhmans and Buddhists, with copies of inscriptions, fac similes of coins, &c.

From the Rev. Mr. Mason, on the Gum Kino of the Tenasserim Provinces.

From the Librarian, Rajendralal Mitra, respecting Wilford's Ancient Geography, with reference to Mr. Elliot's late communication.

From Mr. F. Gomes, reporter to the *Hurkaru*, asking whether Reporters for the public press might be permitted to attend the Society's meetings.

The question having been referred to the meeting was decided in the negative.

A coin from Lieut. Thurburn, several from Colonel Low, copies of inscriptions from the Malayan provinces, two stones from Capt. Frazer of Engineers inscribed with the celebrated formula "Om! mani padma, hom," in Tibetan and Ranja characters, were exhibited on the table, for which the thanks of the Society were voted to the respective donors.

The communication from the Council regarding Mr. Blyth having been renewed in the terms last proposed,—

Mr. Blyth read a reply to the strictures of the Section of Natural History on his alleged neglect of his duties as Curator.

The Secretary read a letter from Mr. Heatly stating that Mr. Blyth had been long exonerated from the charge of the fossils by the Council of the Society.

The President then proceeded to take the sense of the meeting on the several propositions of the Council, the 1st, "that the Report made by the Section of Natural History on Mr. Blyth's reference be received, read and laid upon the table," having been already carried into effect.

2. Proposed by the Council, "that the Society must decline to forward or support the application of Mr. Blyth to the Court of Directors for an increase of salary or a retiring pension."

Upon this an amendment was proposed by Mr. Newmarch and seconded by Capt. Champneys—"that the Society forward Mr. Blyth's application to the Court of Directors with their recommendation in its support."

After much discussion the amendment having been put to open vote and there appeared

For amendment, .....	8
Against ditto, .....	11

The proposition of the Council was then put to open vote and there appeared

For proposition, .....	12
Against, .....	8

The proposition was accordingly carried.

The 3rd proposition having been read, "that the Society cannot acquit the Curator of serious neglect of duty in permitting the collections of shells, fossils and insects to fall into the state of dilapidation in which the same are now found to be,"—

The general sense of the meeting was declared to be that the neglect of the *fossils* should not be included in the censure.

This word having been withdrawn, the proposition was put to the vote and lost.

The 4th proposition having been read, "that the Section of Natural History be requested to adopt measures for the restoration and re-arrangement of these collections."

Mr. Mitchell moved as an amendment, seconded by Capt. Champneys, "That a sub-committee, consisting of Messrs. Frith, McClelland, and Newmarch, be appointed to adopt measures to restore and re-arrange the collections."

Dr. McClelland having declined to act on this committee, the amendment was put to the vote and lost, and the original proposition carried.

The 5th proposition for the printing and circulation to members of the documents submitted in this enquiry having been already acted upon, the 6th was read,

"That the thanks of the Society be voted to the Section of Natural History for the service they have rendered to the Society by their investigation of reports upon the manner in which the duties of the Curator have been discharged."

This proposition having been put to the vote was carried by a majority.

The Librarian having submitted his monthly report the meeting adjourned.

J. W. COLVILLE, *President.*

J. W. LAIDLAY, *Secretary.*

## LIBRARY.

The following books have been received since the last meeting :—

*Presented.*

The Silurian System, founded on Geological Researches in the counties of Salop, Hereford, Radnor, Montgomery, Carmarthen, Brecon, Pembroke Monmouth, Gloucester, Worcester, and Stafford; with descriptions of the Coal-fields and overlying Formations.—BY R. J. MURCHISON, 1 vol. 4to. and a map.—BY J. W. GRANT, Esq.

The History of the Reformation of the Church of England, by Gilbert Burnet, D. D. 2 vols. Rl. 8vo.—BY THE SAME.

The Heimskringla; or, Chronicle of the Kings of Norway. Translated from the Icelandic of Snorro Sturleson, with a Preliminary Dissertation, by Samuel Laing, 3 vols. 8vo.—BY THE SAME.

The Quarterly Journal of the Geological Society of London, No. 14.—BY THE SOCIETY.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, herausgegeben von der Geschäftsführern. Zweiter Band I. und II. luft.—BY THE EDITOR.

Zakarija Ben Muhammed Ben Mahmud el Camvini's Kosmographie. Zweiter Theil, كتاب اشبالبلاد, De Denkmäler der Länder. Aus den Handschriften des Hn. Dr. Lee und den Bibliotheken zu Berlin, Gotha und Leyden, herausgegeben von Ferdinand Wüstenfeld. Gottengen 1847, 1 vol. 8vo.—BY THE EDITOR.

The Calcutta Christian Observer for Aug. 1848.—BY THE EDITORS.

The Oriental Baptist, No. 20.—BY THE EDITOR.

The Journal of the Indian Archipelago, Vol. II. No. VI.—BY THE EDITOR.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of June, 1848.—BY THE DEPUTY SURVEYOR GENERAL.

Tatwabodhini Patriká, No. 60.—BY THE TATWABODHINI SOBHA.

The Upadeshaka, No. 17.—BY THE EDITOR.

*Exchanged.*

The Athenæum, No. 1072.

Journal Asiatique, No. 52.

The London, Edinburgh, Dublin, Philosophical Magazine, No. 216.

*Purchased.*

Calcutta Review, Nos. III. and IV.

The North British Review, No. XVII.

The Annals and Magazine of Natural History, Second Series, No. 5.

Comptes Rendus Hebdomedaires des Seances de l'Academie des Sciences, Nos. 14 to 17.

# Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of July, 1848.

Lat. 22° 33' 28.33" N. Long. 88° 23' 42.84" East. Mag. Variation 2° 28' 36" East. Mag. Dip. 27° 45'.

Days of the Month.	Observations made at sunrise				Maximum Pressure observed at 9h. 50m.				Observations made at apparent noon				Observations made at 2h. 40m. p.m.				Minimum Pressure observed at 4 p.m.				Observations made at sunset.				Maximum and Minimum barometer.		Rain Gauges.		Days of the month.				
	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Max. num.	Mean.	Minimum.	Maximum.	Elevations.								
		Of the Mercury.	Of the Air.				Of the Mercury.	Of the Air.				Of the Mercury.	Of the Air.				Of the Mercury.	Of the Air.							Of the Mercury.	Of the Air.	Of the Mercury.	Of the Air.		Of the Mercury.	Of the Air.	Feet.	Feet.
1	29.50	83.2	84.0	82.4	W.	Cloudy cumul.	29.55	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	1							
2	29.51	83.4	84.5	82.4	W.	Cloudy.	29.56	85.2	86.0	84.4	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	2							
3	29.51	82.7	83.4	81.4	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	3							
4	29.51	83.8	84.5	82.3	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	4							
5	29.51	82.5	83.4	81.5	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	5							
6	29.51	81.0	82.0	80.0	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	6							
7	29.51	81.0	82.0	80.0	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	7							
8	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	8							
9	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	9							
10	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	10							
11	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	11							
12	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	12							
13	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	13							
14	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	14							
15	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	15							
16	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	16							
17	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	17							
18	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	18							
19	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	19							
20	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	20							
21	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	21							
22	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	22							
23	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	23							
24	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	24							
25	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	25							
26	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	26							
27	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	27							
28	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	28							
29	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	29							
30	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	30							
31	29.51	80.0	81.0	78.8	W.	Cloudy cumul.	29.56	85.0	85.8	84.2	S. W.	Cloudy.	29.45	80.2	81.3	83.4	W.	Cloudy.	29.45	81.5	82.5	81.4	81.0	81.4	81.4	31							
Mean	29.540	80.6	81.3	79.6			29.575	88.0	86.7	81.8			29.551	89.8	88.4	82.0			29.500	88.2	87.1	81.4			29.498	84.8	84.8	80.7			91.0	16.09	17.50

Mean of the corresponding month of 1847  
29.556 73.4 80.2 78.3

29.591 86.8 85.8 81.9

29.571 88.8 87.6 81.3

29.520 88.5 87.7 81.3

29.500 88.3 88.9 80.8

29.526 83.2 83.2 79.1

14.14 15.69

The total quantity of rain for 1847 was, ..... 72.36 Inches.  
The quantity of rain which fell in the corresponding month of 1847 was, ..... 15.69 ..  
And for the present year up to the 31st August, ..... 36.96 ..

The height of the surface of the Mercury in the cistern of the standard Barometer in the Observatory attached to the Surveyor General's Office above the Mean Level of the Sea, having been deduced from a series of Tide Observations taken from a Register kept at Kyd's Dock Yard, the result is recorded for general information

Lowest monthly average of Mean Tides in the month of February and March above the zero of Gauge at Kyd's Dock Yard, Calcutta, 8.38 Feet.  
Difference of level between the zero of Tide Gauge at Kyd's Dock Yard, and the standard Barometer at the Observatory, ..... 26.59 ..  
Height of standard Barometer above the level of the Sea, ..... 18.21 ..

H. S. THULLIER,  
Officiating Deputy Surveyor General.



JOURNAL  
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AUGUST, 1848.

*Narrative of a Journey to Cho Lagan (Rákas Tal), Cho Mapan (Mánasarówar), and the valley of Pruang in Gnari, Húndés, in September and October 1846. By HENRY STRACHEY, Lieut. 66th Regt. Bengal N. I.*

(Continued from page 120.)

27th September.—Morning pretty fine but clouds still hanging about the mountain tops. Thermometer at 8 A. M. 38°; must have been freezing at night. This valley is so shut in by lofty mountains that the sun does not show his face for some two hours after the proper time of his rising, and apparent sunset is premature in the same degree, so that the day is much curtailed of its fair proportions, which the climate of the place can ill afford.

Here I make my last halt to-day in order to sort my baggage, getting rid of the greater part of it, and to muster my Bhótias with cattle and all other requisites for progress across the snow. I leave all my domestic servants, with the impedimenta; the Hindus, including two Paháris, are already hors-de-combat, as much I believe from the after effects of the heat to which they were exposed in the lower part of the journey, as from the present cold, which is not very severe. My Musulmen are still pretty lively, but they probably would become unserviceable to me, if not to themselves at 14,000 feet, so they may keep the Hindus company.

I consider it adviseable also to reduce the bulk of my Káfila as much as possible, the better to avoid notice, though my Bhótia companions

seem inclined to multiply themselves and their beasts for mutual protection against the dangers of our expedition. Hirkun Budha considers that one of the greatest risks we have to encounter is the Khampa, who he says are little better than organised gangs of robbers infesting the vicinity of Darchin and plundering all parties they may meet not strong enough to protect themselves; they are in greater force than usual this season, attracted by the concourse of people and concomitant opportunities of plunder, attending the twelfth year religious fair at Gángri. This year the Byánsi Bhótias thought it necessary for their own safety to enter Húndés in armed parties, to which precaution they ascribe their escape from a considerable “*luting*” and “*máring*.” The Khampa are so called from their native country, “Kham,” which is probably identical with the “Kumbák” of Turner; and pending more certain information about them they may be set down as an extensive horde of what we call Tatars (vulgo Tartars) occupying a large tract of country on the north-east of Tibet between latitudes  $30^{\circ}$  and  $40^{\circ}$  and longitude  $85^{\circ}$  and  $95^{\circ}$ , and filling up the blank in our maps, between the Huns of south-western Tibet and the hordes of “Kilmák,” “Calmucs,” “Eleuths” or “Tatars of Koko-Nor,” towards the frontier of China Proper. These people frequent the province of Gnari in considerable numbers under the color of trade and pilgrimage; and they bear a general bad character, both Hunias and Bhótias regarding them with fear and distrust, particularly in unprotected situations where their thievish propensities are said to break into open robbery. On some occasions when unusually mild weather rendered the passes of the Himálaya practicable during the winter months, they are reported to have extended their depredations across the snow, and rifled the houses of the upper villages whilst the Bhótias were absent in their winter quarters below. The Khampa however are not exclusively of this sort; one of the tribe, by name Lochambel, who come from a distance of  $1\frac{1}{2}$  month’s journey with salt, Borax and Pashm to Gartokh and Pruang, is a wealthy and respectable person, well known and esteemed by our Bhótias who have dealings with him. He once, at short notice, lent Chakwa Garpun 62 *Nega* of gold, some 20,000 Rs. worth. The country of Kham is said to be under the dominion of the Lhasa Pontificate, but the extent and nature of the authority exercised is very questionable. I doubt whether the Lhasan Court have any regular



system of government established in Kham under their own officers, as they have in the province of Gnari.

I must now introduce my assistant, Bhauna Hatwál Khasiah, Bráhmañ, Kumáoni, of Jhirkuni, a village near Lohu-ghát. I believe he is the only native of British Kumáon or Garhwál not a Bhótia, that has any personal intercourse with Húndés. For many years past he has been engaged in a small trade chiefly with Pruang, either on his own account or as agent for some of the Almora merchants. The commencement of his intercourse with Gnari was characteristic: making his first appearance at Dába (viâ Jwár) he was forthwith arrested as a "Nia Admi," and brought before the *Zungpun* for examination; he pleaded that "in the days of Chand" some of his ancestors had been in the habit of visiting the Jang-Tang\* for purposes of trade, and he hoped for a renewal of the privilege to himself, on which the Deba directed the Clerks to make search in the archives of Dába, where sure enough, they found mention of one Bhauna Hatwál, an authorised trader from Kumáon some 100 years ago, and the present Bhauna was then admitted to free intercourse with all parts of Gnari. For the first year or two he went through Jwár to Dúngpu, Dába, and the Gartokh Fair, but the avaricious interference of certain influential Jwári Bhótias, jealous of the competition with their own trade, threw such impediments and annoyances in his way that he abandoned that route and took to a more limited traffic with Pruang, through Byáns; he met no opposition from the Bhótias of this district, who if less civilized than their brethren of Jwár, are less sophisticated, and as their own trade is chiefly confined to the barter of grain for salt and Borax, Bhauna's dealings in Europe cloths, Pearls and Corals gave them no offence. In quest of Pearls and Coral and other merchandise for Húndés, Bhauna has been often to Jaipúr and sometimes as far as Calcutta and Bombay, and he is probably the only man now living who has visited those places and Gartokh. He is proficient, colloquially, in the Gnari dialect of Tibetan and his ideas generally have been somewhat expanded by travel. He was introduced to me, unexpectedly only the day before I left Almora (31st October, ultimo): but having heard previously of his qualifications, I engaged him to accompany me on this expedition; never having been to the lakes by the out-of-the-way route I am now taking, he is nothing of a guide, but promises to be useful as informant general-

\* i. e. Uplands of Tibet.

ly, and negociator in case of any untoward collision with the Hunias ; also as interpreter, for I can scarcely understand these Byánsi Bhótias, who have a language of their own (a dialect of the general Bhótia language with little affinity to the Hindi,) and their Hindustani is hardly more intelligible ; they have some imperfect acquaintance with the Khasia-Hindi of the lower hills, but speak it like a foreign language. It is a curious circumstance that the Bhótias of Jwár do not speak the Bhótia language, but a dialect of Hindi like that prevailing in the lower hills ; all the respectable people among them communicate fluently in ordinary Hindustani, and a few are literati in a small way.

The case of Bhauna is one instance to show that the Bhótia monopoly of the trade between Kumáon and Gnari is ascribable not solely to the jealousy of the Lhassan Government but something also to the avaricious spirit of the Jwári Bhótias, which seems to have its own way notwithstanding the British administration of the Province ; the difficulties of the Alpine route and snowy passes, the inhospitable climate of Húndés, together with the poverty of the markets, and actual insignificance of the trade, and much of course to the moral hindrances. Any possible extension or participation of the trade, such as it is, by the Almora merchants should be sought, I think by the way of Byáns, where the Bhótias are more tractable to strangers and the snowy passes less formidable to lowlanders.

As I have before mentioned, there is already some traffic of the Khasias from Dúng of Doti, which passes through Byáns without molestation. The Nítí pass, next in facility to Lípu Lekh, should be similarly open to adventurers from lower Garhwál. But to tell the truth, there seems little scope for material improvement of the Hunia trade so long as the Province of Gnari labours under the political depressions and restrictions that emanate from Lhassan tyranny and Chinese influence, nor is that system likely to be changed at the mere request, or demand even of the British Government. The abolition of the Ládák monopoly of shawl wool, when effected, may perhaps add to the trade of Bisehir and our newly acquired Trans-Sutlej hill districts, but it can do little for Kumáon and British Garhwál under present circumstances. It is to be regretted that none of the Káshmiri refugees have settled in these provinces, where their manufactories could be carried on to great advantage from the proximity of the raw material, and now particularly that the supply of it promises to be unrestricted.

A Káshmíri colony and shawl factory in some part of Kumáon or Garhwál, is still a feasible and promising project ; but it would require encouragement and good management at the outset ; such I believe, were bestowed by the local authorities at Ludhiána when the immigration of the Káshmírís naturally passed that way.

Maximum Thermometer in the sun this afternoon, 62° ; evening cloudy, Thermometer at 9 P. M. 42°.

28th September.—Thermometer at sunrise 34° ; morning fine. After some delay, on the part of myself as well as the Bhótias, with packing and loading baggage, &c., we start soon after noon ; the party consisting of myself, Bhauna, Anand, a young relation whom Bhauna has thought proper to bring with him, to assist in cooking dinner, etc : though as this is Anand's first visit to Hundes, or southern Bhote even, he is likely to be of small use in manual service : Rechu (Pudhán of Kunti) and five other Bhótias, two of whom are supernumeraries intended to return to Kunti when the rest of the party get well over the pass. I begin to have misgivings about Rechu, who I fear is no better than a demi-savage, and I rather regret that I have not taken Hirkun, the Thokdar, in his stead, as in fact Bhauna from the first advised, but in such a sneaking suspicious way that I rejected his suggestion in disgust. The other Bhótias are, if any thing more uncivilized than Rechu. When first asked who were to accompany me, I said that I left Rechu to bring whom he chose from his own village, (as I thought the most simple and convenient plan) but the men of Kunti raised objections, and after much discussion, it was settled coram Patwari and Thokdar, that the service should be equally distributed (like the supply of baggage cattle, provisions, &c.) each village furnishing one man, and then the separate villagers began to assert their independence of one another, and of Rechu, who was mere Pudhán of Kunti they said, and of no authority out of his own village. They will cool down a bit I hope, when I get them well into the snow. Notwithstanding these bêtises and their general rudeness I have had reason as yet to be well satisfied with the readiness which the Byánsis have shown in meeting all my requisitions, whatever part of that alacrity may have arisen from their inability to distinguish between the Government official and the mere private adventurer.

Our baggage goes upon six Zhobus, four of which are however

Chanwr (the Yak) which latter appear to be more numerous in Byáns than the mule breed; and two more of these cattle go as far as the pass to take fuel and assist in relieving the loads of the others in case of difficulties in the snow. We have also a couple of saddle ponies, which may be of use beyond the pass; these are indifferent, long-legged animals, bred in Pruang, whence the Byánsis get the few horses that they have. The only things in the shape of tents that I have been able to get from the Byánsis are half a dozen "Chera," which are blankets, perhaps four yards by two, furnished with loops at the corners and sides by means of which with two sticks and a few pegs of Birch tree a quasi tent is rigged out in a few minutes to any required size and shape, and if necessary the several Cheras are tacked together with the large needles and woollen yarn which every Bhótia carries with him. We have taken provisions enough to subsist us all for near a fortnight, so that we may be independent of intercourse with Hunia villages and *Dúng*, in which lie risks of an untimely end to our travels.

To obviate the questionable appearance of English bottles, as well as their fragility, I have filled a lot of Port wine into a pair of the Bhótia wooden surais, and some rum, &c. into another pair. The spirits should do well enough in this style of decanting, but it is a very doubtful experiment with the Port already deteriorated to the usual Indian quality.

I have of course adopted the Hindustani "*Dhab*" of costume, just enough to pass muster in the distance, and nothing more, as I have not attempted to disguise the Feringi complexion of my face and hair, and my clothes are so much cleaner than the cleanest of my companions that the contrast entails some risk of attracting notice and marking me for a "Nya ádmi," in a country whose native inhabitants vie with their authorized visitors from our side of the snow in the personification of filth. I perceive now that I should have had my clothes dyed of a dirt colour as the only possible way of getting up a passable resemblance to the Byánsi Bhotias, or even to my Kumáonis, who are also villainously dirty. In Jwár I found some of the head people tolerably clean and decent.

For food, &c. having laid in a good stock of materials, I depend for cookery on Bhauna, Anand and the Bhótias.

All my Hindustani servants, with the bulk of my baggage, &c. re-

main at Kunti, till they get notice of our having crossed the pass, when they go down to Gárbia or Budhi, and there wait my return to lower Byáns by Lipu-Lekh.

I have instructed the Patwári to apprehend nothing particular for a fortnight or so ; if our absence exceed that time to send out scouts in the direction of Taklakhár, and in event of our being imprisoned or otherwise coerced or maltreated by the Hunias to do what he can for our rescue and report the state of affairs to Batten. Thokdár Hirkun, the best of the Byáns Bhotias, takes his leave, with repeated warning to me against the "Khampa," whom he seems to think worse enemies to progress than the Pruang Zungpun and his satellites.

Leaving Kunti at length we descend and cross the river (though here easily fordable I should think) by a small Sánga, and a mile or two on cross a small rivulet, Mangdang ; the valley now narrows to a mere open glen, the river and the road one or two hundred feet above it, gradually rising, and the mountains on both sides decreasing in relative (if not absolute) height. A considerable stream, the Toshi-Yánkti, nearly as large as the western branch of the Kunti River, comes through a large ravine, entering the main valley from the northward. The top of the opposite ridge of no great height apparently, and only just tipped with snow, is said to look into the table-land of Hundes (the western branch of the valley of Pruang) but there is no pass this way, the mountain being steep and rocky ; and yet some one must have been to the top to have seen the said view into Hundes. The Surveyor's Map calls this stream Kembelchoo. The road continues over a tolerably level shelf in the hill side, affording a pretty smooth and easy path a few hundred feet above the river. The only vegetation here is grass and a few herbs reaching one or two hundred feet above us, and on the northern exposure of the hills to our left the snow has descended nearly to the limit of vegetation. Having started so late in the day we make but a short march to Sangchúngma, a mere encamping ground near a small stream on the shelf in the mountain side ; the river is one or two hundred feet below us and not visible from this owing to the depth and narrowness of its channel.

Thermometer at 5 P. M.  $41^{\circ}$  ; boiled at  $188^{\circ}$  ; elevation of Sangchúngma 14,000 feet.

Evening cloudy, with slight symptoms of rain or snow.

My share of our camp equipage turns out to be two "Chera," one stretched tent-wise over a rope between two sticks, and the other closing one of the gable ends; which covers altogether an available area for lying and squatting of six feet square or thereabouts.

Night cloudy and cold. Thermometer at 10 P. M. 34°.

29th September.—Morning clear; at sunrise Thermometer 31°. Ice on the still parts of the neighbouring stream and in lots of water left outside at night.

Leaving Sangchúngma, we continue our journey by a very easy ascent over the same sort of undulating berm on the hill side that prevailed in yesterday's march. The ground is covered scantily with grass and a few herbs, among which is *Poh* (*Rhododendron anthopogon*) now in seed; I saw it in flower in Jwár last June, the whole plant is very fragrant, and exported to Hundes for the benefit of the Lámás, who use it for incense.

Monks-hood, or Wolf's-bane, *Atis*, (*Aconitum heterophyllum*) the root of which is exported to the plains of India as a medicinal drug.

A few scraps of Juniper, and Potentillas not in flower.

Cross a rivulet, Nikúrch, and further on we come to the new snow which fell on the 18th, 19th and 20th of this month (when we were imprisoned by the rain at Gala in Chaudáns) and still lies on the northern slopes and other sheltered spots of the ground over which our road passes. Cross the Jhúling-Yánkti, up which is the Pass into Dárma over Lebun-Dhúra, and we here meet two Sípáls\* of Dárma, who have just come this way, with infinite trouble they say, 3 cos in 6 days, through deep snow, which however I do not believe any more than the height of the pass marked on the map 18,942 feet. This Jhuling is the usual halting-place half way between Kunti and the foot of Lánkpya. Cross another stream coming through Byank-shiti, a small pool which must be a permanency (though it would hardly be expected from the loose moraine-like appearance of the ground) as there are traditions that some Raja of Byáns in days of yore indulged his fancy by calling the puddle Mántaláw, and one of the neighbouring snowy peaks (of no remarkable figure) Kailás, after the great originals of those names in Húndés.

The snow now increases and our path lies over it constantly.

\* Men of Síbu, in Dárma.

Cross the Rárub-Yánkti, which consists of one or two rivulets flowing through a remarkably wide and level bed, that looks much like an extinct Taláo, with a single small exit into the Kunti river.

Beyond this, the snow entirely covers the ground, wherever that is level enough to retain it ; it is tolerably deep in the hollows, and on the northern slopes, but well frozen and hard enough to afford fair footing to man and beast ; the ascent too is very gradual, over easy undulating ground ; so that we have got on without much trouble ; but I have suffered something from the excessive glare, my hands and neck being already severely scorched. I found a pair of the Bhotia hair shades sufficient protection for my eyes, though not equal to the wire-gauze of English make.

After a march of 7 hours, and which strange to say, measures only 8 miles on the map, we encamp at Phíámangbu, (a mere name) the "Dakhna" (as the Bhótias call the hill-foot) of the two passes. To the northward, in front of us is Lánkpya, which we cross to-morrow weather permitting, and to our right, Mankshang, the direction of which is almost eastward from this, and it is said to be rather more difficult than the other ; neither of them look very steep or lofty. The Kunti river here consists of a small divided stream winding through a wide and level bed, now so full of snow that we had some difficulty in finding a few feet of bare stones for our encampment.

Afternoon and evening cloudy with slight indications of snow, or particles of frozen mist not enough to whiten the ground, which Bhauna says are signs of safe weather, precluding the likelihood of actual snow-fall.

Thermometer at 5 P. M.  $33^{\circ}$  ; boiled at  $185^{\circ}$  ; elevation 15,750 feet.

The rarefaction of the air is very sensible here ; what I feel is a mere shortness of breath in any bodily exertion whatever ; and in drinking, and even in talking, the same symptom is very decided.

30th September.—I found it rather cold last night, and the thermometer at sunrise this morning  $18^{\circ}$  ; a temperature at which it is not easy or agreeable turning out of bed. We start accordingly at  $9\frac{1}{2}$  A. M., rather later than is proper with a snowy pass in front.

Crossing the Kunti Yánkti, which rises not far off to the westward in deep beds of snow, the stream here shallow and half frozen, we ascend the mountain side to the northward ; the valley here comes to

an end, and no further progress could be made but by scaling the hills in one direction or other; the head of the river appears quite impracticable from depth and steepness of snow. Our road lies over a moderate acclivity, but completely covered with snow, which goes on increasing to an unpleasant depth; the pure unsullied surface without the vestige of a track upon it, indicates a recent and heavy fall, since which the pass has not been crossed. The glare is intense: the surface of the snow is frozen and hard enough to afford tolerable footing to a man on his own feet, but the cattle sink deep at every step; when only knee-deep they get on, though slowly, but where the snow meets their chests it is with the utmost difficulty that they can gain a step; being also exhausted by the rarity of the air which here affects both man and beast. I found it useless to attempt riding through this snow, for the sudden sinking, plunging, and floundering of the horses was such as to knock the breath out of me at every step. The Zhobus would have been better for riding here, but it was necessary to have our two spare cattle unladen in the front, so as to tread down a passage through the snow by which the rest followed with the baggage. At 1 p. m. the cattle came to a stand-still, yet a long way below the top of the pass, and the Bhótias seemed inclined to follow the example of the beasts, and began to talk of the impossibility of getting further, but as the difficulty did not appear to me to be insurmountable, with the two Kumáonis I went on ahead to a small heap of stones or projecting rock free from snow, where we sat down, determined, or pretending a determination, to pass the night there rather than go back, and in hopes of so shaming or alarming the Bhótias into better exertion to join, I began to read a newspaper (which I had got at Kunti), but soon found it intolerably cool work in such a situation.\* In the course of an hour and a half

\* On the ascent of this pass I observed that where holes were sunk in the snow by the foot of man or beast, or by a walking-staff or otherwise, the snow inside assumed a very fine deep colour between azure and sea-green (like Turquoise colour), and I remember to have seen the same appearance in the deep fissures at the top of the Gori Glacier (above Milam in Jwár), near its origin at the head of the valley, many miles up where the substance of the Glacier seemed to be half ice half snow; this must be the inherent colour of the pure rain or snow water, I imagine, (as azure blue is supposed to be of the air) for I saw it when the sky was dull and dark with clouds and incapable of reflecting any such colour, nor did I ever notice it in the old and dirty snow on the Jwár passes in the end of June.



the Bhótias managed some how or other to get the cattle through the deep snow which had promised to stop them altogether; they came up to us at 2½ P. M. and we proceeded again towards the top. This stage of the ascent fortunately proved easier than the preceding, or we should never have got over it in the day. Though the acclivity was steeper (and for that reason, I suppose) the snow decreased, and occasionally patches of bare rock afforded much relief, which was the more needed as the rarefaction of the air became more decided; the Zhobus, Bhótias, and Bhauna were not much exhausted, but Ánand, the young Kumáoni, a novice at this work, was quite ill. I felt passing heavy in the head, as though a *mun* weight were hung over my neck, and the ponies were grunting and groaning in sore distress; I again attempted to relieve myself by riding, but one of the beasts staggered back under my weight absolutely unable to carry me one step upwards, and I found the struggles of the other more intolerable than my own exertions, so I was fain to dismount again and get on the best way I could on my own legs. We reached the top of the pass, at length, by 4½ P. M. Two thousand feet is I think sufficient allowance for the vertical ascent from our last encampment, Phíámangbu, at the bottom of the pass, and the horizontal distance is only 4 miles, which has taken us seven hours, however, the time and trouble being doubled I suppose, by the depth of new snow; absolute elevation of Lánkpya Dhúra, according to this estimate, 17,750 feet, and it seemed to me something inferior to Unta Dhúra and Jainti of the Jwár pass, in the ascent of which, last June, I felt still more exhaustion from want of air, and when those ghauts had not half so much snow on them as now covered Lánkpya. The afternoon had brought with it the usual clouds which obscured the prospect from the top of the pass, if ever there is any; beyond a dull monotonous chaos of snow on all sides, I could see nothing worth notice in any direction. The imagination of the novice in these scenes usually anticipates wonderful prospects from the lofty summits of the Himálayan passes, the natural and political barrier-wall dividing two great kingdoms, from which the eye hopes to range one way over terraces of mountains descending to the plains of India, the other over vast expanses of Tartarian table-lands. Such views are hardly to be realized from the passable gorges of the Himálayan crest whence the prospect is intercepted by obtruding shoulders of higher

mountains. What nature can afford of panoramic sublimity, the traveller may see from the heights above Sákh on the road from Laptel to Dungpu, and the most exacting imagination might hardly be disappointed with that glorious view ; some part of that is to be seen from the Nítí Pass, the only one I believe that admits of any tolerable prospect into Húndés ; from the top of the Lákhúr over Chirchun, I had some faint and narrow glimpse of the distant Gángri mountains.

The possibility of a fall of snow, which might prove dangerous to us in this situation at this late hour of the day, hurried our movements down the north side of the pass. We descended forthwith, after hastily dismissing one of the Bhótias, with the two spare Zhobus, who returned toward Kunti with a message of our having crossed the pass in safety thus far.

The first few hundred feet of the descent was extremely steep, the slope and quantity of snow very suitable for glissading, but I was not in the humour for trying it that way. At the foot of this declivity was a shelf of comparative level, beyond which I was unable to see any thing clearly for the fall of the ground and the obscurity of the weather, and I erroneously imagined that our labours would soon be terminated by reaching terra-firma. The descent began again in a succession of steep slopes on which the snow lay deeper than ever, and in many places it was of very unpleasant consistency, being superficially hardened by frost at top, and soft below, so that it afforded firm footing for an instant, and then suddenly gave away plunging us knee-deep at every other step. I much admired the style in which the laden Chanwrs came down the snowy declivity ; they looked like ships driving before a gale in a heavy sea, the snow flying in spray before them, as they tumbled through it breast-deep ; what a pleasant contrast to the slow toilsome efforts with which they ascended the other side. Half way down we crossed great mounds of broken rock that looked very much like the moraine of a glacier, and the Bhótias called it Gal, though I could not make it out clearly for the quantity of snow with which it was covered in most places. I was now much exhausted with the fatigue of eight hours wading through snow, and from the want of air which made me gasp for breath at the sudden plunges into soft snow ; half stupified and tumbling over at every step, I was at last glad to avail myself of the support of Bhauna and Rechu, who were themselves

still strong and lively. It was past sunset before we three reached the bottom of the pass, and we then had the miserable prospect of an expanse of pure snow covering the whole mountain sides around us, and the valley which extended at our feet as far as could be seen through the obscurity of the cloudy weather and approaching night, and no sign of the rest of our party with the cattle, who had fallen far in the rear, unable to tumble through the snow so fast as ourselves. At the bottom of the hill, a small ledge of bare rock, protruded through the snow, and on this we came to anchor, Bhauna and Rechu attempting to clear a space big enough to lie upon, for we expected that we should have to bivouac there for the night, and were doubting whether we could get one or two *Bakus*\* and *Cheras*† from the baggage in the rear. But in the course of half an hour or so I was most agreeably surprised by the appearance of the *Bhótias* with the cattle floundering down the last steep of the snowy descent; and one of the party going a little way down the valley found in the wilderness of snow a small oasis of bare stones, a ridge some 100 feet long and ten wide, on which we were right glad to fix our encampment. Verdant meadows, shady groves and hospitable roofs have afforded less welcome resting places to the weary traveller than this little ridge of bare cold ground open to the freezing air. It was night by the time we got the *Cheras* over our heads, and past nine before Bhauna, with a few remaining scraps of the fuel we had brought with us from Kunti, could accomplish a *lota* full of greasy tea, on which we consigned ourselves to sleep, too fatigued to miss better refectation.

Thermometer at 9½ P. M. 20°; night very cold.

1st October.—Thermometer at sunrise (or an hour after it, more likely) 14° outside; and inside my tent (so to call the two blankets) 15°; I have now experienced what Moorcroft relates on one of his mountain passages in Ladak, the moisture of the breath freezing on to the pillow at night, which has also taken some of the skin off my blistered face. At 9 A. M. the Thermometer was 29°; at this time I was attempting to write my diary, when the first dip of ink at once froze in my pen, and on looking into the Inkstand I saw the contents of it all suddenly congealed in the same way. I found my hands so benumbed with cold and encumbered with gloves that I could hardly use a

\* A kind of hill-cloak.

† Small blanket-tent.

pencil. We are all of us something the worse for yesterday's work : the Bhótias not much, nor Bhauna, who seems as strong as a Yak. I still feel great oppression in the head, or rather in the neck, as though a heavy weight were slung over it, and every part of my face not protected with beard is as perfectly blistered as though it had been treated with cantharides, which signifies little however, as my eyes (always strong) have escaped without damage ; the glare from the fresh snow has been intense, but I found a pair of gauze wire shades sufficient protection. It is this glare, I suppose, alternating with the keen dry cold of the air, that plays such havoc with a white skin, for the blacks are hardly affected by it. I have heard some people talk of darkening the face in order to complete a disguise, for entering Húndés, but there would be an even chance of the color coming off along with the skin, I apprehend. I found my Hindustáni clothes troublesome enough ; two *Paijáma* and three *Chapkan*, one over the other, with a slouching cap, *Pagri* and *Kamarband*, all abominably uncomfortable. Ánand, the young Kumáoni, is very unwell indeed, both sick and heavy in the head.

The place of our encampment here is called by the Bhótias Lánkpya-Dakhna or Welshia ; by the Hunias, Larcha ; it is near the head of a valley which rises from the Byáns Himálaya to the South-Eastward, and running for a few miles north-westward, turns east of north into the valley of the Sutlej. Upwards nothing but pure snow is visible, downwards, a few symptoms of bare rock, as the valley expands and the mountains on either side subside into hill, and through the opening northward is a glimpse of distant blue mountains, part of the Gángri range perhaps, on the north side of the Sutlej. The descent from Lánkpya Dhúra opens into this valley from the southward ; the top of the pass is not visible from the Dakhna, being hidden by the lower declivities, which are rather steep ; the way by which we descended yesterday looks very formidable ; heaps of driven snow rising one above the other, in which our track appears as a thin faint streak. We tumbled down this somehow or other in two hours, but all of us agree that to ascend by the same way with cattle and baggage would be an absolute impossibility ; Rechu says that he has never before crossed the Ghát in such a state.

Thermometer at 9 A. M. 29° ; boiled at 184°, but fuel was wet, fire slow and ebullition imperfect, so that the proper boiling point is 184½

probably, and elevation 16,000 feet, and I cannot suppose the place to be much higher than the Dakhna of the Byáns side, (which is 15,750 feet for a boiling point of 185°) the descent this side appearing nearly equal to the ascent on the other.

From Larcha our road lay north-westward, down the valley of the Dárma-Yánkti, the name of the river which flows into the Sutlej; the stream winds quietly through a flat bed a furlong wide, stream with rough fragments of broken stone, now mostly covered with snow, and there was a great deal of ice on all the stiller parts of the water; the declivity is very gentle. We travelled in the bed of the stream for the first mile or two, and then over the foot of sloping ground on the right bank. Two or three miles down we passed an opening from the south-westward through the mountain on the left, coming in two branches from the Dárma passes, Nyue and Kach, which communicate this way with Húndés. The Dárma-Yánkti has derived its name from its alleged origin in this quarter, though as far as I could see, by far the principal body of the river is that by which we have descended from the base of the Byáns, and not the Dárma, Himáchal; I could distinguish nothing in the direction of the Kach and Nyue Dhúras but confused heaps of continuous snow, like the northern side of Lánkpya. Two or three miles further down at the point where the river turns northward by east, the left bank assumes the remarkable straight and regular from which is one of the characteristics of the ravines on the northern side of the Himálaya in this part of Húndés; it resembles a huge artificial dyke running for several miles in a straight line, in a steep slope which at this end is I suppose 500 feet in vertical height, the top of it being covered with snow. Our path along the right bank of the river now lay over undulating ground intersected with a multitude of ridges and hollows which proved extremely troublesome to us, fatigued as we were still from yesterday's work; the ridges were all of bare sharp stones, and the hollows between them filled with deep accumulations of snow, recurring one after the other at every fifty paces, for one or two miles; over which abominable ground I found it a choice of evils to ride or walk, my pony being as jaded as myself. Below this we came to Silangtar, a stream flowing into the Dárma-Yánkti from the eastward in a bed of great width and depth, through a considerable opening in the mountains on our right hand, a mere ravine apparently leading to

nothing but Himálayan chaos. Notwithstanding the difficulty of my own progress, I had got so far ahead of the Bhótias with the cattle and baggage, that I was obliged to wait an hour here before they rejoined me. We then crossed Silangtar, and came to easier ground; the snow decreasing as we continued down the valley, then altogether receding to the adjacent hill-sides giving place to stunted herbage, and lastly to a few scraps of *Dáma*, the "Goat-thorn" of Tibet (a sort of *Astragalus*) and the only firewood for the traveller in Húndés. Late in the afternoon we reached a halting-place called Bháwiti, close under the hill-side on our right. The Dárma-Yánkti is a quarter of a mile to the westward of this, flowing through a level bed a furlong wide, with the great dyke-like bank rising high on the opposite side; on this side the mountains have subsided into steep hills, still abundantly covered with snow, between the base of which and the river bed intervenes an open bank of undulating ground.

Our halting-place here is eligible only by comparison with those of the last two days; there is just enough *Dama* for a few fires, some shelter under a small precipice in the hill-side and one or two boulders of rock, and a most ridiculous Dharmshála consisting of a stone built hovel four or five feet cube, just big enough to admit of one Hindu squattant.

Thermometer at 8½ P. M. 30°, but this was on the top of the Dharmshála, inside of which I afterwards found that Bhauna had established his kitchen, and no doubt the temperature was thus much raised above that of the open air. At this time, when attempting to empty a mug of water from which I had been drinking not long before, I found the contents retained so firmly by a coating of ice that they could not be dislodged by the most sudden and forcible inversion.

2d October.—Thermometer at 7 A. M. 20°, boiled at 185°; elevation of Bháwiti 15,750 feet, which agrees pretty well with my estimate for Larcha, as we were there encamped in the bed of the river and are now two or three hundred feet above it; the fall of the stream between the two places appears very moderate, and I did not observe any very decided descent in our road over the left bank. The diminution of snow here naturally follows the greater openness of the country and the distance northward from the crest of the Himálayan range, beyond which the formation and fall of snow makes little progress. There are

still a few patches of snow lying on the ground about our encampment.

Our road from Bháwiti turned somewhat to our right, north-eastward away from the river, over easy undulating ground, a great relief from the troubles of snow and sharp stones that beset our journey for the last three days. A mile or two on, we reached an eminence on the shoulder of the hill, perhaps 250 feet higher than Bháwiti, and 500 feet above the bed of the Dárma-Yánkti, which passes a mile or so to the westward; this spot commands a fine view of the country, and as usual in such situations, is studded with the religious structures called *Choktan* or *Mánepáne*, little towers of stones, stuck about with dirty ragged flags.

There is an unusual number of these here, erected by some Láma they say, after whom the place is called *Láma Choktan*. Before us extended a low plain, which on the left, northward, expanded to a considerable size (many square miles), but to our right, eastward, contracted to a mere valley a mile wide, receding south-eastward behind the shoulder of hill on which we stood: beyond this valley north-eastward, the ground is occupied by lofty hills or low mountains not easily reducible to a regular plan, but the general tendency of them seems to be in parallel ranges running N. W. and S. E., the most distant of them, the highest, slightly tipped with snow in streaks here and there, and beyond these lie the lakes, entirely shut out from view. The north-western horizon is bounded by the Gángri range of mountains moderately tipped with snow, and remarkable for the deep purple-blue color of their inferior rocky parts; and about the middle of this range rises the snow-capped Peak of Kailás, somewhat higher than the rest of the line. I do not believe these mountains are nearly so lofty as the main ranges of the Indian Himálaya. On our left, westward, the view is closed by the high bank of the Dárma-Yánkti, which to the northward however, gradually subsides into the lower level of the plain first noticed. From what I saw in June last on the road between Laptel and Dúngpu, and Dúngpu to Chirchun, I know that a tract of elevated plain lies on the top of this bank extending westward a great distance, near 120 miles perhaps, up to the mountains of northern Bisehir, with no other interruption than occasional clusters of hills, and deep ravines draining into the Sutlej. The Dárma-Yánkti, after running northwards

a few miles receives another stream, the Gúnda-Yánkti, rising from the Dárma Himálaya, after which the united river takes the name of Chu-gárh (?) (or Chu-gák?), and lower down receives another tributary that springs from high ground near Ligchepu, a day south of Kyunglung, on the Chirchun road. It thence runs nearly parallel to the course of the Sutlej, but in a contrary direction (viz. from west to east), from which circumstance it derives its name Biphu-kula, *Biphu* signifying *contrary*. This Biphu-kula, I believe, before entering the Chugárh, receives the Chúnagu, a stream which rises from the northern foot of the Dárma Himálaya, a few miles west of the Gúnda-Yánkti, and flows nearly parallel to it past Gumpáchin, which is half way between Chirchun and Kyunglung, and a short journey south of Ligchepu. One of the sources of the Indus half way between Misar and Gartokh bears the same name, Biphu-kula, apparently for the same reason, that its course is *opposite* to that of the sources of the Sutlej, which flow southward from the other side of the same height. The Chugárh falls into the Tirthápúri branch of the Sutlej, half way between Kyunglung and Tirthápúri. Moorcroft noticed the debouchment east from the route on the opposite bank of the Sutlej, (15th August, 1812) but erroneously supposed the stream to come from Rákas Tál, and Hearsay's map has made the same mistake, inconsistently with Moorcroft's own previous observation at Tirthápúri, (31st July,) to the effect that the Tirthápúri branch of the river came from Rákas Tál, which it does to some partial extent.

In the low plain to the north-eastward, 10 or 12 miles off, rises a small isolated hill, on the top of which was once a fort, called Nima-Khar; Bhotias call it, Gyánima; there is no village or fixed habitation here, but a considerable resort in the summer for the salt and grain traffic of the Bhotias from Dárma and western Byáns; it lies in the road from Pruang to Gugi, and one way to Gartokh, and on the road from Chirchun to Gángri. They say that the Sikhs had a fight with the Hunias somewhere hereabouts. Immediately beyond Gyánima a long narrow sheet of water is visible; it is a sort of lake receiving the drainage of the low plain and the adjacent hill, on the east, and giving off its surplus water occasionally into the Chugárh westward. Beyond this again rises a range of hills concealing the bed of the Tirthápúri Sutlej. Gyánima belongs to Kyunglung. Wild geese and ducks breed



upon the lakes during the summer, and the people of Kyunglung take the eggs.

In the season of heat and rain the Chugárh is a very considerable stream, sometimes unfordable, and perhaps equal to the Tirthápúri river; it is the furthest eastward of the large feeders which the Sutlej receives from the Indian Himálaya, and may be considered as one of the main sources of that river.

From Lámá-Choktán we descended into the plain by a long, but easy declivity, and crossed the flat where it is about a mile and a half wide; reaching the middle of which, we saw it extending many miles in a long valley confined between the base of the Byáns Himálaya, and the ranges of the lofty hill which I noticed from Lámá-Choktán. The origin of the Karnáli is close upon this valley; the river enters it a few miles further down (south-westward) coming out of ravines in the North-eastern face of the Byáns Himálaya, its principal source probably from the north slope of the Mankshang pass, though I could get no accurate information on this point. It is a curious fact that the sources of the Sutlej and Karnáli, main branches respectively of the Indus and Ganges, should lie so close together and divided by an almost level plain, across which a man might walk from one river to the other in an hour or two, without vertical ascent or descent of 500 feet. The case is much the same with the south-eastern source of the Gartokh Indus (the Bípku-kula) and the north-western branch of the Misar Sutlej, which are separated by a mile only of mere rising ground (Jilkwá-Lá), and it would probably be found the same with the Jáhnávi above Nilang, *the main source of the Ganges, yet unexplored by Englishmen!*

The end of this valley appeared to turn southward where it entered the head of the Pruang valley, and the view in this direction was terminated by a huge snowy mountain, the last and greatest of a chain which comes from the south-eastward along the left bank of the Karnáli. I immediately recognized this remarkable mountain as the same that I had seen from the high plain between Dungpu and Chirchun, and of which the Jwáris who were with me could give no account; according to Rechu, the Hunia name of it is Momonangli, and the Bhotias call it Gurla. It is one of the grandest objects I ever saw; from this point of view, the huge towering mass of snow that forms

the upper part of the mountain is wonderfully contrasted with the dark shadows which the height and steepness of the surrounding hills throw upon the corner of the valley at its base. To avoid the possibility of exaggerating, I reckon Momonangli to be as high as the second-rate peaks of the Indian Himálaya, or 23,500 feet, of which 8000 rise above the level of the valley, and the uppermost 5000 is all pure snow.

I was about to take bearings of this and other points when the alarm was given of a horseman ahead, which obliged me to pocket my compass and assume as much as possible of the *Chal* of a Bhotia, depriving me as I afterwards found of a most valuable observation for my survey. The horseman who was coming up the valley from the direction of Pruang, fortunately took no notice of us, but crossing our path entered the hills in front and was soon out of sight; we also saw one or two *Dúng*, i. e. encampments of herdsmen and shepherds, under the hills on both sides of the valley, but at tolerably safe distance.

My Bhotia companions were not a little alarmed at the horseman and the *Dúng*, and we edged off to the right in order to give them a wide berth, and then ascended the hills on the north-east, throwing out an advanced guard of two men to feel the way. This precaution proved useful, for soon after on gaining the crest of the hill and looking down the other side our videttes found a valley full of *Dúng*; we then skirted along the ridge eastward (or south-eastward) for a mile or two in hopes of finding some place to cross safe from observation, but the *Dúng* appearing rather to thicken as we proceeded, we gave it up and encamped under cover of the hill side, with the intention of effecting our transit before daylight next morning. This valley proved to be Chujia-Tol, a favourite resort of herdsmen and shepherds from Pruang; and all the best pasture grounds in this country are similarly situated in low hollows sheltered between lofty hills. This Chujia-Tol is a side ravine running from north-west to south-east, into the main valley; the springs of water that rise in it form but a meagre rivulet, which I believe is absorbed again before it can reach the Karnáli.

In the afternoon some of our party went into the Tol and had a conference with the shepherds, who were after all not over-dangerous enemies, for they evinced no curiosity at all regarding their visitors from the encampment of Byánsis on the other side of the hill; they reported

that the horseman we saw was a Government chaprassy (or whatever may be the Hunia equivalent to that functionary) come to collect men from the Tols for the conveyance of provisions, &c. from Pruang to Barka, for the use of a Garpun then encamped at the latter place; who this Garpun was and what he was doing at Barka did not appear; the regular Garpun being usually fixtures at Gortokh, or in the winter at Gargunsa, which is one or two days further down the river northward.

Fuel being scarce and Bhotias dilatory, I was unable to boil the thermometer here; but the elevations of the bottom of Chujia-Tol may be estimated, I think, at 15,250 feet, 750 below our last camp at Bháwiti, and 1000 feet of descent from Láma-Choktán. Our camp here was on low hills not more than 150 feet above the bottom, being only a mile or so from their termination, where the Tol enters the main valley.

Thermometer at 9 P. M. 25°.

*3rd October.*—Thermometer at 3 A. M. 24°. We started early at 4 A. M. with moonlight just sufficient for our purpose; descended the hilly bank, crossed Chujia-Tol, in which I could see nothing, but the flat bottom of the valley appeared to be a furlong or two in width, and the stream of water very small; we then ascended again a very considerable hill, part of which was very steep and stony, and the rarefaction of air so sensible as to give some trouble to myself and my pony. We reached the summit a little before sunrise; the elevation of it must be about 1,750 feet above Chujia-Tol, i. e. 17,000 feet, yet there was very little snow on the top, only a few patches lying in hollow and sheltered parts of the north side. The most remarkable part of the prospect from this eminence was the Indian Himálaya, the view of which extended from Momonangli on the extreme east, as far westwards perhaps as Laptel, including all the outer part at least of the snowy range of Byáns, Dárma and Jwár, and from our elevated station we seemed almost to be looking down upon the top of the snowy range, which had now lost much of its apparent height, but with an increase of visible breadth in the same proportions, so that the range assumed something of the appearance of a wide field or sea of snow tossed into a thousand heaps in the most gigantic confusion. It was only at the base of the Byáns mountains close opposite that I could distinguish any thing like a regular arrangement

of ridges and ravines which tended northward into the head valley of the Karnáli, and among which lie the ultimate sources of that river; and to the eastward I could see the Byáns Himálaya receding some way south-eastward, and close opposite to it a parallel snowy range of equal height terminating in the great peak of Momonangli, which seemed to be the loftiest of any in sight. The bed of the Karnáli that lies in the deep valley between these two ranges was concealed by deep shadows and obtruding shoulders of mountain. On the extreme west I noticed some distant and very lofty looking peaks and ridges of snow, but I attempted in vain to identify these and others in eastern Byáns with any of the known points of the snowy range as seen from the southward, nor could my companions help me. The northern face of the Himálaya thus seen from a commanding station, though still much broken into ravines, peaks and ridges, exhibits a much more gradual and flatter general declivity, with smoother and rounder slopes than the vast rocky walls of the southern face, and a much greater expanse of snow, which extends down to the limit of congelation in a regular line, scarcely broken here and there by a few more rocky prominences. The snow line was now, I suppose, between fifteen and sixteen thousand feet, much about the same as on the south side; a zone of one thousand feet or so must be allowed for the variation of the line according to the nature of the subordinate slopes, their individual exposures, and degree of proximity to the open country northward, in which direction the snow line appeared to me to be somewhat higher, as I before noticed at Bháwiti. The termination of the Himálaya in the table-land is generally abrupt, and well defined, and the transition to a new climate seems to be similarly well marked and sudden. The great bulk and height of the mountainous range appears to arrest the progress of the Indian rainy season, and to the northward consequently, there is so little free moisture in the upper air, that snow does not fall in sufficient quantities to withstand the heat of the sun for many days together, at very considerable elevations: hence the line of snow on the mountains that rise from the northern table-land is on an average perhaps two or three thousand feet higher than on the Indian Himálaya, though the atmospheric temperature on the former may possibly be colder at equal heights. The lower plains of the table-land which enjoy a good deal of bright sunshine are thus exempt from

lying snow except in the occasional severity of winter; otherwise the country would be quite uninhabitable. A heavy fall of snow which occurred at Gartokh this summer in September (the same three days I believe of universal rain on the south side of the Himálaya, or of snow on the higher elevations), was considered a most unusual circumstance.

I expected some view of the lakes from this lofty ridge, but they were still hidden by intervening hills, some of which also rose high enough to shut out Kailás, and there was no good prospect of the country northwards.

From this pass we descended again as much as we had come up from Chujia-Tol, but more gradually, into a level valley with flat bottom, varying from one to three furlongs in width, winding between steep rounded hills for many miles together, along which we continued till 10½ A. M. when a small stream of water made its appearance, and we halted for breakfast, &c. The name of this valley is Amlang; a little further on it turns northward, and drains into the Gyánima water, which I noticed from Láma-Choktán. We were fortunate in finding no *Dúng* here, for the place is well adapted for pasturage, and occasionally frequented by shepherds. I thought it a very pleasant spot—for Húndés. The bottom was well covered with green herbage, and the surrounding hills sheltered the valley from wind without excluding sunshine. Here we saw some of the wild animals peculiar to Tibet; the *Kyáng* (*Equus hemionus*?) which I shall call the wild mule, for in appearance it is half way between horse and ass. The hares, *Rekong*, differed much from any that I had seen elsewhere; the upper part of the body, head, ears, &c. being of an iron-grey color; belly, breast, and inside of legs and ears white; rump (and perhaps origin of tail) slaty blue, and a long furry white tail. Ramsay (of Gurhwal) has seen hares between the Nití pass and Dungpu answering to this description, save the long white tails, which he does not acknowledge. I don't think I could have been mistaken in these observations, for I had many good views of these animals, who sat upright with reverted ears waiting my approach within a few yards; yet in June last I saw many hares in the vicinity of Dungpu, which were probably the same sort as described by Moorcroft, (July 13th,) near Dam, somewhat different from the English or Indian hare, but without the remarkable peculiarities "a posteriori" noticed in these of Amlang. There appears to be some contrariety

in the matter of the tails here, for the field rats have none that I could see; the ground was intersected in all directions with the burrows of these animals, and I saw numbers of them, looking like diminutive Guinea pigs, but of the ordinary mouse colour.

Thermometer at noon  $45^{\circ}$ ; boiled at  $186^{\circ}$ ; elevation of Amlang 15,250 feet (about the same as Chujia-Tol). In the sun at noon the thermometer rose to  $68^{\circ}$ .

Our course from Chujia-Tol to this had been somewhere about east north-east. We now turned eastward, leaving Amlang over the low hills on the right side of the valley. A mile or two of undulating ground brought us into another valley similar to Amlang, through the opening of which, north-westward, was seen an isolated cluster of remarkably bare red-colored hills, *Chulda*, not far east of Gyánima, and the road thence to Gángri passes under them. In the opposite direction the valley was closed by hills over which the top of Momonangli came in sight again. A mile further on we entered a third valley or a second branch of the last, like the others, but open at both ends and I observed a slight rise across the flat bottom dividing the drainage into Gyánima water north-westward, from that into Rákas Tál eastward. We here came upon the western high road leading from Pruang to Gartokh, a well beaten track of men and cattle 30 feet wide. The eastern road goes between the Lakes, viâ Barka, Gángri, &c. A mile down, the valley divided into two branches going eastward and south-eastward, the road following the former, and we were proceeding that way when on turning the corner of a hill that separated the two vallies, we found ourselves entering suddenly into a large Tol full of sheep and cattle with encampments of shepherds. The Bhótias recoiled in alarm, and we turned back into the other branch of the valley to the south-east, but finding this to end in nothing, except hills, a mile up, we endeavoured to regain the proper road by crossing the hill side if possible ahead of the *Dúng*. On gaining the ridge, however, we saw the Tol still occupied by the shepherds, as far as could be traced, so we continued skirting along the top, till we were brought up by the sudden termination of the ridge, in a passage that communicated with another valley, also full of flocks and shepherds, close under our right. We were in rather a critical position here, between two fires, and the Bhótias vented their disgust in loud complaints against me for bringing

them into it, so I resolved to push through it at once, rather than waste time in indecision or retrograde movements. We descended accordingly, into the hollow connecting the two valleys, whence we perceived the southern Tol to be more extensive than the other, with a number of black tents, some of them of good size. There was a fine expanse of verdant pasturage in a flat bottom enclosed by steep hills, and a deep rivulet came out of the southern valley through the narrow passage into the northern, thence turning east, towards Rákas Tál. We crossed this and immediately ascended the hills, which began again on the other side, without hindrance from the enemy, who kept their camp at tolerably safe distance. Continuing along this ridge of hill till sunset, we had the northern Tol with the *Dúng* in it, still close under our left. The Bhótias were so paralyzed with fear that I had to take the lead myself, though ignorant of the ground, and show the way to what I thought a safe corner for our encampment during the night, but the want of water obliged us to keep close to the Tol. Thus dodging about the hills we were 3 hours in reaching a point not more than 2 miles up the eastern valley, at the entrance of which we were diverted from our proper course. The shepherds here when visited by some of my Bhótias, proved to be as harmless neighbours as those of Chujia-Tol, being quite uninquisitive about us, though our parade along the top of the hill over their heads might well have attracted their notice and suspicions. It would have been as safe probably and much easier, to have walked straight through the *Dúng* by the proper road, as my imitation of the Bhótia costume, &c. was good enough to pass muster at a little distance, and it is not the vocation of shepherds to stop and question travellers on the high road. The timidity of the Bhótias to-day was little short of rank cowardice, and rather disgusted me, as promising to increase difficulties. Bhauna evinced much better sense and spirit.

Near this I saw some deer, "*Ridákh*," i. e. "*Banbáshi*," "Jungle squatters." They were in herd, of a dozen or so, small-sized (as big as Kákar perhaps) of very pale fawn color, approaching to white, and, as well as I could make out, with stag-antlers.

Thermometer at 9 A. M. 30°. I had no opportunity of boiling here, but the elevation must be much the same as that of Amlang, 15,250 feet. The Byánsis could not give me any name for this place, but

from the Jwáris I afterwards learned that it is called Jungbwa-Tol.

In the middle of the night one of the ponies amused himself by walking over the ropes of my tent, which brought the whole concern down upon me: but as it was not very onerous, consisting of two blankets, and I still found breathing room, I thought it better to lie still and let matters rest as they were till morning, rather than turn out into the miserable cold of the night air, till I could rouse my companions and so get the hut set up again.

*4th October.*—Thermometer at 6 A. M. 20°. Up to this time I had been somewhat in the dark as to the true position of the Lakes, and my best route for a good inspection of them, depending on the map, which was uncertain, and the clumsy accounts of Bhótia and other informants equally vague and doubtful; nor had I much confidence in the guidance of Rechu: but I now began to understand the anxiety he had shown at the Dakhna to take me by Mankshang instead of Lánkpya-Dhúra, for the great easting we had now made from Lankpya, without attaining Rákas Tál, proved the Map to be wrong in bringing that Lake too far westward, and Rechu to have been right in asserting that the direct route to the nearest point of the Tál was by Mankshang, and his object was evidently to cut the expedition as short as possible. I had determined to begin with Rákas Tál,\* because it was less known than Mánasarowar, though geographically more interesting, as being suspected of communication with the Sutlej; being no resort either for pilgrimage or for Bhótia traffic, the western Lake has been less observed by Hindustáni visitors, and from its intricate outline less easily comprehended and described by them; nor did Moorcroft's imperfect view and accounts of it add much to our information. Rechu now affirmed that we were close upon the south-western quarter of the Tál, and a debate arose as to which way we should proceed so as to have a good view of both the Lakes and of the channels connecting the two together and Rákas Tál with the Sutlej, all of which I insisted on as essential. The Bhótias were rather inclined to make for Mánasarowar along the southern bank of Rákas Tál, but as I had little confidence in their intentions, and there was constant risk of an untimely end to our expedition, should we be detected, by the intervention of

\* Ráwanhrad of Moorcroft.



the Lhassan authorities, I resolved first to secure the north-west point of Rákas Tál, said to communicate with the Sutlej, and thence return by Mánasarowar along the isthmus between the two Lakes. My orders were accordingly for the *Nikás* (outlet) of Rákas Tál; all the Bhótias seemed well acquainted with it, and saving the presence of the enemy, Rechu promised to bring us to the spot by evening.

Finding no harm to have come from yesterday's dangers, the Bhótias had screwed up their courage a peg or two this morning, and allowed me to lie in bed till daylight, though we had to begin our march by crossing the Tol. We started at sunrise, course about north of east, descending, crossed the stream, the same that we had passed yesterday afternoon, which runs into Rákas Tál, and ascended rising ground at the foot of lofty hills on the other side. The shepherds of the Tol were asleep in their tents, I suppose, for I saw none of them. We were now again on a frequented road, leading from Gángri to the large Tols near our last encampment and thence on to Pruang, and a *Rah-gir* (traveller) suddenly made his appearance over one of the ridges of high ground; he was horsed and armed, and the Bhotias in great alarm declared that he must be either a *Khampa*, come to rob us, or a Government messenger to arrest us. As we were edging off to the right to avoid the man, he seemed to be doing much the same on his part, apparently in equal apprehension of us, which emboldened the Bhotias to accost him, and he turned out to be a humble shepherd coming from his master's house at Gángri to one of the Tols, where he had flocks at graze; he possibly took us for *Khampa* and was glad to pass us so quietly. We now came in sight of a corner of Rákas Tál, a mile or two south-east, and apparently an inlet advancing further west than the body of the lake towards the low ground of the Tol, and thence receiving the rivulet before noticed. The view of the lake enlarged and improved as we proceeded. At 10 A. M., we reached a point that seemed to lie about the middle of the eastern side, a mile from the shore, and well elevated above it, whence the lake swept before us in a long irregular crescent some seven miles wide, east and west, and twenty long, north and south. The snowy mass of Momonangli, was again conspicuous to the south-east, and from the base of the mountain a lofty range of hills, partially tipped with snow, stretched north-westward, separating the lake from the head valley of the Karnáli, and forming its south-western banks nearly par-

allel to the course of the river. These hills rose abruptly out of the water in bold rocky banks with many deep inlets, promontories, and one or two small islands of the same character. This part of the lake is altogether so irregular in outline that it could hardly be defined without detail-survey and close inspection of every point. The eastern shore was bounded by shelving ground and low hills, the south end being a good deal recessed, eastward, into a deep bay, the middle part advancing, further westward, in a rocky bank of moderate height, and the north end sweeping round to the westward, as far as could be seen, with a margin of green grassy plain from the back of which the Gángri mountains rose in dark steep slopes. The main peak of Kailás, now beautifully developed to its very base, was seen on the extreme left of the range, (so far as visible to us), and over the low hills in the middle of the eastern shore, a streak of bright blue showed a distant glimpse of Mánasarowar. The western shore of the lake was undulating ground or low hills, over which we had been travelling this morning, at the foot of steep and lofty hills here and there streaked with snow. The water of the lake was of the clearest brightest blue, reflecting with double intensity the colour of the sky above, and the northern horn of the water overshadowed by the wall of mountain rising above it, was darkened into a deeper hue, partaking of the fine purple colour that distinguishes the rocks of Gangri. Fresh breezes broke the surface of the water into waves that rolled upon the shore. The surrounding hill sides, though very bare of vegetation, were tinted with many shades of red, brown or yellow, happily varied with the margins of verdant grass in other parts of the shore, and bright sunshine spread a warm glow over the whole landscape, entirely divesting it of the cold barren aspect that might be supposed inseparable from these intemperate regions. The beauty of this novel scene appeared to me to surpass any thing that I had seen on the south side of the Himálaya; it certainly far exceeded my expectations, and I felt already repaid for the trouble of my expedition.

Our course now inclined to the northward, and as we proceeded, the hilly bank on which we had been travelling subsided into level shore sloping down to the water's edge. Our road lay over this for two or three miles, the water half a mile to our right; and as far to our left we passed Chabgía Gumba somewhere, not visible under the steep hill-side; this I believe is the only *Gumba*\* on the banks of Rákas Tál.

\* *Gumba*, Monastery.

We met an orange colored *Dába*, (inferior monk,) coming from it, who passed by without taking particular notice of us. At noon we came to the end of this plain under a low spur of hill that advances to meet a small bay of the lake, and here halted for rest, breakfast, &c.

Thermometer at 2 P. M. 54°; boiled at 186°; elevation of the lake 15,250 feet; we were close upon the water. In the sun the thermometer rose to 70°.

The native name of Rákas Tál is *Cho Lagan*, “*Cho*” or “*Tsho*”, signifying lake.

The shore of the lake here shewed marks of variation in the water-level to the extent of a few feet; ground which appeared to have been lately inundated, now half dry and swampy, was covered with a very thick efflorescence of soda (or some such salt), which must arise from the soil, as the water was quite pure and sweet.

I found this a most delightful place: the lake was beautiful; quite a little sea; long rolling waves broke upon the shore close under our feet, and as far out as could be seen the whole face of the water was freshened into the “*ἀνηριθμον γελασμα*” of old ocean. There might be glorious sailing here, if the Láma of Gángri would keep a boat, which might be made with Pine or Fir imported from Byáns.

At 3 P. M. we continued our journey; course about northward; passed under the small rocky headland, which advanced close to the water edge, and then entered on another low flat, bearing marks of occasional inundation in places; here two promontories of low clear land appeared stretching into the lake for a mile or two, one from the south, and the other from the north, covered with green grass, and I think I saw *Kyáng* on one of them; they enclosed a large bay, the middle of which came close up to our road. High hills were still on our left.

I saw a few wild ducks on the lake here, coarse ill looking birds, about the size of the domestic; color dirty grey and fulvous red; specimens of the same sort are occasionally to be met on the south side of the snow, I believe; I saw one myself, last June, on the *Sángas-kúnd*, a pool in the Gori Glacier above Milam in Jwár; and there were other white-looking birds, still more ill-favored than the ducks. I saw no signs whatever of the grey goose said to frequent these lakes in the rainy season, and according to Moorcroft (August 10th and 12th) “bred on

the banks of Rákas Tál" "in vast numbers;" they had all migrated to India I suppose. Nor could I see any thing of the fish, though I do not doubt the assertions of the Bhótias that there are plenty of them. In the winter when the lakes are frozen over, numbers of the fish, they say, are cast up dead along the banks where the ice is broken, and in this state the Hunias present them to their Gods as *prasád*, but they have not the sense to take the fish alive for their own eating.

The northern horn of the lake was now rapidly narrowing and we continued skirting its western edge till sunset, when we reached the extreme north-western point, where the lake ended in swampy ground interspersed with puddles of water. This is, or ought to be, the *Nikás*. The ground evidently slopes down to Changchung, a verdant hollow with pasturage, *Dúng*, &c., a mile or two to the north-westward, but there is no visible channel from the lake, and the only effluence is by filtration through the porous soil of the intermediate ground, unless it be at times of extreme flood, when the level of the lake may possibly rise high enough to overflow the margin at this corner. The stream so formed flows westward, through an open valley; below Changchung it receives the Sar-chu (gold river), a rivulet from the deep ravine immediately west of Kailás; the united stream then takes the name of Lajandák, which is also an encamping ground on its banks about a day's journey from Gángri: below this the river receives three other feeders from the Gángri mountains, viz. the Kyuktwa; the Dokpa-chu, (i. e. the river of the Dokpa), by the ravine of which a road crosses into Bongbwa-Tol, a valley on the north side of the Gángri hills, inhabited by a tribe of people called *Dokpa*, who are the chief carriers of the salt from the north country; and the Yarmigu; the united river then flows under Tirthapuri. Dulju is a *Gumba* on the left bank, half a day west of Lajandák, as far south-east of Tírhápúrí, and a day and a half east of Kyunglung; the most direct road from the last named place to Gángri running through the valley by Dulju and Lajandák. Moorcroft's statement regarding the Tirthapuri river, (12th August,) agrees with this account of mine, though not with his own of the 15th, when he made the Chugárh come from Rákas Tál. Hearsay's map makes the same mistake, and on the 13th idem, he describes two of the four tributary streams from the Gángri mountains large enough to be bridged with Sángas, though he did not notice them on his way

out to Mánasarowar, 1st and 2d August. The effluence of Rákas Tál probably contributes less to the Sutlej than others of its numerous sources in the Gángri mountains, or the Indian Himálaya, for the Bhotias say, that the stream at Lajandák, even after it has received the Sarchu, is very inconsiderable. It is a question that can be decided only by actual measurement perhaps, whether the main source of the Sutlej be not in the Dárma-Yánkti, for the discharge of the Chúgarh sometimes, though not constantly, exceeds that of the joint Tírthapúrí and Misar river, as the Bhotias testify, who are in the habit of fording both streams close above their confluence at Pálkia. The former is liable to great floods in the summer, the discharge of the latter being more equable throughout the year.

The mountains which had run along the left flank of our march to-day had here subsided into moderate hills and circled round to the westward, leaving the open valley of Lajandák, perhaps three miles wide, running in that direction as far as could be seen; on the other side the Gángri mountains stretched north-westward, their snowy summits visible for many miles, (up to Misar perhaps, 30 miles distant), and the road to Misar and Gartokh lies along their base, which merges into the Lajandák valley by inferior hills. The Gángri range continued also far to the eastward, rising out of a wide green plain, which extended between the base of the mountains, and the northern shore of both lakes being visible from this as far as the low hills on the north-western corner of Mánasarowar. The Lhásza road lies along this plain. The most remarkable object here was Kailás, now revealed in full proportion to its very base, rising opposite (northward) straight out of the plain only two or three miles distant. The southwest front of Kailás is in a line with the adjacent range, but separated on either side by a deep ravine; the base of the mass thus isolated is two or three miles in length perhaps; the general height of it, I estimate to be 4250 feet above the plain, but from the west end the peak rises some 1500 feet higher, in a cone or dome rather, of paraboloidal shape; the general figure is not unlike that of Nanda Devi, as seen from Almora. The peak and the upper part of the eastern ridge were well covered with snow, which contrasted beautifully with the deep purple color of the mass of mountain below: the stratification of the rock is strongly marked in successive ledges that catch the snow falling from above, forming irregular

bands of alternate white and purple : one of these bands more marked than the rest encircles the base of the peak, and this, according to the Hindu tradition, is the mark of the cable with which the Rákshasa attempted to drag the throne of Siva from its place. Fragments of a dark purple stone strongly resembling in color the rock of Kailás, which I found on the shores of the lake, were a sort of rough jasper. The openings on both sides of Kailás disclose only more mountains in the rear ; the western ravine appears to be two or three miles deep ; the back of the eastern recess is occupied by a fine pyramidal mass rising in steps of rock and snow, with a curious slant caused by the dip of stratification (to the eastward). I conjecture the average height of the Gángri mountains to be about the same as the eastern ridge of Kailás, 4250 feet above the plain, i. e. 19,500 feet of absolute elevation above the sea, of which only the uppermost 1000 feet, or so, was now tolerably well snowed, and the eastern summit of the peak of Kailás, may be 1,500 feet higher, i. e. 21,000 feet ; at sunset I had a proof of its inferiority to Momonangli, the snowy top of which was illuminated a minute or two longer than Kailás. But in picturesque beauty Kailás far surpasses the big Gurla, or any other of the Indian Himálaya that I have seen ; it is full of majesty, a King of mountains.

On a ledge in the base of Kailás, about the middle of the south side, is Gangri, by the Hindustánis called Darchin. I could distinguish nothing in the site pointed out to me : the buildings are few and mean, I believe, and the place of no note except in the way of religious resort, the concourse of pilgrims also attracting a little pedling trade in the summer.

Moorcroft, 3rd August 1812, found here "four houses of unburnt brick or stones, and about 28 tents," to which may be added the Gumba of Gyangtang.

Through the ravines on either side of the mountain is the passage by which the pilgrims make the *parkarma* ; the circuit is performed in two days by those who take it easily, but with more exertion it may be done in one day. There are four *Gumba* on the road, viz. 1st, *Nindi*, in the western ravine, on the right bank of the Sarchu, and immediately opposite the Peak of Kailás ; this is the principal shrine and the head-quarters of the Lho-ba Láma. 2nd, *Didiphu*, which is further up the ravine of the Sarcho : thence the pilgrim road crosses

Dolmala, the ridge of the mountain behind the Peak, on which is a small pond which the Hindustanis call *Gauri-Kúnd*; the ridge is high enough to have snow upon it early in the summer. Thence the road descends to the 3rd Gumba, *Jungdulphu*, in the eastern ravine. The 4th is *Gyanktang*, in Gángri, already mentioned. The Sarchu, which comes from the western ravine as before observed, flows past Changchung into the channel of Lajandák, contributing to the Tírhápúri Sutlej. This was not noticed by Moorcroft, apparently, on his way to Gángri, 3rd August, but it may be the "small river" at which he encamped on his return, 11th idem.

From the south face of Kailás, close above Gángri, rises a considerable stream, which the Bhotias called *Lá-chu* (i. e. the mountain river), falling into Cho Lagan, 3 or 4 miles to the south-east of its northern extremity. Moorcroft describes this stream, 3rd August, as crossed by a Sánga just below Gángri, and originating in a cascade close above; and 11th idem, he calls it the Darchan-gadrah, a mere Hindustani generality. From the ravine east of Kailás comes another considerable stream also debouching into the lake a mile or two east of the Lá-chu; I could get no other name for this than *Barka*, which is on the right bank of it somewhere in the plain between the mountain and lake. This Barka is the third "*Tarjum*," i. e. mail station, on the Lhassa road from Gartokh. There is no village, but a standing camp of a tent or two, for the couriers. On Moorcroft's return from Mánasarowar, 8th August, he encamped "near 7 or 8 tents;" 3000 paces further east he noticed "tents of Tartars and Jwaris;" and somewhere between the two encampments, "a watercourse, dry when he went towards Mánasarowar, but now two feet deep;" one or other of these possibly was Barka.

These two streams, La-Chu and Barka are the only permanent affluents of Cho Lagan from the Gángri mountains. Moorcroft, 10th August, makes many more, with Hindi names, but that enumeration of his must be set aside, being derived apparently from the report of his Hindustani companions, and not agreeing with his own account of the streams actually crossed on his route along the northern shore of the lake: nor indeed do his accounts of streams crossed going and returning by the same route, agree, inter se.

In attempting to find a channel of effluence from Cho Lagan, Rechu

and I, following two of the Bhotias who were equally ignorant of the place, went a good way westward towards Changchung and were floundering about the swampy ground for a long while seeking in vain for the channel that did not exist, till at last we perceived that the rest of our party, with the baggage, &c. had already turned the northern extremity of the lake far behind us, and were now proceeding eastward along the northern shore : we followed, and joined them by dark. The Bhotias affirmed that Barka Tarjum was too close to the bank of the lake to be passed by daylight without risk of detection, particularly if the Garpun should be encamped there with a concourse of people, as we had been informed by the shepherds of Chujia Tol on the 2nd instant. It was resolved therefore to pass Barka by night ; and in order to make it later and safer, we halted for an hour, a mile or so east from the northern point of the lake. We were then so far north of the shore that water was not accessible ; fuel also was very scarce ; so instead of dinner or tea, I had to content myself with biscuits, port-wine (both very bad), and a cheroot. My port-wine in the wooden decanters had got sour enough by this time, and nastier than ever.

At 8½ P. M. we resumed our journey, course somewhere about south-eastward, as well as I could judge from the moon, and the great land marks Kailás and Gurla. The ground became very sandy, and undulated into ridges and hollows which reminded me of the bank of the Ganges. Three or four miles of this brought us to the La-Chu, which we found a very large stream, in the aggregate I suppose 150 feet wide and at deepest 3 feet, running through a sandy bed here a furlong broad, but expanding with much subdivision of the stream towards the lake. The passage proved extremely troublesome and occupied us near half an hour : the sandy bottom was soft under the main streams of running water, and frozen in the shallows, so as to afford footing for an instant, then breaking suddenly under the feet of the cattle and plunging them knee-deep at each step ; it was without exception the worst ford I ever crossed. Two miles further on, in the same direction and over the same sort of ground, we reached the Barka river, which was like the other, but a third smaller in width and depth. The ford was not quite so troublesome as the Lá-Chu but the cattle showed the greatest reluctance to attempt it. We could neither see nor hear any thing at all of the Tarjum, being in all probability a mile or two below it, and



as the lake was also out of sight, perhaps a mile off, Barka must be two or three miles above the shore, instead of close upon it, as the foolish Byánsis had asserted, and the same might be inferred from the relative direction of the Lhassa road and the north-east shore of the lake. Crossing the Barka river we continued, rather more southerly perhaps, over ground still sandy but now remarkably flat and level, with a straight dyke-like ridge some 100 feet high close above our left, and the lake visible again on our right, perhaps  $\frac{1}{4}$  mile distant. This continues without any variation whatever that I could see for six or seven miles.

5th October.—At  $1\frac{1}{2}$  A. M. being at a safe distance from Barka and all of us pretty well tired, we bivouacked for the rest of the night. With a *Baku* and *Chera* for bedding I found it miserably cold, and suffered great pain from my *Lam* (snow-boots) which were damp from walking over wet ground and seemed to be nearly freezing on my feet. I had kept them on, as I thought for warmth, but got no rest till I divested myself of them. At sunrise, finding ourselves on very bare ground with water distant and fuel scarce, we started again, in quest of a better encamping place further on, and one that would command a full and close view of Mánasarowar. The margin of Rákas Tál was now a mile from our road, circling off to a headland, the north end of the projecting rocky bank, which occupies the middle of the eastern shore, as noticed from the opposite side. The ridge of high ground on our left began to break into irregular hillocks. A mile on, we came to a large stream 100 feet wide and 3 deep, running rapidly from east to west through a well-defined channel: this was the outlet of Mánasarowar. It leaves that lake from the northern quarter of its western shore, and winding through the isthmus of low undulating ground, for four miles perhaps, falls into Rákas Tál in the bight formed by the projecting headland above mentioned. Two or three miles to the eastward, we saw the back of an odd looking eminence, in the face of which was Ju Gumba, a Láma-shrine on the west bank of Mánasarowar, and on the north bank of the *Nikás*. I could see nothing of the Gumba itself. Having forded the river, the deepest we had yet crossed, we ascended a little on to higher ground broken into easy undulations; course still south-easterly. Here we passed sundry pits said to be the remains of extinct gold mines, the working of which was stopped

by some sage auguries of the Lámás, an interference that is often exercised by the priests in this country, where superstition is at a premium and gold at a discount. I saw a few Kyáng hereabouts.

On the top of the high ground, we came in sight of the further part of Mánasarowar, and thence descending a little, reached the middle of its western shore, five or six miles from the point where we had crossed its outlet. At 9 A. M., we encamped under cover of a steep bank, close above the edge of the lake, and halted here for the rest of the day, man and beast being somewhat fatigued with the long march of the preceding day and night.

The Hunia name of Mánasarowar is *Cho Mápán*. In general characteristics this lake is very like Lagan, but so much more compact in form that our position in the middle of the western shore commanded (what we could not get, from any point as yet visited, on the shore of Rákas Tál), a complete view of the entire lake, excepting only the extreme western edge of the water which was concealed by the declivity of the high bank on which we were stationed. The figure of Mápán is, as stated by Moorcroft, an oblong with the corners so much rounded off as to approach an oval; the longer diameter lying east and west. To avoid the possibility of exaggeration I assent to Moorcroft's estimate of its size, viz. 15 miles in length (E. and W.) by 11 in width (N. and S.) though it appeared to me somewhat larger; I think this would give a circumference of some 45 miles, at the water's edge; divided by the eye into four quadrants, each of them seemed, as well as I could judge, a moderate day's journey of 11 or 12 miles, which agree with the accounts of pilgrims who make the *parkarma* usually in 4, 5, or 6 days, according to their stay at the several Gumba and other circumstances. Bhauna tells me that Chakwa, ex-Garpun, made the *parkarma*, (as he himself informed Bhauna) in six days, on foot, as all pilgrims do, by way of *Dharm*. As the Garpun could have been little used to walking, it is not improbable that he was content with a daily march of 7 or 8 miles, 6 of which would make the circuit, as estimated, about 45 miles. Mápán is bounded thus; westward by the hilly ground that separates it from Lagan, of no great height (averaging 250 feet perhaps), but rather steep towards the lake, and apparently leaving little level shore on the margin excepting at small bays here and there. The northern bank begins in a ridge of high ground rising precipitously

from the water's edge, and extending along four or five miles of the west end, the "face of the rock," noticed by Moorcroft in his walk round the north-west corner of the lake, "in many places near 300 feet perpendicular." Thence eastward the shore is a plain three or four miles wide, sloping down from the base of the Gángri mountains, which rise behind in a continuous wall. This ground appears to be a continuation of the plain on the northern shore of Lagan under Kailás, passing without interruption, or with a slight rise perhaps, behind the ridge of hills above mentioned. Moorcroft, 8th August, estimates the valley of Gángri to be 12 miles broad and near 24 long: that length may be right, but the breadth is not clear; if the 12 miles be intended to include the whole basin of the two lakes it is considerably under the mark; and the mere plain between the Gángri mountains and the northern shore of the lakes cannot average any thing like that width. Moorcroft was then encamped (as I conjecture) in the vicinity of Barka, and he possibly estimated the breadth of the plain from its appearance at that point, where it is certainly very much widened by the southing of the eastern shore of Rákas Tál. At the north-east corner of Mápán the level ground is widened by the rounding of the lake; it looked greener than the rest, as though irrigated by streams of water, and is said to be pasturage occupied by *Dúng*, &c. This was noticed by Moorcroft as "a plain at the foot of elevated land. . . to the north-east." On the east side of the lake rise hills and mountains sloping down to the water's edge with more or less margin of level ground at the bottom. The northern half of this range is mere hill of no great height, connected at the north end with the base of the Gángri mountains, and on the south joining a cluster of mountain, that occupies the southern half of the lake's eastern shore: the latter was well topped with snow and seemed as lofty as the lower parts of the Gángri range. The south end of this mountain was connected with the base of the Nipál snowy range by a ridge of inferior hills, behind which rose another mountain very similar to the first, but not so far detached from the Himálaya. These hills preclude any distant prospect to the east of the lake, in which direction nothing more is to be seen than the crest of the Gángri range on the north, and of the Nipál Himálaya to the south; both appear to make a good deal of southing; and the Gángri range, is terminated twenty or thirty miles off either by actual subsidence in height,

or by change of direction to the northward, or by both of those causes perhaps. On the south side of the lake, (which Moorcroft observes to be "bounded by immense mountains,") in its eastern half, rises sloping ground, then hills, and behind all the Indian snowy mountains, a blank dismal chaos, in appearance rather broad than lofty, the further end receding southward, and the nearer advancing towards the lake, till it terminates in Momonangli. This great mountain occupies all the western half of the lake's south bank; its upper and greater part a vast towering mass of pure snow, the base in earthly mounds, almost bare of verdure, sloping right down to the water's edge. The isthmus of low hilly ground that forms the western boundary of the lake joins the foot of Momonangli. The view which I here obtained of Mánasarowar confirmed my belief of the accounts of native informants, which all agree in stating that the lake has no other affluents than a few unimportant streams rising close by in the surrounding mountains, and but one effluent, that communicating with Rákas Tál, which we crossed this morning. The two lakes are placed together in a basin, girt about by an enceinte of hill and mountain, from which the only exit appears to be at the north-western extremity opening into the valley of Lajandák.

The outlet (Nikás) of Mápán leaves the lake from the northern quarter of its west side. I was much puzzled to account for Moorcroft's failure to find the mouth of so large a stream as that we forded this morning, till at last I heard on good authority, that the entrance of the channel is completely closed by a large bar of sand and gravel, continuous with the shore of the lake, and the effluent water runs through this in a copious stream. He thus describes the very point he was in search of, and passed without knowing it: "As the bank approached this angle (i. e. the north-west), it declined to gentle elevations leading to interrupted table-land, and at its base was a large bay, from the bottom of which rose a pyramidal red rock connected with a ridge of high land to the higher flats on the north and steep towards the south: upon this was the house of a Lama and many Gelums, &c. &c." That was Ju-Gumba, with the outlet immediately under the south-west side of it concealed merely by the bank upon the edge of the bay.

It is a pity that Moorcroft did not get the company of some intelligent Hunia (as he might easily have done), who would have explained

all such matters as this, and have removed many other doubts and errors in the course of his explorations.

The permanent affluents of Mápán are three or four. First, a stream rising in two branches from the Gángri mountains, and falling into the lake at the eastern quarter of its north side; the second also from the Gángri range, a few miles further east, entering the lake at the north-east corner: at the very same point is the mouth of the third stream, which rises in Hortol, behind the mountain which I noticed at the east end of the lake, and flows round its northern base. The presence of these three streams accounts for the greater verdure which I observed in the ground above the north-east corner of the lake. Sátaling is the name of the pasture ground on the bank of the second river, through which the Lhássa road passes, and thence along the north bank of the third. The fourth affluent is doubtful: a stream possibly comes from the Nipál Himálaya into the south-east corner of the lake, but of this I could get no certain account. In the summer season there are many temporary streams from rain and melted snow, and it was probably one of these that Moorcroft saw, and called the "Krishna river," on the south-west corner of the lake.

There are eight *Gumba* on the banks of Mápán, viz. 1st, Tokar, somewhere about the middle of the south side; this is sometimes called a village, but it is a mere monastery somewhat larger than the others.

2d, Gusur, at the southern quarter of the east end.

3d, Ju, at the northern quarter of the east end, on the north bank of the Nikás.

4th, Jakyab, at the western quarter of the north side, where the high bank terminates; this probably is the "house inhabited by Gelums," with "terraces of stone with the usual inscriptions," near which Moorcroft encamped 5th to 7th August, 1812, and which figures in the old maps (after Hearsay?) most unduly and exclusively, as *the* "Lama's house."

5th, Langbuna (i. e. elephant's trunk), in the middle of the north side.

6th, Bundi; at the north-east corner, between the 1st and 2d affluents.

7th, Sárálung, in the middle of the east end; and 8th, Nunukur, at the south-east corner of the lake.

I could see none of these from our camp, nor did I think it prudent

to visit the nearest. The exterior view of those which Moorcroft saw (Jakyab and Ju), exhibited nothing but huts pitched on steep banks, and their main interest, I imagine, consists in our ignorance of them.

The water of Mápán is quite clear and sweet, and in mass of the same fine blue color as Lagan. In picturesque beauty the eastern lake is hardly equal to the other; its uniform outline being comparatively dull and monotonous, the surrounding hills blank and dreary, and the gigantic grandeur of Gurla less pleasing perhaps than the majestic beauty of Kailás. The Rákshasa have got, in my opinion, the better quarters of the two.

The depth of these lakes is possibly an average of 100 feet or so, and double that in the deepest places.

I saw no signs of animal life on Mápán, the *Mánasaucas* must have taken their departure for their winter quarters in India; Moorcroft saw numbers of them here in August (1812).

Thermometer in the sun at noon rose to 120°, part of which must have been caused by reflection from a *Baku* (of white woollen stuff), against which the instrument was placed, but in the course of this expedition, I had often found the noon-day sun unpleasantly intense.

At 3 P. M. Thermometer in shade 46°, boiled at 186°; elevation of the lake, which was some 175 feet below our camp, 15,250 feet.

Bhauna and Anand bathed in the lake, by way of *Dharm*, and not at all for cleanliness, which, as good Kumáonis, they duly set at nought.

In the afternoon I began to moot the *Parkama* of Mánasarowar; and suggested the feasibility of doing it in 3 or 4 days, myself with Bhauna and one Bhótia, taking only two of the Zhubus, without tents, bedding, or kitchen, leaving all the rest of the party and baggage to wait our return. Bhauna made sundry hollow professions of readiness to accompany me to Lhássa, or Peking, if I wished to go so far, but I observed him in fact putting excuses into the mouths of the Bhótias, who were all quite aghast at the idea of thus wantonly adding to aimless risk and trouble, as they considered my expedition from beginning to end. Rechu declared that they had already "*Margaye*" to a greater degree than on any former occasion of their many visits to Húndés, and that the execution of my plan alone was wanting to make a calamitous end of them altogether.

My estimate of the risk of detection was not a tenth part of what

they made it, and of the consequences, if we were detected, not a hundredth (for they talked of getting hanged!); but with such discontented and dispirited companions, I had little inducement to incur the further hardships which the proposed digression would have entailed upon myself; and the circuit of the lake after all promised no other result than a little nearer approximation to the true figure and size of its outline, and to the exact position of the few unimportant affluent mountain streams, and of the several *Gumba* round the bank. Putting together Moorcroft's observations, my own, and the reports of native informants (the best of which I have embodied in my account), I think the geography of the lakes is fixed in the rough, beyond all reasonable doubt, though my map cannot pretend to topographical accuracy.

In the evening, Rechu, with a well assumed air of distress, reported that both the ponies had strayed from our camp, and one of the Bhótias in search of them for the last hour not yet returned. I have a strong persuasion that this was a contrivance of my worthy companions to put a spoke in the wheel of my *parkarma*; for being rather sulky, I had not yet informed them of my consent to abandon that design: their clumsy artifice would certainly not have stopped me, if I had resolved upon it, as my own plan had been to go without the horses, riding one of the Zhobus when I could not walk.

Thermometer at 9 P. M. 30°.

6th October.—The ponies not yet found, reported Rechu this morning, either to make sure (as he might think) of me and my *Parkarma*, or to preserve the vraisemblance of his own stratagem; and besides the Bhótia already detached two others had walked off, as they pretended to enquire for mutton at Tokar, but in fact more probably straight back to Byáns, for they never showed themselves again to the end of our journey. Rechu also stayed behind to make further search for the horses, according to his own story. We saddled two of the Zhobus, distributing their loads among the other four, and the rest of us then started for Pruang at 8:20 A. M.; course west of south. Descending from the high bank we entered on a small bay of the lake, now half dry, with great quantities of efflorescent salt (carbonate of soda, I think,) about the swampy grounds. There were two unfortunate Hunias here who seemed to avoid us with alarm as though they expected some maltreatment; they took us for *Khampa*, perhaps. Crossing this bay we

ascended on the high bank again, and then fell into the high road between Pruang and Gángri, which is nothing more than a wide and well beaten track over hill and dale. Four or five miles brought us in view of what appeared to be the south-western corner of Mápán, which was rounded off with shallow water; a concentric bar of shingle-sloping beach, and then steep hills, connecting the ground on which we were travelling with the base of Gurla. There was no sign of any affluent stream in this quarter, and the nature of the ground precludes an effluent. Continuing along the ridge, and inclining gradually from the east to the west side of it, we came in sight of Cho-Lagan again, viz. the south-eastern quarter of it which forms a large bay under the foot of Momonangli. By an easy descent we reached the shore, and 1½ p. m. halted at Lagan-Tunkang, which is, or was, a Dharmshála close upon the water at the south-east corner of the lake; it now consists of some roofless and ruinous walls built of shingle stones embedded in mud; the roof is said to have been burnt by the Sikhs under Zoráwar Sing, who passed this way during winter and were hard up for firewood. There is rather a marine looking beach here with concentric ridges and shingle showing variations in the water level to the extent of six feet perhaps, above the present surface: the shingle and sand are mostly granitic, and the former partially rolled; only the southern half of Lagan is visible from the Tunkang, the northern part being hidden by the projecting hilly banks which I noticed from the other side occupying the middle part of the lake's eastern shore. The extreme breadth of the lake at this its widest, may be eleven miles or thereabouts, equal to the middle breadth of Mápán. The south-western bank had the same steep profile and irregular indented outline, as viewed from the other side, and the little islands were visible again. Gerard was misinformed about the island in Rákas Tál with a monastery on it: there is nothing of that sort I believe: as the Hunias have no such things as boats here, the only access to these islands, is by the ice when the lake is frozen over in winter, and they are then sometimes visited by shepherds in quest of fresh pasturage. There is a story, true or not I cannot say, of a shepherd having thus taken up his quarters on one of the islands, and not being alert enough on the approach of spring and thawing of the ice, his communication was interrupted before he could effect his retreat to the shore; he was thus



imprisoned for some nine months, and had to live the best way he could upon his sheep, till released by the formation of ice again next winter; a miserable and dangerous situation, comparable to that of the Jwári Bhótia, who was snowed up for a whole winter at Topi Dúnga, a dismal pit between the two formidable passes of Kyúngar and Únta-Dhúra.

At 2 P. M. we left Tungkang; course south-westerly, crossing a mile of flat ground upon the south-east corner of the Tál, with a large ravine running through it from the foot of mount Gurla, full of granitic shingle, but without water. We thence ascended high ground connecting the base of Momonangli with the range of hills that forms the south-western boundary of Lagan. The eminence is many miles in breadth, undulated into a number of ridges and hollows, and attaining an elevation of 100 feet perhaps above the level of the lake, at the highest part crossed by the road; but further west the hills are higher than that, and partially tipped with snow. We were nearly 4 hours crossing this hilly ground, something impeded by a very strong south wind blowing in our teeth; towards sunset, we descended into a sloping plain, the head of the Pruang valley.

Gurla rose close upon our left, on our right and rear was the southern face of the hills of Lagan, which here range east and west for a few miles; in front rose the Byáns Himálaya in dark steep slopes with the snowy summits towering behind, and close below ran the Karnáli, hidden in a deep ravine. Projections of the mountainous enclosure concealed the opening of the valley from Chujia Tol on the north-west and to central Pruang on the south-east. This valley of northern Pruang forms an acute triangle, of which the base and smallest side, is marked by the hills of Lagan on the north; the two longer sides by the base of Momonangli on the east, and the Karnáli at the foot of the Byáns Himálaya on the west; the apex of the triangle being southward at the entrance of middle Pruang. All this ground, though flat in the gross, has a sharp slope towards the Karnáli, and drains into the river by a multitude of deep ravines rising from the base of mount Gurla, and one or two from the Lagan hills. In the middle of the valley, a mile or two from its north end, a singular little isolated hill rises from the plain; apparently the same that I saw from the valley between Lámá Choktán and Chujia Tol on the 2nd instant.

We had to cross a mile of very rugged ground covered with a flood

of granite shingle from the foot of Momonangli; the road said to have been made over this by a certain Láma, being nothing better than a width of a few feet, very indifferently cleared of the larger stones, which have been thrown to the sides of the path; numerous large water courses, which in the summer contribute streams to the Karnáli, were now all dry. We encamped in one of these at 6½ P. M.; night and fatigue obliging us to halt notwithstanding the want of water, I had to dine again off biscuits and cheeroots.

7th October.—Thermometer at sunrise 16°; ground and tents covered with hoar-frost; hitherto I had seen little or no dew in the mornings; the increase of moisture in the air here is brought perhaps by the south wind blowing up the valley of the Karnáli from the Indian side of the Hímálaya. This place is probably about the same elevation as the lake, i. e. 15,250 feet.

Rechu and the other Bhotia made their appearance early this morning, bringing the ponies with them. Yesterday, Anand lagging behind the rest of us on the march, saw two horsemen in the distance, probably these very worthies of our own party following at our heels as near as they durst.

We started at 7½ A. M., course south-westerly; 3 miles on crossed a very wide ravine full of granite shingle and large enough for a considerable river, but at present there was a small stream only: on the left bank is a ruined Dharmshála high Baldak, like Lagan Tunkang, and strewed about with bones said to be the remains of the cattle which perished here in the flight of Zoráwar Sing's party from Gángri to Pruang. Three or four miles down, and little above its entrance into the Karnáli, this ravine is joined by another from the northward, (one of those we crossed yesterday evening), and in the angle of ground between them stands Kardam, one of the three *Khar* or Forts of Pruang, and a large village, the highest up the valley; the fort is said to be in a ruinous, or at best neglected condition, without garrison, though nominally kept by a "*Zungpun*" of inferior rank (a *Kharpun* probably). Our route continued with very little variety over ridges of high ground, alternating with stony ravines, for the most part dry. We could now see many miles up the valley to the north-westward, the head of which under Chujia Tol we had crossed on the 2nd instant; but there were no points of particular note about it. Five or six miles

below Baldak, the narrowing of the Pruang valley brought our road within a mile and a half of the Karnáli. On the top of the opposite bank stood a small village, Dunsála, on a ledge of flat ground under the Byáns mountains; the depth of the channel concealed the river and two other villages on its left bank, Dumar and Hárkáng, through the former of which passes the road from Taklakhar to Kardam, &c. Three miles further down we entered a ravine with a small stream falling into the Karnáli not a mile below. The river here seemed to take a turn to the south-eastward after receiving a western branch through a deep ravine from the Byáns Himálaya. We were still close under the base of the huge Momonangli, the snowy top of which was almost hidden by the lower outworks that rise in steep earthy mounds with little precipitous rock, which is very much the character of all the mountains hereabouts on the north side of the Himálaya. Pruang has got a reputation, amongst our Bhotias, for great fertility; and with diligent cultivation it doubtless may produce some scanty crops of barley and peas, but its advantages in this way can only be by comparison with other places still more sterile than itself, for I can assert that the upper part of the valley, at least thus far, is barren in the extreme; indeed it seemed more destitute of vegetation than any of the low ground I had yet passed over, and the "Dámá," goat-thorn, still the sole shrub, was certainly much scarcer, though perhaps from the consumption of it for fuel by a dense population. At the best however, upper Pruang cannot compare in natural fertility with the most sterile of the inhabited parts of our Cis-Himálayan Alpine valleys, such as the vicinity of Kúnti in western Byáns, or of Milam in upper Jwár.

We now halted at 1 P. M. and encamped for the rest of the day, having approached as near as was safe (or according to the Bhotias, much nearer) to the large village of Toïyon. The road to Lípú-Lekh, the eastern Byáns pass, lay through the very middle of this, and other thickly inhabited ground beyond under Taklakhar, which we thought it advisable to pass by night.

In the course of this morning's march we had passed some native travellers on pilgrimages from Kajarh, with whom we exchanged salutations, and shepherds grazing their flocks in the hollows along our road. Our present encampment too was close below a *Dúng* in the same ravine; but we were not troubled with particular notice from any of these quarters.

Thermometer at 2 P. M.  $56^{\circ}$ , boiled at  $187^{\circ}$ ; elevation 14,750 feet. Kardam-khar is probably about 15,000 feet. Thermometer in the sun rose to  $76^{\circ}$ . The south wind blowing up the valley of the Karnáli was disagreeably strong, though I am not sure that the temperature of the air was depressed thereby.

Our Bhotias went to the *Dúng* for milk and mutton: the shepherd was very stingy with his milk, but I got just enough to qualify half a lota of tea, which was the most, and perhaps the only, refreshing draught that I had enjoyed since leaving Kúnti: hitherto I had subsisted on Bhauna's decoction, which was made with a liberal mixture of ghee. The Bhotias make their tea with soda (*Bal*), which extracts the color, and, as they fancy, the taste of the trash they get from the Lhássa merchants at Gartokh; the decoction, which is boiled for a long time, with plenty of ghee also, tastes more like broth than tea. In the matter of mutton, the Bhotias insisted on bringing goat, which I rejected. The Tibet goat is the most elegant of his tribe, small and handsome as a deer; but his virtues reside rather in the fleece than in the flesh.

We resumed our journey at 7-40 P. M., course east of south; a bright moon little past the full rising soon after, gave me a fair view of the principal objects in the vicinity of our route.

Leaving the ravine in which we had been encamped, we crossed a mile of high ground, and then entered another ravine wider and deeper than any we had yet crossed in the Pruang valley: a steep descent of some 500 vertical feet, brought us into a flat bottom half a mile broad covered with a profusion of rough granite shingle, of which a very indifferent clearance had been made for the road. The length of the ravines was inconsiderable, the foot of the mountain being hardly a mile from our left, and the Karnáli a furlong below our right. For want of light perhaps, I did not see the houses said to stand on the river bank, but our road passed through fields belonging to the village, and channels for the irrigation of them.

It was on this ground, the ravine of Toïyon, that the Sikh invaders of Gnari under Zoráwar Sing met their well deserved end. After having mastered the whole province, and established himself in Pruang, Zoráwar took it into his head to go to Gángri with the greater part of his men: when there they were surprised by the arrival of the relieving army of Hunias from Lhássa, and attempting to effect a retreat, a

flight rather, to their position in Pruang, they were here overtaken and destroyed, but more by want and cold, for it was the middle of winter, than by the prowess of the Lhássa army, who were probably a viler rabble, though far more numerous, than these bastard Sikhs, the refuse of the Jamu hill districts. The Sings well earned their fate by the indiscriminate robbery and violence which they perpetrated on the unoffending Hunias of Gnari: ruined villages and impoverished people still shew the brand of their devastations throughout the country.

On the south side of the ravine ran a good sized rivulet, crossing which we ascended the left bank, here not more than 100 feet high, but rising to double or treble that elevation by high ground close upon our left, (eastward). On the corner of level ground, some half a mile wide, between this hill and the Karnáli, stands the village of Toïyon, straggling loosely over the next mile of the road: there are houses also on the eastern eminence, besides the hamlet, which we passed on the other side of the rivulet. The greater part of the area I have assigned to the village is occupied by the fields, amongst which the houses are scattered here and there, singly or in small groups: I could see nothing in the shape of a street excepting the rows of Choktán walls and towers, ruinous inelegant structures of stone and mud, that lined the road in considerable numbers: none of the houses were within a hundred yards of our road and most of them further, so that I could see little of their construction, but they seemed to be rather long than lofty, with very few doors or windows, the walls whitewashed, and crowned with dark lines, which from their low shallow appearance could be coverings to the walls concealing a flat roof to the interior body of the house. Bhauna explains that the houses are built in hollow squares, two-storied, with a flat terrace roof above, which is dignified with the name of a third story: the apartments are ranged round an open court in the centre, to which all the windows are directed, a single doorway in the middle of one side, being the only aperture in the outer walls. This construction, however, is by no means universal in Hundes, for at Dúngpú in Gugi, I myself saw numbers of houses quite open to the front, though otherwise as above described, and very like the dwellings of the Byánsi Bhotias. The dark summits of the walls, are the copings formed by layers of *Dámá*, *Hompu*, or other brushwood laid upon the top of the parapets and weighed down by stones.

Turner (Chapter VII. Teshoo Loomboo) was at a loss to understand the object of this crowning to the house walls which he found equally prevalent in the province of Chang ; in Gnari it is intended merely as a coping to protect the walls from rain and snow, flag-stones suitable to that purpose being rarely procurable. The annual renewal of these cornices, together with a general repair and ornamenting of houses, forms one of the observances of the "*Lo-sar*" festival, the Tibetan new-year's day, which many possibly have some affinity to the new year's day of China, the principal festival of that nation. The ground-floors of the houses here are appropriated chiefly to cattle and whatever else cannot find room in the dwelling apartments of the family in the upper story.

We heard and saw some signs of life indoors ; musical noises and voices, lights and shadows ; but ourselves passed unnoticed except by the dogs, who did their best to give the alarm.

The harvest here, which is mostly barley and peas, had been all reaped and carried ; the fields were quite bare, but showed marks of careful tillage, being intersected with a multitude of artificial watercourses for irrigation. Pruang is in advance of Byáns with its harvest : this must not be attributed to superior temperature of climate, but rather to the greater amount of sunshine enjoyed by the former, the valley being more open, and the far smaller quantity of rain and snow on the north side of the Himálaya, and something I believe to the palpable neglect of the Bhotias in their agriculture, which they postpone to their trading affairs, leaving the tillage of their fields almost entirely to their women.

The elevation of Toïyon may be estimated at 14,500 feet, viz. 250 feet below our last encampment.

This village is the head-quarters of one of the three *Makhpun* of Pruang, who are the hereditary superiors of as many small circles of villages, responsible for collection of revenue and keeping of the public peace, but entirely subordinate to the Zungpun of Taklakhar.

Beyond the village was an easy descent for a mile, but the road very stony, by which, after crossing a small rivulet, we reached the left bank of the Karnáli.

The river here appeared to be about as rapid as the Káli in the middle of Byáns, and in width such as to be spanned by a Sánga, 50 feet long from pier to pier, and of the construction common on the

south side of the *Himálaya*, but more carefully built than any I have seen in *Kumáon*. Probable elevation of the bridge (200 feet below *Toïyon*) 14,300 feet.

The right bank of the river rises abruptly to the height of two or three hundred feet; above the bridge in cliffs of conglomerated earth and shingle, with *Láma* caves in them, overhanging the river; and close below in steep slopes and landslips up which we ascended. The top was some 250 feet above the river, and for a mile in length an open level with higher ground rising on our right (westward). Here on the roadside occurred a line of *Choktán* wall and towers, remarkable chiefly for its extreme length, which was not short of a furlong I suppose, and exceeding any I had yet met with. At the end of this elevated level we crossed a very deep ravine connected with the bed of the *Karnáli*, beyond that a ridge of high ground, and half a mile further on a second ravine like the first, ascending from which we wound over the shoulder of a steep rounded hill which sloped down to the river on our left (eastward) to the depth of 250 feet below the road, rising as much above it on our right (westward). The hill side was here and there broken into small cliffs and prominences; the top was studded with a moderate assemblage of houses like those of *Toïyon*. This is *Takla-khar*, by the *Hindustanis* called *Takla-kot*, which is a fair equivalent, as "*Khar*" signifies a fortress: the fort however was not visible to us. Half a mile from the last ravine brought us to the south side of the hill, which is formed by the *Tidya-Chu*, a very deep and wide ravine with a river coming from the westward out of the mountainous base of the *Byáns Himálaya*. On the northern corner of its confluence with the *Karnáli*, is the village of *Beli*, whence the inhabitants of *Takla-khar* have to fetch their water, the hill above being destitute of it. The south side of the hill is very steep and ruinous, being little better than a great landslip strewed with fallen masses of the conglomerate (earth and shingle) that forms the more solid parts of the soil. We descended by this and forded the *Tidya-Chu*, a very considerable stream not far inferior I suppose to the main branch of the *Karnáli*.

Ascending the right bank, which was steep and some 200 feet in height, we found a pretty extensive level on the top, entirely occupied by fields, like those of *Toïyon*, quite fallow and scored all over with channels for irrigation. These marks of irrigation point to the fact of

the great dryness of the climate in Pruang, compared with that of the neighbouring Cis-Himálayan Alpine valley, in which the natural rains during the summer supply abundance of water for all cultivation. The crops of Pruang are raised by artificial irrigation during the height of the Indian rainy season. From this ground we had a good, (moon-light) view of Takla-khar, which extended along the top of the opposite bank: the principal development of the place appears to be east and west, the extreme length in which direction may be a quarter of a mile; and to judge from what we saw of the east end, and from the descent of the buildings in parallel terraces this side, its breadth must be inconsiderable; a mere strip along the top of a narrow ridge. I could see nothing of the Khar or the Gumba, which are the principal edifices; the former is said to be well built, with lofty walls and numerous apartments, capable of holding a thousand men; but the fortress has the fatal defect of being without water, the nearest supply of which is, as above mentioned, in the village of Beli at the bottom of the hill: there was once a walled passage communicating with this, but it is now ruined, and so far obliterated that I saw no vestige of it, as we crossed the east end of the hill. The Pruang Zungpun resides in the Khar, but without any garrison whatever. The Gumba is a large building adjoining to the fort, and stocked, they say, with some 300 of the monkish order. Many of the houses of the place belong to people of the neighbouring villages, and are used chiefly as depôts for their salt and grain, the traffic in which with the Bhótias of Byáns, and the people of Dhúli, Humla, &c. constitutes the main resort to Takla-khar. The village, with its Khar and Gumba, may perhaps equal in extent the north-eastern suburb and bazar with the town fort of Almora. I estimate the elevation of the summit of Takla-khar to be 14,750 feet, viz. 500 feet higher than the confluence of the Tidya-chu with the Karnáli.

Námi is a small village on the south bank of the Tidya Pryág, where there are the remains of field-works made by the Sikhs under Zoráwar Sing, who (to command water I suppose) took up his position here in preference to occupying the fort above.

When he went on his fatal pilgrimage to Gángri, his Lieutenant, Basti Sing, with the remaining party, went over to Kirow, the district of the third Makhpun on the other side of the Karnáli, and thence after the



destruction of their commander and comrades, effected their escape by Lipu-Lekh into Byáns and Kumáon.

Our road now turned to the westward ; half a mile up the right bank of the Tidya-chu stood Maghram, a small village, of note only as being the residence of the second Makhpun, whose district, "Tidya," lies on the south side of the Chu. The elevation of Maghram is about 14,500 feet, being 250 above the bottom of the Tidya-chu.

"There was a sound of revelry by night," a noisy concert of singing and instrumental music, very like the oratoris of the Hindus, proceeding from the Haweli of the Makhpun ; perhaps, as Bhauna suggested, on the occasion of his son's marriage, which promised to come off about this time, and Pruang Zungpun might possibly be among the wedding guests. We saw dark shadows of men flitting across the lights through the open door. I longed to approach and look in upon the strange scene, which would have been rendered doubly strange by the sudden apparition of a "Feeling"\* visitor, but the diversion was not worth the possible cost to my companions, if not myself. The Bhotias indeed, thought it unsafe to keep the road which passes close to the village, and we struck across the fields to the left under a range of hills, bounding the cultivated flat of Maghram on the southward. Two miles from the Tidya-chu, brought us to another ravine with a small stream coming from the south-westward, and entering the Tidya-chu a little above Maghram. Tashikang, is a hamlet on the west bank of the confluence. Three or four miles up the ravine we came to Pála, a *Dúng*, in which I observed a good collection of cattle and a few shepherds' tents, &c. Here the ravine divided into two branches from the south and from the west ; our road turned up the latter, called Ningri, where a mile further on we halted at 3-40 A. M. 8th October, and being now close to the foot of the pass we bivouacked till morning.

This night I had fortified myself with an extra Chapkan and Pajáma, which with the excitement of the stolen march through the thick of the "Chinese Tartars," had kept me warm and comfortable enough : the first time I may say since leaving Kúnti, that I had felt any thing of the sort at night. The worst inconvenience I experienced this night was the difficulty of opening my watch to time distances, and of writing a

\* The Tibetan form of "Feringi."

few pencil notes for my field book, &c., my hands being nearly disabled between cold and gloves.

This place, Ningri, is but a narrow ravine far recessed in the Byáns Himálaya, with little to be seen but bare walls of rock with glimpses of snowy summits behind. There was so little fuel forthcoming that I could not boil my Thermometer here, but the elevation may be estimated at 15,000 feet, 100 feet above Pála, which I reckon to be 500 feet higher than Maghram, the ascent up the ravines from that place being very moderate.

Bhauna, with Anand, now returned to Pruang to visit his friend Tidya-Makhpun, realize some debts and pick up the news. With the Bhotias I started for Byáns at 8.25 A. M. course westward (by south) up the Ningri ravine. We met several Hunias on the road with laden sheep, &c. and they stared at me with no little astonishment, as I now showed my face without reserve, but none of them presumed to ask questions, which were rather defied by the confident air of the Bhótias who had regained their courage now that the danger (such as it was) was over; among a party of Hunias I met "the man of Lamjung" again, who also recognized me with some surprise; he appeared to be doing a little in the salt and grain line in partnership with some Kham-pa. They asked three rupees for a puppy worth a timashi, for which I had offered a rupee.

Three or four miles of straight and tolerably easy ascent by a fair road (for these parts), brought us to the top of Lípú-Lekh by noon. Seven or eight hundred vertical feet of the summit was pretty well covered with snow, but this was for the most shallow and well frozen, or when otherwise, so beaten down by the traffic of men and cattle, as to make a very good path, over which we travelled without any difficulty. The sun was shining bright, but the passage of snow was not long enough to entail any injury from the glare, though that was of course considerable over the snow. The rarefaction of the air was sensible but no way distressing to any of us except the ponies, who seem to have very little endurance in this matter. Altogether, I found the ascent nothing more than a pleasant morning's walk, and that after an 8 hour's march through the preceding night. A Barometric measurement of this pass made by Manson, 14th October 1828, made the elevation

16,844 feet (Calcutta Gleanings of Science, April 1829), which appears to me rather in excess.

Lípú-Lekh, like most of the other passes, does not command any extensive prospect ; I saw nothing but low ugly looking snowy ridges on all sides, a partial glimpse of Gurla, and a spur of bare hills down below in the direction of Takhlakhar.

We met with several cut Pine trees near the top of the pass, in process of transport from Byáns to Pruang. Wood, both for carpentry and fuel is an article of regular traffic this way ; for Pruang, the upper part of it at least, is utterly destitute of trees ; as far as I could see down to Taklakhar the vegetation was of the scantiest sort, even Dáma bushes being rather scarce.

The descent down the south-west side of Lípú was long but not steep, and I found much the same quantity of snow as on the north-east side. The road fairly made or naturally good, follows the right bank of the Káli, which rises in water courses under the pass. The spot marked on the map "Mandarin's Camp," I suppose to be the delta of level ground at the entrance of a ravine, with a stream coming from the eastward, which opens through the left side of the main valley three or four miles below the top of the pass ; this ravine had a wide level bottom near a mile long, terminated rather suddenly by steep snow-topped mountains, said to be impassable : its elevation, according to Webb's map, is 14,506 feet ; there is no vegetation here except grass and small herbs. The origin of the absurd name "Mandarin's Camp," may have been in the circumstance of a former Zungpun of Pruang having come here to visit Captain Webb, when that officer was surveying in Byáns (in 1816?) Deba Phúndu, the Pruang Zungpun who was relieved last year (1845) was the son of Captain Webb's visitor, and then a mere boy, accompanied his father on this occasion. He appeared to have derived a favourable impression from the interview, or the present of a fowling piece which terminated it, and when last in Pruang, in the office formerly held by his father, is said to have expressed his desire to renew the intercourse with any English gentleman who might visit Byáns. It is well for himself that he had not an opportunity of doing so, for any proceeding of the sort if known to his superiors would certainly have lost him his "*Zung*" at the very least.

I looked in vain for the great snowy mountain, which rises close above the left bank of the Káli between Lípú-Lekh, and the "Mandarins" ravine, as marked on the map under the name of "Koonlus," nor could the Bhotias tell me any thing about it. I have seen it, however, from the Deo Dhura, between Lohu-ghát and Almora, and its position must have been fixed by observation from some such distant points of view. The snowy summits, though towering to the height of 22,513, and 21,669 feet, are here quite hidden by the nearness of the steep and rocky base.

Below the "Mandarin's Camp," vegetation began to increase, first Dama and Juniper shrubs, then birch trees, and at last gooseberry bushes and the upper limits of Pine forest. At 3-20 P. M. having walked rather quick down the hill far ahead of the cattle, &c., I reached Yirkha, which is a small hamlet with one house and a few fields, on the right bank of the Káli, just above the confluence of a large stream coming through a deep ravine from the westward. The elevation of this place is near 13,000 feet, (I suppose that is), according to Webb's survey, which makes the Kálápání bridge some way lower down 12,742; but the vegetation appeared to me very luxuriant for such an elevation, and the village of Kúnti, which I made 13,000 feet, is more cold and sterile than Yirkha, and it must be 10 miles road distance from the top of the pass, though less in a straight horizontal line. Here I found quarters in the vacant cottage which, though low, dark, and dirty, felt absolutely luxurious after the miserable discomfits of my quarters in Hundes; and the change of climate was no less agreeably marked.

The pass which we had crossed to-day was a wonderful contrast to all the others that I have seen. A march of 7 or 8 hours had brought us, with nothing beyond a wholesome fatigue, from a passable encamping-place close above a pasture ground on the Húndés side, into a pleasant smiling hamlet, green with shrubs and yellow with harvest, in a sheltered Alpine valley, the bottom terraced for cultivation (here and there) along the river bank below.

Lípú-Lekh must be passable for the next month or two, if no fresh snow should fall in the interim, indeed, I can readily believe the passage might be effected safely even in the middle of winter, if not over-

severe, only with proper arrangements and precaution. It was rather from the want of such arrangements than from absolute extremity of climate, that the Sikhs under Bashti Sing suffered so much damage to life and limb in their winter-retreat from Pruang by this pass. The commander, obliging his men to carry him in a Dooly, escaped unhurt, and those who were maimed by the frost accused him, perhaps justly, of imposing on them more than a fair share of exposure.

The cattle came in 2 or 3 hours after me, all foot sore, I suppose from the abominable stony ground of Pruang; the ponies, as usual the least enduring, were dead lame.

In the absence of Kumáonis, who had hitherto cooked my dinner for me, when I had any, I was obliged to divide the kitchen operations between Rechu and myself, and the result was not much worse than the average of the last 10 days from the hands of Bhauna and Anand. I regaled the Bhótias with all that remained, which was nineteen-twentieths, of my wine and spirits in the wooden bottles; Rechu had prudently declined my offers of it in Húndés, because "when the *wine* is in, the wit is out," and they had then great need to keep their wits, (such as they were) well about them.

9th October.—I enjoyed such luxurious rest in the little mansion of Yirkha, that I was not on foot till 10 A. M., after my last breakfast of greased tea and biscuits.

We crossed over to the left bank of the Káli under Yirkha, a mile below which is a good-sized stream coming through a deep ravine from the eastward, with plots of cultivated ground at the confluence, very similar to Yirkha; thence recrossing the river, the road lay over a great landslip which, for some years past, has quite obliterated the former hot spring of Kálápáni: the name however has been transferred to another spring further down on the left bank of the Káli, (to which the road crosses again,) but the water here is neither black nor hot, nor any way remarkable. Below this the valley begins to expand, and gives room for Shangduma, a very pleasant little *maidan* on the left bank of the river, beautifully planted with Pines. It was here that the Commissioner (Lushington) had his interview with Bashti-Ram Sing in September or October, 1841, 3 months before the Sikh discomfiture and flight from Pruang. Close below Shangduma, is the hamlet of Mala-Kawa. The

valley of the eastern Káli then opens into the main valley of the Kúnti-Yánkti, our road falling into the Kúnti road at the hamlet of Tala-Kawa, and thence entering on ground already sufficiently described in my way to Kúnti.

Having tried in vain to reconcile the map with what I saw of the ground between Lípú-Lekh and Gárbia, I have come to the conclusion that the map is wrong in many particulars. The position of Kálápáni, if the same site as that pointed out to me, may be about right, but from that to the "Mandarin" the distance is very far short of the truth, leaving no room for the two confluent streams of Yirkha and the other, which have been omitted accordingly; on the other hand the "Koonlus Peaks" interfere with the necessary corrections, which if the position of the former has been truly fixed by distant triangulation, indicates some radical error in the survey of the valley. The Káli meets the Kúnti river at right angles a long way above Chángrew, and not as the map has it, in an acute angle tending south-eastward towards that village. The confluence of the Tinkar river is equally misdirected; it should come obliquely from the north-eastward running close under the village of Chángrew.

It was more than 5 hours' walk from Yirkha to Gárbia, where I arrived at  $3\frac{1}{4}$  P. M. I here found my servants and all that I had left behind at Kúnti, and I was not sorry to exchange the inhospitalities of Húndés for some of the comforts of civilized life again.

It cost me the rest of the afternoon to clean myself, ablutions having been quite out of the question during the last 10 days; even now my face was only just enough recovered from the blistering of Lánkpya Dhúra to bear a gentle application of warm water. On looking into the glass I was quite astonished at my own visage; my nose was one entire cicatrix, contrasting strangely with my cheeks, which had already changed their skin and were now a color that I had never known since boyhood in England; such roses are to be gathered only in the gardens of Húndés.

*(To be continued.)*

*Notice of the Ikhwán al safá,\* by Dr. A. SPRENGER. Communicated by H. M. ELLIOT, Esq. Vice-President. (Continued from the June number.)*

12 (25.) A man is a microcosmos *في ان انسان عالم صغير*. The authors explain the subject of this chapter in the following words: "Know, O brother, that the knowledge of one's ownself is the key to every science, and this is threefold; first man ought to be acquainted with the component part and economy of his own body, and with all those qualities which are independent of the influences of the soul; secondly, he ought to study the soul and its qualities independent of the body, and thirdly, he ought to understand their joint action." They compare the animal economy with the systems of the heavens. According to their opinion every thing is formed under the influence of the stars, and every thing must therefore bear a resemblance to them. This is the leading idea of the natural sciences of the Arabs. The openings of the body, (the ears, eyes, nostrils, mouth, orifices of the breasts, navel and the sabylán) answer to the signs of the zodiac; the five senses correspond with the five planets, reason with the sun, and understanding with the moon. The principal functions of the body are equally likened to the seven planets; they are the power of attraction *القوة الجاذبة*, of retention *القوة الهامسة*, of assimilation *القوة الهاضمة*, of secretion *القوة الدافعة*, of nutrition *القوة الغاذية*, the vegetative power *القوة النامية*, and the plastic *القوة المصورة*. Every element is predominant in one part of the body: in the head, fire: this is attested by the sparkling of the eyes and the rapidity of the motion of the senses; in the chest air is predominant, for it contains the organs of respiration; in the abdomen water, and in the lower extremities, on which the body rests, the earth. This idea has been revived and expanded by Professor Oken in his natural history.

13 (26.) On the growth of partial souls in the human body, *في كيفية نشو الانفس الجزئية*. The authors explain that this life is a

\* Since I wrote the first part of this notice I found one of the authors of these memoirs mentioned in the following terms: "Zayd b. Rofá, one of the authors of the *Ikhwán al safá*, was extremely ignorant in tradition, and he was a liar without shame."

period of probation, during which the soul ought to be perfectionated and prepared for a future state : knowledge is the food of the mind.

14 (27.) On the extent of the powers of the human mind to penetrate into the mysteries of the universe ; *في طاقة الانسان*.

15 (28.) What is life and what is death ; *في ماهية الموت*.

16 (29.) On pleasure and pain both of mind and body and in this life and in the life to come *في ماهية لذات والالام*.

17 (30.) Causes of the difference of languages *في علل اختلاف اللغات*.

### III. SECTION.

1 (31.) On the origin of things according to the notions of Pythagoras. It is shown in this chapter that God has created every thing (in opposition to the opinion of those who maintain that the word is eternal), and that the system of the world is contained in the units of the decimal system.

2 (32.) On the origin of the *logos* *عقل* (i. e. intellect considered as a substance and not as a faculty).

3 (33.) The world is a human being magnified *في معني قول الحكماء ان العالم انسان كبير*.

4 (34.) On intellect (as a faculty of the mind), and the object of intellect *في العقل والمعقول*.

5 (35.) On the revolutions and orbits of the stars *في الاكوار والادوار*.

The authors enter at some length on the sidereal period, or Yugas of the Hindus, which became known to the Arabs by a translation of the Siddhanta.

6 (36.) On Love *في ماهية العشق*.

7 (37.) On the resurrection and immortality of the soul *في ماهية البعث والنشور*.

8 (38.) On motion *في اجناس الحركات*.

9 (39.) On cause and effect *في العلل والمعلولات*.

10 (40.) On the nature of simple and compound bodies *في السدود والرسوم*.

### IV. Memoirs on law *الرسائل الذاموسية*.

1 (41.) On the different religions and philosophical sects *في الاراء والذاهب*.

This chapter is very long, but the reader, who would expect to find any facts on the systems of philosophy or heresies then in vogue among



the Arabs would be much disappointed ; the authors dwell here as elsewhere on generalities, and repeat their dreamy speculations on astrology and natural philosophy as they do in every chapter.

2 (42.) On the road to God ;—admonitions to a virtuous and pious life في ماهية الطريق الى الله عز وجل.

3 (43.) On the faith of the *Brothers of purity*, and on the religion of the *Rabbániary* في بيان اعتقاد اخوان الصفا ومذهب الربانيين.

Qorhazry derives the word تصوف from صفا ; this may be etymologically wrong, yet in several Sufi books, (among others in the *Kashf al-Mahjúb*,) in Sa'dy, &c. “brothers of purity,” and “Suffis,” are used as synonymous terms. The tenets of this fraternity are chiefly explained in parables. A physician came into a town, in which the plague prevailed ; he discovered a remedy by which he cured a man ; and by degrees he gained the confidence of the whole town. The physician is likened to a prophet. The duty of sacrificing one's self for the good of others, is illustrated by the story of Zopyrus : the hero, however, is a counsellor of the King of the Hayátilah, and the enemy is Fyroz, King of Persia. The authors conclude that the body is for the soul, what the egg is for the chicken, it must be destroyed before the soul can find life and freedom : we must, therefore, despise pain and death for higher objects. Examples of devotion are quoted from the life of Mohammed and his followers. The authors do not neglect to mention the great example of resignation : they give an outline of the life of our Saviour, which is exceedingly well worked out to illustrate the principle of their fraternity. They complain in several passages, that their contemporaries were devoid of a practical belief in the immortality of the soul ; and they show that Abraham, Moses, and other prophets, as well as Plato, Aristotle, and most of the philosophers were actuated by the conviction of another life in their actions.

4 (44.) I give the first part of this chapter in a translation and in the original.

*On the social intercourse of the brothers of purity ; on the mutual assistance which they rendered each other in the spirit of true charity ; on their benevolence, affection and kind-heartedness. The object of this treatise is to inculcate unity, and the duty of aiding each other in worldly and spiritual concerns.*

“In the name of the most merciful God ;—Know, O dutiful and

mild-hearted brother! (May God assist you and us, with his spirit!) that wherever our brothers may be, they ought to have a private place, where they assemble at fixed times, and from which strangers are excluded. They are to converse on their sciences and discuss their esoteric knowledge. They ought to dwell particularly on the science of the soul, sense, objects of the senses, reason, and the objects of reasoning, and speculation, and on the study of the mysteries of the divine books, and revelations, and of the sense of the divine law. But they ought not to neglect the four mathematical sciences, that is to say, arithmetic, geometry, astronomy and theory of music. They ought, however, particularly to occupy themselves with theology (and metaphysics) which is the great object of life. They ought not to be prejudiced against any science or book, nor ought they to be biased against any sect, for our sect comprizes all sects and all sciences, in as much as it consists in speculations on all things, that exist from beginning to end, both those which form the subjects of our senses, and those which we can be comprehended only by our reasoning faculties, and both internal and external, natural and supernatural objects; but we penetrate into the essence of things deriving them from our common cause and origin; they emanate all from our world and soul with all the difference in the composition of their masses, and diversity of genera, species and varieties. We have already mentioned in the second memoir, that we derive our knowledge particularly from four books: first, the writings of sages and philosophers; secondly, revealed books as the Pentateuch, the Gospel, the Psalms, and the Qorán and other books of the prophet, the meaning (but not the expression) of which was revealed to them by angels. Thirdly, books on natural philosophy in which every thing is described, as it is now. The subjects of these books are the order of the spheres of the heavens, of the division of the zodiac, the motion of the stars, the disunion of this volume, the succession of the seasons, the metamorphosis of the elements, the diversity of natural bodies, viz. of animals, plants and minerals and the productions of art; these are phenomena and forms of existence. All these things contain a recondite meaning, but men see only the outside and do not penetrate into the mysteries of the works of the Creator. Fourthly, books on metaphysics (or mystics), which only the pure are to touch, and which were written by the hands of scribes honoured and just, Qorán 80, 15. They con-

tain effusions representing the essence, genera, species and varieties of the souls, and therefore, (I read *فتصرفها*) the soul is moved, carried away, guided, and regulated by them, and through them, and out of them.\* Souls manifest their actions, and go through various conditions in the progress of time and during the periods of the conjunctions and revolutions of the heavenly bodies; some descend at times into the abyss of incarnation, others rise at times from the darkness of their union with a body; they awake from the period of thoughtlessness and neglect, they rise on the day of judgment and justice, they pass over the bridge, they enter into paradise, or hell, they are detained in the *barzakh* or remains in the *áráf*, as it is mentioned in the *Qorán* (22, 102.) Behind them is the *barzakh* to the day of judgment,† and (7, 44), “upon the *áráf* are men, who know every body by his mark,” &c. These are the men, who are “in the houses which God has permitted to be raised, and, that his name be commemorated therein, men celebrating praise in the same morning and evening, men whom neither merchandizing nor selling diverteth from remembering God, and the observance of prayers and the giving of alms,” (*Qorán* 24, 36, 37.) This is the condition of our distinguished brethren, imitate them, O brothers, and you will find in these our memoirs every information which you require respecting these sciences.

Know, O brother, that the favors of God are innumerable, yet they may be brought under two heads, with several sub-divisions; the one is physical, and the other moral; to the former belongs wealth, and to the latter knowledge. Men fall under these heads into four classes, some possess wealth but no knowledge, others possess both; some possess neither, and some possess the latter and not the former. He who possesses both, ought out of gratitude pray to God that he may send him one of our brothers, who is without either, that he may comfort him; he ought to assist him with money to support his life and to instruct

\* It is likely that “books,” has here a mystical meaning; in the dictionary of Sufi terms p. 42, the words *كتاب صدين*, “the manifest book,” are considered as equivalent with “universal soul,” *الذفس الكلية*.

† It would lead us into too long details to explain the mystical meaning of these allusions to Muhammadan mythology and the *Qorán*. Those who take an interest in the subject I must refer to the *Kashf-al-mahjub* or the *Ma'árif al-'awárif* or the *Fotúhát*.

him in order to insure his happiness in the life to come, but the donor ought never to reproach him for what he has received, nor treat him with hauteur, for he knows that He who made the poor made the rich ; he ought to make no distinction between a real son and a spiritual son ; he educates the former, spends money on him and makes him the heir of his fortune after his death. It is related of the prophet that he said to 'Alyy : "I and you are the fathers of this nation."\* Christ said in the same sense to the apostles : "I have come from my father and your father," and it is said in the Qorán, "the religion of your father Abraham." All these are allusions to spiritual paternity. The prophet says "every relationship ceases except that with the prophet." He also said "O children Háchim, don't act so that on the day of judgment other people bring forward their works and give your relationship to me, for I cannot do any thing for you." In this passage he means the relationship of the blood which ceases with our body, but the relationship of the mind continues ; for the soul remains after the dissolution of the body. And if any one thinks that the son whom he has begotten will keep up his memory after his death, he ought to recollect that if he leaves a spiritual son, he will keep up his memory in the assembly of the learned and of the good, when he may have acquired a name for his knowledge, and he will invoke the mercy of God upon him, whenever he may mention his name. We mention in this manner, our spiritual father much more frequently than the father who has begotten us, and we invoke the mercy of God upon him. If a man should think that his son by blood will be of use to him in his old age, and that he will support him, he ought to recollect that it frequently happens that a spiritual son, when he has come to maturity in wisdom and knowledge, will by his erudition improve the mind of his master and contribute to his salvation without his being aware of it. It is said in the Qorán : "You do not know who is more useful to you, your fathers or your sons."

\* The prophet says : the faithful is the brother of the faithful by father and mother. Abraham said : who follows me is of me. God answered to Nuh when he said my son belongs to my family ; "he is not of thy family for he has misbehaved. It is said in the Qorán when the trumpet will be sounded there will be no relationship between them and none will intercede for the other." It is clear that relationship by blood is of no use for the world to come.

If any one of our brothers is rich but uninstructed, it is his duty to seek one of his brothers who possesses knowledge and is poor, to take him into his house and assist him with his wealth. His well informed brother is to communicate to him his knowledge in return. Thus they help each other to improve their conditions in this world and in the life to come. But the rich ought never to let the poor feel his dependence, nor to treat him with hauteur on account of his poverty ; for wealth is a worldly possession, by which the life of this body, during our stay in this world is sustained ; and knowledge is a spiritual possession, and the sustenance of the immortal soul in the world to come ; the soul is better than the body, and the life of the soul better than the life of this body ; for the former is finite, it diminishes and ends, whereas the life of the soul in the world to come is eternal. It is said in the Qorán, “ You suffer on that occasion only the first death.” The well informed brother must not envy the other for his wealth, nor despise him for his ignorance, nor must he boast of his knowledge, nor is he to expect a remuneration for imparting to him his knowledge. Their relation is like that of the hand to the foot : they are equally connected in one body and assist each other. The hands do not expect thanks or payment, if they put the shoes on the feet or extract a thorn from them ; nor do the feet expect a reward, if they convey the hands to the place which is conducive to their growth and rise, and where they escape the danger of being cut off ; for they are members of one body and must preserve and assist each other. In the same way the ear does not reproach the sight, if it hears the call, nor the eye reproaches the ear, for seeing the person from whom the voice comes ; for they are faculties of the same mind, and the welfare of the one, is the welfare of the other. In the same manner the brothers of poverty ought to assist each other in worldly and spiritual needs.

The assistance which the poor, who is possessed of knowledge, and the rich, who is ignorant, ought to afford to each other, may be illustrated by an apologue : Two men made in company a journey through a desert, one had his eyesight, but he was weak and had so many provisions with him that he was unable to carry them. The other was blind, but strong and without provisions. The former took the latter by the hand and lead him, and the blind man carried the burden of the seeing on his shoulder, and they both lived on these provisions. In this manner

they both arrived safely at the end of their journey. In the same manner our brethren ought not to reproach each other for having saved each other. Mutual assistance ought to be afforded between two and two, or more. The ignorant is like the blind, the poor is like the weak, and the rich like the strong, the well informed resemble the seeing, the journey may be compared to the union of the soul with the body, and the desert with the life of this world, and the safe arrival with salvation in the life to come.

Those of our brothers who are poor, but possessed of knowledge and cannot find a rich man who will enter in partnership with them, must be patient and wait for better times; for they may be certain that God will help them and will send them a comrade or a brother who will make easier to them the burthen of poverty, as he has promised it to his saints. For him who trusts in God, he will open an outlet, and he will help him when he does not expect it. It is also said in the Qorán God will facilitate to him who trusts in him his undertakings. He ought also to recollect that he who possesses knowledge is better than he who possesses wealth, as it has already been explained.

He who possess neither knowledge nor wealth ought to thank God for what he has, and thus to render himself worthy of more, as it is promised in the Qorán—"If you are grateful we are sure to better your condition." His mind will be pure, his morals good and he will be free from bad principles: he will love his family and what is good, and he will be patient and contented with what God has allotted to him. And he ought to remember that he who has good morals has a better lot than he who possesses wealth and knowledge; for there are instances that a man has wealth and knowledge, or one of the two, and yet he is defective in the above qualities, for it frequently happens that philosophers who write books on ethics are the most immoral characters, whereas simple-hearted men are generally the most moral. Good morals is one of the greatest gifts of heaven, as it is said in the tradition, good morals, sustenance and death are all the work of God, but He praises his prophet for his morals in the words of the Qorán, "thou hast good morals." It is also said in the Qorán:—"If thou hast bad morals everybody will avoid thee." It is said that a man with good morals will enjoy in paradise the same happiness as a man who fasts and spends the night in prayers. Morality is the characteristic of the

angels and of the blessed in paradise, as it is said in the Qorán : “ They (women) said by God, this (Joseph) is not a man, he is an exalted angel.” Bad morals are the peculiarity of devils and the tenants of hell, who envy each other, as it is said in the Qorán :—“ And the seduced shall say to their seducers, verily ye shall not be bidden welcome ; ye have brought it upon us ; and a wretched abode is hell.” They will be together in hell.

Know, O brother (may God help thee!) that the faculties or qualifications of the mind of our brothers with reference to the matter to which we allude, are four ; first, purity of the substance of the soul : the quickness of perception and impressiveness ; this qualification is necessary for the artisans of our republic as mentioned in the second book. This is the faculty of intellect which distinguishes between the objects observed by the senses ; it comes after the faculty of speaking at an age of about fifteen years ; an allusion is made to it in the Qorán : “ When your children have attained puberty they have no longer free access.” We call man of this class in our memoirs “ pure” and “ kind.” Above this class is the class called “ masters,” who are the rulers, that is to say, the guardians of the brothers. They treat them with mildness and kindness, this is the administrative faculty which is acquired after the intellectual faculty at an age of thirty years. God alludes to it in the words (28, 13.) “ And when Moses had attained his age of full strength and was become a perfect man, we bestowed on him wisdom and knowledge.” We call this class in our memoirs our “ distinguished and good brothers.” The third class is above this. It is the class of reigning kings who are able to defend themselves against opposition by kindness and mildness and by contributing to the welfare of their enemies. This is the religious turn of mind (administrative faculty or the talent of ruling) which develops itself after about the fortieth year of age. To this refer the words of the Qorán ;—“ And when he had attained the age of strength, that is to say, when he was forty years, he (Solomon) said, O Lord, bestow knowledge upon me that I may thank thee for the favour which thou hast conferred upon me and upon my parents, and that I may perform good works which thou shalt approve of.” We have called this class in our memoirs “ distinguished and honored brothers.” The fourth class is above this, and may one of our brothers in whatever class he may be aim at it. Men of this class are completely

resigned, they receive the assistance of God and behold truth, (i. e. the deity). This is the angelic condition of mind which is acquired after fifty years of age, and which prepares man for departing from this life. After this condition of mind follows the exstatic (death), the soul ascends into the heavenly empire, and beholds the resurrection, judgment, and the entering into paradise. To this allude the words of the Qorán (89, 27.) "O thou soul which art at rest, return unto thy Lord, well pleased with thy reward and well pleasing unto God, enter among my servants and enter my paradise." Again "place me among the heirs of the delightful paradise!" Joseph alludes to it in his words (12, 102.) "O Lord, thou hast given me a part of the kingdom, and hast taught me the interpretation of dark sayings. The Creator of heaven and earth! thou art my protector in this world, and in that which is to come: make me to die a Moslem and join me with the righteous." Christ alludes to the same in his words to the apostles: "When I have departed from this temple I shall stand in the air on the right side of the throne before my father and your father, and I shall intercede for you. Go to the kings in the different parts of the earth and call them to God, and be not afraid of them, for I am with you, wherever you may go with help and assistance." Muhammad alludes to the same in his words "you will meet me (on the day of judgment) on the tank." These traditions are well known among traditionists. Socrates alluded to the same fact on the day on which he had to drink the poison, he said, "I separate from you, but I go to honoured brothers who have preceded me, &c." Pythagoras says in the same sense towards the end of his *golden verses*. "If you do what I have ordered you will reside in the air." Molúhar (?) says in the same sense, "The king asked to his Wazyr, who holds this theory? He answered, "those who know the empire of heaven," &c. We call the attention of all our brothers to this subject, God leads whomsoever he chooses on the right path. Many verses of the Qorán are in this sense, viz. all the verses in which paradise, its tenants and pleasures are described. The conditions for those who aspire to eternal happiness are four:—first, to profess the truth of it; secondly, to meditate on this subject illustrating it by similes and in other ways; thirdly, a firm faith thereon; fourthly, by actions which correspond with this belief. A man who believes in it without meditating believes blindly, and he who reflects on it without firm faith is a sceptic;



and if a man was to believe and not to act up to his faith, he does not do his duty, and if a man denies and disbelieves it, he is in ignorance. "As to those who believe not in the life to come, their hearts deny the plainest evidence and he proudly rejects the truth. There is no doubt but that the fire of hell is prepared for them, and that they shall be sent thither before the rest of the wicked." Know that a man who professes this doctrine, and reflects on it will find in his mind four qualities which he had not before:—first, elevation of the mind above the body; secondly, readiness to seek for purity which is in harmony with the mind; third, hope for happiness after this life; fourth, faith in God: on all these subjects he is strengthened.

Know that the believers in the Qorán and the books of the prophets may be divided into four classes which only they themselves know:—first, some profess their faith by their tongue, but do not believe it with their heart; second, they profess their faith with their tongue, and believe it with their heart, but they do not understand its meaning; third, they profess to believe and distinguish (understand), but do not act up to their faith. The first class of these has but little knowledge and understanding, and therefore though they exert their ingenuity, and reflect on the meaning of the books of the prophets, their intellect is insufficient to comprehend it, for they do not comprehend the literal meaning nor the recondite sense. This is the reason why they disbelieve it in their hearts and doubt on it. Those who profess and believe do reflect and know that a doctrine on which the prophets, the Imáms and the first Khalifs and all righteous Moslems, and every distinguished man agreed, must be true, yet their intellect is not strong enough to enter into it, and to *feel* its truth. Those who fully understand it, but do not act up to it, are guided by God, but they have not aid to enable them to do their duty; they stand alone, and every business cannot be performed by one man, on the contrary in some instances a combination of many individuals is necessary. This is particularly the case with the divine laws and nomos. A man must possess at least forty qualifications and there must be at least forty men united to attain this object.

The rest of this chapter treats on the choice of a friend, and on the choice of a Pyr or Teacher. The author is here even more verbose than usual which renders a translation almost impossible.

بسم الله الرحمن الرحيم

الرسالة الرابعة الاربعون من القسم الرابع من كتاب اخوان الصفا  
 فى كيفية عشرة اخوان الصفا وتعاون بعضهم بعضا بصدق المودة  
 والشفقة والتكهن والرحمة والغرض منها هو تاليف القلوب  
 والتعاقد فى الدين والدنيا بسم الله الرحمن الرحيم اعلم ايها الاخ البار  
 الرحيم ايدك الله واينا بروح منه انه ينبغى لخواننا ايدهم الله  
 حيث كانوا فى البلاد ان يكون لهم مجلس خاص يجتمعون فيه  
 في اوقات معلومة لا يداخلهم فيه غيرهم ويتذكرون فيه علوفهم  
 ويتجاورون فيه باسرارهم وينبغي ان يكون اكثر مذاكراتهم في علم  
 النفس والحس والمحمسوس والعقل والمعقول والنظر والبحث  
 عن اسرار الكتب الالهية والتزييلات النبوتية ومعاني ما يتضمنها  
 موضوعات الشريعة وايضاً ينبغى ان يتذكروا العلوم الرياضيات  
 الاربعة غنى العدد والهندسته والتنجيم والتاليف واما اكثر  
 عناياتهم قصدهم فينبغى ان يكون البحث عن العلوم الالهية التي  
 هى الغرض الاقصى وبالجملة ينبغى لخواننا ايدهم الله ان لا يعادوا  
 علما من العلوم او يهجروا كتابا من الكتب ولا يتعصبوا على مذهب  
 من المذاهب لان راينا ومذهبنا يستغرق جمع المذاهب كلها ويجمع  
 العلوم جميعها وذلك انه هو النظر في جميع الموجودات باسرها  
 الحسية والعقلية من اولها الى اخرها ظاهرها وباطنها جليلها  
 وخفيها بعين الحقيقة من حيث هي كلها من مبدأ واحد  
 وعلة واحدة وعالم واحد ونفس واحدة بجميع جواهرها  
 المختلفة واجناسها المتبانية وانواعها المفتنة وجزئياتها المغايرة  
 وقد ذكرنا فى الرسالة الثانية ان علومنا ماخوذة من اربع كتب  
 احدها الكتب المصنفة على السنة الحكما والفلاسفة من  
 الرياضيات والطبيعيات والاخر الكتب المنزلة التي جأت بها الانبياء  
 عليهم السلام من التوراة والانجيل والزبور والفرقان وغيرها من

صحف الانبياء الماخوذة معانيها بالوحي من الملائكة و ما فيها من الاسرار الخفية و الثالث الكتب الطبيعية وهي وصور اشكال الموجودات بما هي عليه الان من تركيب الافلاك و اقسام البروج و حركات الكواكب و مقادير اجرامها و تصارييف الزمان و استحالة الاركان و فنون الكاينات من الحيوان و الذببات و المعادن و اصناف المصنوعات على ايدى البشر و كل هذه صور و كاينات دالات على معان لطيفة و اسرار دقيقة يرى الناس ظاهرها و لا يعرفون معاني بواطنها من لطيف صنع البارئ عزوجل و النوع الرابع الكتب الالهية التي لا يمسه الا المطهرون الملائكة التي بايدى سفرة كرام بررة وهي جواهر النفوس و اجناسها و انواعها و جزوباتها و تصريفها و تحريكها لها تدبيرها و اياها تحكيمها عليها و اظهارا افعالها بها و منها حالا بعد حال في ممر الزمان و اوقات القرانات و الادوار و الخطاط بعضها تارة الى فعر الاجسام و ارتفاع بعضها تارة من ظلمات و الجنان و ان بذعاتها من نوم الغفلة و النسيان و حشرها الى الحساب و الميزان و جوازها على الصراط و وصولها الى الجنان او حبسها في دركات الهاونة و النيران او مكثها في البرزخ او وقوفها على الاعراف كما ذكر الله تعالى فقال ومن وراءهم برزخ الى يوم يبعثون و في قوله تبارك و تعالى و على الاعراف رجال يعرفون كلا بسيماهم و هم الرجال الذين في بيوت اذن الله ان ترفع و تذكر فيها اسمه يسبح له فيها بالغدو و الاصال رجال لا تهيمهم تجارة و لا بيع عن ذكر الله و اقام الصلوة فهذا حال اخواننا الفضلاء الكرام فاققدوا بهم ايها الاخوان تكونوا مثلهم و قد بيننا في رسالينا كلما يحتاج اليه اخواننا من اهل هذه العلوم فضل و اعلم ايها الاخ بان مواهب الله جل اسمه كثيرة لا يحصى عددها الا الله عزوجل و لكن يجمعها جنسان تحت كل جنس انواع كثيرة احدهما يسمى قنينة جدانية و الاخر قنينة نفسانية فمن الفتنة الجسدانية احدها المال و من القنيم النفسانية احدها العلم و الناس في هاتين

النعمتين العظمتين على منازل اربع فمنهم من رزق العلم ولم يرزق المال ومنهم من رزق المال ولم يرزق العلم ومنهم من رزقهما جميعا ومنهم من حرمتها فينبغي لاخواننا ممن قد رزق العلم والمال جميعا ان يودي شكر ما انعم الله عزوجل به عليه بان يضم اليه اخا من اخواننا فمن قد حرمتها جميعا وبواسطه من فضل ما اتاه الله من المال ليقيم به حيوة جده في دار الدنيا ويزوده ويعلمه من علمه ليحى به نفسه للبقاء في دار الآخرة فان ذلك من اقرب القرىبات الى الله عزوجل وابلغ لطلب مرضاته ولا ينبغي له ان يمن عليه بما ينفق عليه من المال ولا يستحقره ويعلم ان الذي حرم اخاه هو الذي اعطاه وكما انه لا يمن على ابن له جسداني فيما يريه وينفقه عليه من ماله ويورثه مما جمعه من المال بعد وفاته كذلك لا يجب ان يمن على ابنه النفساني لانه ان كان ذلك ابنه الجسداني فهذا ايضا ابنه النفساني كما روى عن النبي صلى الله عليه وسلم انه قال لعلى رضى الله عنه انا وانت ابوا هذه الامة وقال المومن اخ المومن من ابيه وامه وقال ابراهيم عليه السلام فمن تبعني فانه مني وقال الله عزوجل لنوح عليه السلام حين قال ان النبي من اهلي وقال انه ليس من اهلك انه عمل غير صالح وقال تعالى فادفنج في الصور فلا انساب بينهم يومئذ ولا يتساءلون فتبين ان النسب الجسداني لا ينفع في الآخرة ولهذا لمعني قال الشيخ عليه السلام للجوارمير جيت من عند ابي و ابيكم وقال الله عزوجل ملة ابيكم ابراهيم فهذه الابوة نفسانية لا ينقطع نسبها كما قال النبي صلى الله عليه وسلم كل نسب ينقطع يوم الضيمة الانبي وقال يا بني هاشم لا ياتونى الناس يوم القيامة باعمالهم وتاتونى بانسابكم فاني لا اعني عنكم من الله شيا انما اراد به النسب الجسدانية لانها ينقطع اذا اضمخت الاجسام وبقيت النسبة النفسانية لان جواهر النفوس باقية بعد فراق الاجساد وان كان يظن ان ابنه الجسداني يحيى ذكره

بعد موته فهذا أيضاً ان عاش احيا ذكره في مجلس العلماء و مفاضر  
اهل الخير اذا نشر علمه يتوجه الله و يرحم عليه كلما ذكره كما تذكر  
نحن معلمنا و اوستنا ذينا اكثر مما تذكر ايانا الجسدانيين و نترحم  
عليهم اكثر مما نترحم على آباينا و ان كان يظن ان ذلك الابن  
الجسداني ربما ينفعه اذا كبر و يعينه على امور الدنيا فهذا ربما باغ  
في الحكمة و العلم و الخير و المرتبة عند الله تعالى ان يشفع بعلمه  
لمعلمه فينجو بشفاعته و هو لا يدري كما ذكر الله تعالى بقوله اباؤكم  
و ابناؤكم لا تدرون ايهم اقرب لكم نفعاً و اما من رزق من المال ولم يرزق  
من العلم من اخواننا فيذبغي له ان يطلب اخا ممن قد رزق العلم ولم  
يرزق المال و يضمه اليه و يواسيه هذا من ماله و يرفده هذا من علمه  
و يتعاوننا جميعا على اصلاح امرالدين و الدنيا جميعا فيذبغي للاخ  
ذي المال ان لا يمن على الاخ ذي العلم فيما يواسيه به من ماله و لا  
يحتقره بفقره لان المال قنية جسدانية بقاء بها حيوة الجسد في دار  
الدنيا و العلم قنية نفسانية ليقيم بها حيوة النفس في دار الآخرة  
و جوهر النفس خير من جوهر الجسد و حيوة النفس خير من حيوة الجسد  
لان حيوة الجسد الى مدة مائتم ينقطع و يضمحل و حيوة النفس  
في دار الآخرة يتقى مدة مويده كما ذكر الله تعالى فقال لا يدوقون  
فيها الموت الا الموتة الاولى و يذبغي للاخ ذي العلم و الحكم ان لا يحسد  
اخا اذا مال لماله و لا يستحقره لجهله و لا يفتخر عليه بعلمه و لا يطلب  
منه عوضاً فيما يعلمه لان مثلها في صحبتها و تعاونها هذا هذا  
بماله و هذا هذا بعلمه كمثل اليد و الرجل في اتصالها بالجسد  
و خدمتها و تعاونها في اصلاح الجملة و ذلك لان اليدين لا يطلبان  
من الرجلين اذا اخذت لهما فعلا او اخرجت منها شوكة جزاء و لا  
شكورا فكذا لك الرجلين لا يطلبان من اليدين اذا بلغت لهما الى الموضع  
الذي منشاء تا و نشرتا و هربتا به من خوف القطع جزاء و لا عوضاً  
لانها الات جسد واحد و قوام احديهما بالآخري و صلاح كل واحد منهما

صلاح الآخر وهكذا ايضاً السمع لا يمين على البصر اذا سمعه الذداء  
والا البصر يمين على السمع اذا اراه المندى لانهما قوتان لنفس واحدة  
في اتصالهما وصلاح كل واحدة منهما صلاح الآخر في تعاونهما في  
خدمته النفس وطاعتها في ادراكها المحسوسات وهكذا ينبغي  
ان يكون تعاون اخوان الصفا في طلب صلاح الدين والدنيا وذلك  
ان مثل معاونة الاخ ذى المال للاخ ذى العلم بماله ومعاونة الاخ  
ذى العلم للاخ ذى المال بعلمه في صلاح الدين والدنيا كمثلي رجلين  
اصطحبا في الطريق في مغارة احدهما بصير ضعيف البدن معه زاد  
ثقيل لا يطيق حمله والاخر اعمى قوى البدن ليس معه زاد فاخذ  
البصير بيد الاعمى يقوده خلفه واخذ الاعمى ثقل البصير بحمله على  
كتفه وتواسيا بذلك الزاد وقطعا الطريق نجيا وجميعا فليس لاحدهما  
ان يمين على صاحبه وفي نجاته له من الهلكة في معاودته لانهما نجيا  
جميعا بمعاونة كل واحد منهما صاحبه والمعاونة لا يكون الا بين اثنين  
او اكثر والاخ الجاهل كالاعمى والاخ الفقير كضعيف البدن والاخ الغنى  
كالقوى والاخ العالم كالبصير والطريق هو صحبة النفس مع الجسد  
والمغارة هي الحياة الدنيا والنجاة هي الحياة الآخرة فهذا مثل  
اخواننا المتعاونين في طلب صلاح الدين والدنيا واما من قد رزق  
العلم ولم يرزق المال ولا يجد من نوا سبيه من المال من اخواننا  
فينبغي له ان يصبر وينظر الفرج فانه لا بد من ان يويده الله عزوجل  
باس او باخ يخفف عنه ما يتكمله من ثقل الفقر كما وعد لا وليا به فقال  
غر من قابل ومن يتق الله يجعل له مخرجا ويرزقه من حيث  
لا يحتسب وقال تعالى ومن يتق الله نجعل له من امره يسرا وينبغي  
له ان يعلم ان الذي رزق من العلم خير من الذي رزق المال لان العلم  
سبب نجات النفس في الدامى الدنيا والاخرة جميعا والمال سبب  
لاقامة حياة الجسد في دار الدنيا فقط وفضل ما بين النفس والجسد  
وشرف جوهرهما وفضل حيوتهما وفضل ذارتهما فقد تقدم ذكرها

وينبغي له ان يتفكر فى الذي حرم من المال والعلم جميعا ليعرف  
النعمة نعمة الله من الله تعالى عليه يشكركه على كل حال ليتوجب  
المزيد كما وعد الله تعالى فقال لئن شكرتم لازيدنكم واما من ليس بذي  
مال ولا يذني علم من اخواننا فيوالذي له نفس زكية جملة الاخلاق  
سليم القلب من الآرأفاسدة محبت للخير واهلة ضائرة راضيه بما  
قسم الله عزوجل له من ذلك فينبغي له ان يعلم ان الذي اعطي  
من حسن الاخلاق وسلامته القلب ومحبة الخيرو الرضاء بما قسم له  
خير من الذي أعطى من المال والعلم لاننا نجد فى الناس من قد  
أعطي العلم والمال واحدهما ولم يرزق بين هذه الخصال التي ذكرناها  
شيا وذلك انا نجد ا قواما علماء متعلقين يصفون الكتب في تحسين  
الاخلاق وياسرون الناس بها وهم اسوء الناس خلقا ونجد ا قواما ليس  
لهم علم كثير وهم مهذ الاخلاق كما وصفنا فقد تبين ان حسن الاخلاق  
من مواهب الله تعالى الطعام كما قال فى الخبير قد فرغ الله تعالى  
من الخلق والخلق والرزق والاجل وقد مدح الله تعالى عزوجل  
نبيه محمدا صلى الله عليه وائه وسلم بحسن الخلق حيث قال  
وانك لعلي خلق عظيم وقال تعالى ولو كذت قضا غليظ القلب  
لانفضوا من حولك وقد قيل ان الانسان بحسن خلقه يدرك فى  
الجنة درجة الصائم القايم لان حسن الخلق من اخلاق الملائكة ويثمة  
اهل الجنة كما ذكر فى القران وقلن حاش لله ما هذا بشران هذا لا ملك  
كريم وسوء الخلق من اخلاق الشياطين واهل النار الذين يحسدون  
بعضهم بعضا كما ذكر فى القران كلما دخلت امته لعذت اختها  
وقال لامر حبابهم انهم صالوا النار قالوا بل انتم لامر حبابكم انتم  
قد متموه لنا فبيس القرار وقال فهم فى عذاب مشتركون واعلم ايها  
الاخ ايدك الله ان قوة نفس اخواننا فى هذا الامر الذي نشير اليه  
ونحث عليه اربع اولها صفاء جوهر نفوسهم وجودة القبول وسرعة  
التصور وهي مرتبة ارباب ذوى الصنایع فى حديثنا التي ذكرناها

فى المقالة الثانية وهى القوة العاقلة المميزة لمعاني المجسوسات  
 الواردة على القوة الناطقة بعد خمس عشرة سنة من مواليد الجسد  
 والى هذا اشار بقوله واذ بلغ الاطفال منكم الحكم فليستأذنوا وهم  
 الذين نسميهم في مخاطباتنا ورسائلنا الابرار الرحما بر وفوق هذه المرتبة  
 مرتبه الروساء ذوى السياسة وهى مراعاة الاخوان وسخاء النفس  
 واعطاء الفيض بالشفقة والرحمة والتحنن على الاخوان وهى القوة  
 الحكمية الواردة على القوة العاقلة بعد ثلاثين سنة من مولد الجسد  
 واليه اشار بقوله تعالى ولما بلغ اشده واستوى آتيناها حكما وعلما وهم  
 الذين نسميهم في رسالنا اخواننا الفضلاء الاخيار والمرتبة الثالثة فوق  
 هذه وهى مرتبة الملوك ذوى السلطان والامر والنبي والنصر  
 والقيام بدفع العناد عند ظهور المخالف المعاند لهذا الامر بالرفق  
 والल्पف و المداراة في اصلاحه وهى القوة الشرعية الواردة  
 بعد مولد الجسد باربعين سنة واليه اشار بقوله ولما بلغ اشده  
 وبلغ اربعين سنة قال رب ازرعنى ان اشكر نعمتك التي انعمت  
 على و على والدي و ان اعمل صالحا ترضيه وهم الذين نسميهم في  
 رسالنا اخواننا الفضلاء الكرام والرابعة فوق هذه وهى التي يدعوا  
 اخواننا كلهم في اى مرتبه كانوا وهى التسليم وقبول التأييد ومشاهدة  
 الحق وهى القوة الملكية الواردة بعد خمستين سنة من مولد الجسد  
 الممهدة للمعاد المفارقة للهيدولي و عليها ترد قوة للمعراج و بها يصعد  
 الى ملكوت السماء فقشاهد احوال القيامة من البعث والنشور والحشر  
 والحساب الميزان ودخول الجنان و مجاورة الرحمن ذي الجلال والاکرام  
 والى هذه المرتبة اشار بقوله يا ايها النفس المظمئنة ترجعي الى  
 ربك راضية مرضية فادخلى فى عبادي و ادخلي جنتي واليه  
 اشار لقوله اجعلنى من ورثة جنته النعيم واليه اشار يوسف بقوله  
 عزوجل رب قد اتيتنى من الملك و اعتمنى من تاويل الاحاديث  
 فاطر السموات و الارض انت وليي فى الدنيا والاخرة توفينى مسلما



و الحقني بالصالحين و اليها اشار المسيح بقوله للحواريين افني اذا فارقت هذا الهيكل فانا واقف في الهواء عن يمين العرش بين يدي الى و ابيكم اشفع لكم فاذهبوا الى الملوك في الاطراف و ادعوهم الى الله و لاتنها بولهم فاني معكم حيث ما ذهبتم بالنصر و التأييد لكم و اليها اشار النبي محمد صلى الله عليه و سلم انكم تردون على الخوص و احاديث مروية كل هذه مشهورة عند اصحاب الحديث و اليها اشار سقراط يوم سقى السم ان كذت افارقكم اخوانا فضلا فاني ذاهب الى اخوان كرام قد تقدموني و حديث طويل و اليها اشار فيثاغورس في الرسالة الذهبية في اخرها انك ان فعلت ما اوصيتك تبقى في الهوا محلا و اليها اشار ملوهر حين قال ان الملك قد قال لوزيرة و من اهل هذه المقالة قال هم الذين يغرفون ملكوت السماء في حديث طويل و اليها ندعوا اخواننا جميعا والله يهدي من يشاء الى صراط مستقيم و ايات كثيرة في القران في هذه المعني وهي كل آية فيها صفة الجنان و اهلها و نعمها و اعلم ان المطلوب من المدعين الى هذا الامر اربعة احوال اولها الاقرار بالاسنة بحقيقته هذا الامر و الثاني التصور لهذا الامر بضروب من الامثال و الوضوح و البيان و الثالث التصديق بالضمير و الاعتقاد و الرابع التحقيق له بالاجتهاد في الاعمال المشاكلة لهذا الامر و اعلم ان المقربا للسان غير متصور له يكون متقلدا و المتصور له غير مصدق به يكون شاكا متحيرا و المصدق به غير متحقق له بالاجتهاد بالعمل المشاكل لهذا الامر يكون مقصرا مفرطا و للكذب باللسان لهذا الامر المنكر له بقلبه يكون جاحدا قال الله

الذين لا يؤمنون بالآخرة قلوبهم منكرة وهم مستكبرون لا جرم ان لهم النار و انهم مفرطون و اعلم بان المقر لهذا الامر بلسانه المتصور له بقلبه على حقيقة يجد من نفسه اربع خصال لم يعرفها قبل ذلك احدھا قوة النفس و بالذهوض من الجسد و الثاني النشاط في طلب الخلاص من الهيموى الذي هو من جهته النفس و الثالث الرجاء و الامل با الفوز و النجاة عند مفارقة النفس الجسد و الرابع الثقة

با الله و اليقين بتمام هذا الامر وكما له و اعلم ان كل مقر لهذا القران و بكتب الانبياء و اخبارهم عن الغيب فهم في ذلك على اربعة منازل لم يعرفوها قبل احدها مقر بلسانه غير مصدق بقلبه او مقر بلسانه و مصدق لقلبه غير عارف بمعانيه و بيانه او مقر و مصدق و مميز ولكن غير قايـم بواجب حقه فالمقر بلسانه غير مصدق بقلبه فهو الذي قد رزق من الفهم و التمييز قليلا فاذا فكر بعقله و ميز ببصيرته ما يدل عليه الفاظ الكتب النبوية لا يقابله عقله لانه لا يتصور معانها اللفظية و اشاراتها الخفية فيذكره بقلبه و يشك فيها و اما الذي قد اقر بلسانه و صدق بقلبه فهو الذي يتفكر و يعلم ان مثل هذا الامر الجليل الذي قد اتفقت على تحقيقه الانبياء و الائمة المهديون و الخلفاء الراشدون و صالحو المؤمنين و اقربه فضلاء الناس و المميزون و المستبصرون لا يجوز ان لا يكون له حقيقة ولكن فهمه و تميزه و عقله يقصر عن ادراكه و تصوره لها بحقايقها و اما من عرف بيانه و لكن قصر في القيام بواجبه فهو الذي و فقه الله و ارشده و اهتدى بحقايق الاسرار المذكورة في كتب الانبياء عليهم السلام و لكن لا يجد المعين له على القيام ببصيرتها و واجب حقها لانه و حيد و ليس كل امر يتم بواحد من الناس بل اذا احتاج الى الجمع العظيم و خاعة امر الشرايع و النواميس و اقل ما يحتاج الى اربعين خصلة يجمع في واحد من الاشخاص او اربعين شخصا متولفة القلوب ايدهم الله

في ماهية (45.) On faith and on the morals of the Moslems  
الايمان و خصال المؤمنين.

6 (46.) On the divine law في ماهية الناموس الالهي.

7 (47.) On praying to God في كيفية الدعوة الى الله.

8 (48.) Phenomena of the spiritual world or of supernatural beings في كيفية افعال الروحانيين.

9 (49.) On the different kinds of Government في كيفية انواع السياسة.

10 (50.) System of the whole world في كيفية نضد العالم بأسره.

11 (51.) On the magic and conjuring في ماهية السحر و العزائم.

12 (52.) Conclusion في اتمام اخوان الصفاء.

*Note on the motion of the Glacier of the Pindur in Kumaon. By Lieut.  
R. STRACHEY, Engineers.*

In No. 181 (August 1847) of the Asiatic Society's Journal, I gave an account of the Glacier at the head of the Pindur River, in which it was noticed that I had been unsuccessful in an attempt to measure directly the motion of the glacier. In the past month (May 1848), I again visited this glacier, chiefly with the intention of making an accurate measurement of its motion; and the result of my operations I now propose to detail.

About 200 yards below the small tributary that enters the main glacier from the N. W. an old moraine, grown over with grass and bushes, which vouched for its present stability, offered a convenient station from which the motion of the ice could be observed. The moraine is heaped up against an almost perpendicular wall of rock, sufficiently high to command a view of the greater part of the surface of the glacier along the line on which observations were to be made. This line, which is nearly perpendicular to the general direction of the glacier, was marked by two crosses painted white, one on the rock in contact with the old moraine, the other on a cliff on the opposite side of the valley. A stake was driven into the moraine, at its highest point, close to the rock on the line between the two crosses, and a Theodolite was set up over it. Five other marks were also made on the glacier, at intervals along the same line, by fixing stakes in holes driven in the ice with a jumper. These marks, which were all carefully placed on the exact line between the crosses by means of the Theodolite, were completed at about 0h. 30m. P. M. on the 21st May.

On the following day the Theodolite was again set up on the same place as before, and being properly adjusted, the cross-wires of the telescope were directed to the cross on the cliff on the opposite side of the glacier. A stick was then set up near the first of the five marks that had been made the previous day, and was, by means of signals, moved up or down the glacier, till it appeared to coincide exactly with the cross-wires of the Telescope, and consequently to be exactly on the line between the two crosses painted on the cliffs. The distance between the centre of the stick and that of the fixed mark was then measured, which evidently showed the downward progress of the ice at that point

of the glacier since the marks was made the day before. The same process was repeated at each of the other marks.

On the 25th May the progress of the fixed marks was again measured in exactly the same way. The results of these measurements are as follows :

Time of observation.	Distances of fixed marks from standard line.				
	On the west moraine.	On the medial moraine	At east foot of medial moraine.	Near the middle of the clear ice.	On the eastern moraine.
	0	0	0	0	0
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
21 May, 0 30 p.m.	0 5½	1 0¼	1 0	1 0¼	0 6¾
22 May, 1 15 p.m.	1 9½	2 9¾	2 11¾	3 1	1 5½

The motion in 24 hours of the several marks will also be found to be—

Date.	Mean motion of Ice in 24 hours, (in inches.)					Approx. mean Temperature.
	On the west moraine.	On the medial moraine.	At east foot of medial moraine.	Near the middle of the clear ice.	On the eastern moraine.	
21 to 22 May,	5.3	11.9	11.6	11.9	6.5	43°F.
22—25 May,	5.7	7.6	8.4	8.8	3.8	38°F.
General mean,	5.5	9.7	10.0	10.3	5.1	

The progress of the lower extremity of the glacier was likewise approximately measured by observing the apparent angular motion of a pole fixed on the top of the eastern moraine, and of a conspicuous rock lying not far from the middle of the glacier.

The results of these observations are :

Date.	Mean motion of Ice in 24 hours, (in inches.)	
	On the moraine.	Near middle of Glacier.
19th to 20th May,	3.0	..
20th to 23rd May,	6.2	8.1
23rd to 25th May,	5.3	10.8
General mean,	4.8	9.4

The comparison of the motion of the lower and upper parts of the Glacier is :

	Mean motion of Ice in 24 hours, (in inches.)	
	On the lateral moraines.	On the middle of the Glacier.
Lower part of Glacier.	4.8	9.4
Upper ditto.	5.3	10.0

At the time of my visit to the glacier hardly any of the last winter's snow remained on its surface. The weather, which was tolerably fine up to the 22nd May, after that day became very bad. Besides a good deal of rain, about 3 inches of snow fell on the 23rd, and as much on the 24th, and on the morning of the 25th, the clearer parts of the upper end of the glacier were still covered with snow, though it had melted on the moraines and open ground near the glacier. This bad weather appears to have had considerable effect in retarding the motion of the ice.

I may as well here mention that the motion of the Mer de Glace, as measured by Prof. Forbes, varied from 27 to 9 inches in 24 hours, in different parts of the glacier, and at different times between the months of June and September. The motion of the middle part of the glacier of the Aar is also stated by M. Martins to be about 71 mètres per annum, which amounts to about  $7\frac{1}{2}$  inches in 24 hours.

The elevation of the foot of the glacier, where the Pindur leaves it, determined by the comparison of corresponding Barometrical observations, made there and at Almora (5586 ft.), is 11,929 feet above the sea. The elevation of the station where the Theodolite was fixed to measure the motion of the glacier, was similarly found to be 12,946 feet; and the elevation of the surface of the glacier near its lower end, at a distance of about 6000 feet from the Theodolite station, being about 12,140 feet; the slope of the surface of the glacier is about  $7\frac{1}{2}$  degrees.

*Notice on the Coleoptera of Hong Kong, by Capt. CHAMPION, 95th Regt. (Communicated by Dr. J. McLELLAND.)*

It may not be generally known by Indian Naturalists, that a very complete collection of the insects of Hong Kong, especially its Coleoptera, has been made by John Bowring, Esq. a Member of the Entomological Society of London, who has been for some years a resident of the Island, and is an excellent practical Entomologist and Naturalist. As Mr. Bowring returned to England by the April Mail, it is to be hoped that he will not neglect the opportunity of publishing such of his collection as remain at present undescribed.

The insects made up for sale by the Chinese, and usually arriving in England in a very mutilated and unscientific state of preservation for the cabinet of the Entomologist, were described as far back as the time of Fabricius, and of Donovan in 1798 ; with this exception, there have been very scanty notices of other Chinese insects (consult Dejean's Catalogues of Coleoptera) until Mr. Hope, in March 1842, published half a century of the Coleoptera of Canton and Chusan, collected by Dr. Cantor, at a period when he was too much of an invalid to collect largely. An almost unexplored field thus lay open to Mr. Bowring on his arrival in China, and although his means of research have been almost entirely limited to the little Island of Hong Kong and neighbourhood of Macao, the result of his labours has been very successful. Part of his new Coleoptera and Homoptera have been published in the *Annals of Natural History*, Vol. IV. December, 1844, by Adam White, Esq. There is reason to believe that insular and mountainous Hong Kong is more productive in its Entomology than the opposite coast although the general features of the mountains there resemble those of Hong Kong, and produce a similar Fauna. Macao seems to differ more than would be expected from its distance from the Island. Already is Mr. Bowring in possession of upwards of six hundred Coleoptera from these two localities.

Mr. Bowring and myself paid much attention this winter to the collection of the Carabideous Genera, the rarer species of which, as in other countries, appear to frequent marshy localities or the summits of mountains. Several fine species were there captured in tolerable abundance, and possibly belonging to new genera. Amongst those whose genera

were recognised are a fine *Galerita*, several *Chlæni*, three species of *Helluo*, a *Panagæus*, several large *Pherosophi* (*Brachinidæ*), a *Clivina*, *Dyschirius*, *Casnonia*, and *Agra* or *Leptotracheilus*. The beetles belonging to *Badister*, the *Amaræ* and *Harpalidæ*, are of small size. The largest *Carabideous* form has much the appearance of *Omaseus*—it is thirteen lines long. Including the *Tiger Beetles* and their allies, with *Carabideous Beetles*, *Hong Kong* cannot produce much under three score of species; a very large number for a small island, the geographical position of which is tropical. The *Carabideous* genera are the most abundant of all the insect tribes during winter in *Hong Kong*, some forms commencing to appear with autumn. In April they are very abundant, and I still find a few in May. They now however give place to the *Cicindelidæ*, none of which are found here during winter. Of *Cicindela* Mr. Bowring mentions ten species; *Colliuris longicollis*, is found at this season on the flowers of *Bauhinia Vahlii* (?) W. and A. *Tricondyla pulchripes* (White) on *Litchee Trees*, differing in habit from its congeners, by being found on trees, not at their roots. It is apterous, like other species. A small species of *Lebia* and of *Brachinus* is found on flowers. *Scarites* has not hitherto been found in the Island, and *Calosoma* and *Carabus* proper are probably confined to Northern China.

Water beetles are abundant in pools of water during the spring months, and comprise genera from the giant *Trochalus* to the more minute but still interesting forms. At the same season *Coprophagous* Insects, are abundant. *Onthophagi*, armed cap à pie, yielding in interest to few of the Indian species, and so numerous that I believe fifty species in an estimate were no exaggeration. *Copris*, *Onitis*, *Hister* and *Aphodius*, as might be expected, and perhaps the largest known species of *Sisyphus* on record—the *S. Bowringii* (White), remarkable for the extraordinary spinal projections from its *coxæ*. Similar spines occur in *S. senegalensis*.

The *Brachelytreous* genera are far from abundant, and the forms small; one of the largest is a small *Emus*, 6 lines long.

Of other families of insects the mass are found at the commencement of summer and during the summer rains, between April and August. *Disselicus Cantori* is found in *Hong Kong* as well as in *Chusan*. There are many interesting species belonging to the *Melolonthideous* or *Cetoneidous* genera, and those soft-bodied insects, amongst which *Lampyris*, *Cebrio*, *Malachius*, &c. are classed. An *Atractocerus* is of very rare

occurrence. Elateridæ and Buprestidæ not very abundant. *Dorcus* on the mountain range above Victoria in June. I am not acquainted with any Chinese species of *Passalus*, a genus abounding over India and the Archipelago. The Mylabridæ few in species, but these abounding in numbers. The Heteromerous genera tolerably numerous, but principally found under stones on hills; not on the sea-shore as in the Mediterranean. *Cossyphus* has not been found. The Helopidæ which devour Agarics under bark are scarce, for trees are restricted to a few ravines in Hong Kong. Notwithstanding this there are numerous forms of the Longicorni and Curculionidæ. They are found on bushes if trees are wanting. Mr. Bowring had a true species of *Tetraglenes* (a Manilla genus) with the four eyes quite distinct. To one of the families which bring up the rear of the Coleoptera, belongs *Sagra purpurea*, found on *Euphorbia antiquorum* (*S. lugubris* in Ceylon, is found on the Castor Oil plant)—*Donacia* having been found in Ceylon\* may possibly occur in other parts of India and China, but has not been found here. There are many interesting species of *Galeruca*, *Crioceridæ*, *Clythridæ*, the pretty *Platycoryne bifasciatus*, Tortoise Beetles, and some of our early favorites the *Vaches a Dieu*, one of which is a very large sized species.

A few days before Mr. Bowring's departure 9 specimens of three new species of *Paussus* were added to the Entomology of the Island. They were all found under stones, and two of the species in the nest of a small yellow ant. I believe this will prove the first notice of Alpine *Paussi*. I think Indian species have usually been recorded as being found in low ground, but all these had reached the highest elevation to be found in this Island: upwards of seventeen hundred feet. The three species all crepitate, and at least one of them has a discharge staining like that of a *Brachinus*. I am not certain that both sexes crepitate.

I must leave Mr. Bowring to tell his own tale of Coccoideous parasites found on the Dragon-fly and on the common *Fulgora Candelaria*, an inhabitant, but not illuminator, of the *Pumplemos* Trees.

\* When at Point de Galle I observed that the leaves of a species of *Limnanthemum* (*L. Wightianum*) which grows in tanks, were devoured by a Carabideous larva, and a few months after found a species of *Donacia* on it. I cannot find any notice of *Donacia* as an Indian or Javanese genus.



The few remarks I have made on Hong Kong Coleoptera may possibly attract the attention of Indian Entomologists to the descriptions which I trust Mr. Bowring may find leisure and inclination to make when in London, where he will have access to the numerous Indian genera lately published. I have done far too little whilst abroad in Entomology to be more than a mere field collector, which must be my apology for the unscientific mode in which my notes are put together.

Out of the six hundred Sp. Mr. Bowring has collected of Chinese Coleoptera, at least five hundred require careful search amongst flowers, or under stones or other localities. Hong Kong is chiefly Indian in its forms, but the capture of so many Carabideous genera leads to the supposition that Northern China, where a true *Carabus* is found, must contain some interesting Beetles approaching to the European forms. The Chinese are a nation who, satisfied with the knowledge they acquired centuries back, remain stationary and have no turn for the advance which science has made in every branch in Europe. They are not likely to do much for the science.

Central China is nearly on the same isothermal line with the Mediterranean; although more southerly in latitude. Its climate and productions are however very different. Cold dry weather and northerly winds during winter, cold fogs during spring, extreme moisture accompanying the setting in of the South West Monsoon during May and June, after which there is excessive heat until autumn, when the weather becomes rainy and very changeable. In Southern Europe, rain in winter; dry heat from spring to autumn. In vain do we look on the sea shore of China for the *Scaritidæ* and *Pimeliæ* so abundant in the Mediterranean. The cold season is in no country very productive of Insects; that of Hong Kong produces numerous species of the only ones likely to be found during that season of the year—the Carabideous forms, whilst the China Pine, Dog Violets, Azaleas and Honeysuckles are in blossom. From all I know of Hong Kong Entomology I should say that the scanty notices hitherto published respecting China Proper give a very inadequate idea of its Entomological resources, and that when the time arrives that its interior can be explored, many novelties will reward the labours of the Naturalist.

*Journal of the passage from the Dharee falls to the Hirnphal, by Captain FENWICK, (late of the Nizam's Service) in charge of 10 boats laden with coal, by order of R. N. C. HAMILTON, Esq. Resident, Indore. [Communicated by order of the LIEUT. GOVERNOR, N. W. P.]*

SIR,—On receiving your instructions at Timmournee to examine the Nerbudda from Hindia to the falls of Dharee, I proceeded to the former place, where I arrived on the 29th of January, and have now the honor to lay before you the result of my expedition.

2nd. About Hindia the river does not appear to be applied to any useful purpose, and the only available boats or boatmen, are those employed at the different ferries or ghauts.

3rd. The boats are consequently unfitted for ascending and descending the more difficult parts of the river, being too broad and low-sided, and the boatmen are unskilful in their use.

4th. With some difficulty I succeeded in procuring from a village a few miles above Hindia, a boat that from its shape was more suited to my purpose, and having fitted it with mast and sail, and engaged boatmen, I started on the afternoon of the 30th January. The boat was flat-bottomed, 19 feet 9 inches long, and 4 feet 9 inches broad.

5th. I was accompanied from Hindia to Mundaar by two canoes lashed and manned by fishermen; these I found most useful, as they enabled me to precede the larger boat in places where from the shallowness of the water its progress was necessarily slow. From Mundaar I permitted them to return, as I found I could dispense with their assistance for the remaining part of the journey. For any purpose of traffic these canoes would be perfectly useless, as the waves in the rapid parts of the river completely fill them, and if laden they would sink.

6th. From Hindia to the junction of the Ajnal river the Nerbudda is unusually favorable for navigation; near the foot of Joga, we were delayed by some rapids, but to boatmen well acquainted with the river, they would be impediments of no moment.

7th. Commencing at the Ajnal river, the bed of the Nerbudda extends to nearly double its usual width, and is divided into many small shallow streams running between rocks and jungle, the inclination being so great as to give this part of the river more the appearance of a

collection of mountain streamlets than the course of an important river. At the junction of the Machneh river, these rapids cease, and the stream is concentrated into one large deep pool to the head of the Mundaar falls, a distance of 2 miles.

8th. The Mundaar falls are almost as high and the descent of water more perpendicular than the falls of Dharee, which in general character, they closely resembled. Towards the southern bank a smaller stream makes the same descent in a number of short drops, down which my boat was dragged by 30 men, but in places it was almost carried.

9th. From Mundaar to Basnia, opposite Chandghur, the river resumes its usual character of pools and shallows.

10th. From Basnia to within a few miles of Dharee, high abrupt rocks rise on each bank of the river, which flows between them, hemmed in to about  $\frac{1}{4}$  its usual width with rapids almost every mile, at one place it narrows to 34 feet!

11th. I reached Dharee at noon on the 7th of February, having thus been 9 days on my way.

12th. From my personal observations and the enquiries I was enabled to make, I am of opinion that from the junction of the Ajnal river to the bottom of the Mundaar falls the Nerbudda is useless for navigation.

13th. From Basnia to near Dharee the river is only just passable, and I fear that the number of men who would be requisite to take a laden boat down it would make the cost of carriage equal to, if not greater than what it would be on land.

14th. It is impossible to conjecture how the rise of the river during the rains may affect this last portion of the stream. It appears to me that it would probably cover the difficulties, but the boatmen hold a contrary opinion, and until a trial has been made in that season the question must, I fear, remain undecided.

April, 1848—*Dharee*.—The boats being laden below the falls were loosened from their moorings at sunrise on this date.

5th. ( $\frac{1}{2}$  mile)—*Ringaye* “*tur*.”\* Not difficult; there is a good sandy beach or landing place here on the Poonase side, but the jungle must be cut for five or six hundred yards from the road to the landing place.

\* *Tur*, a rapid.

(3½ miles) Deep water the whole way, detached rocks on the river, but not dangerous. At Kumla-tur 5 feet water with bad rocks in the channel. This is considered one of the worst places between Dharee and Mandhata. Laden boats are let or eased down with ropes, and empty ones dragged up.

(1 mile) A narrow passage near the right bank, 6 feet water, detached covered rocks here and there, to be carefully avoided.

(1 mile) Deep water, ruins of Kinchgurh on the right bank, and junction of the Kunnair river.

(2 miles) A fine, large, broad, deep pool all the way. Rocks here and there.

*Buckutgurh.*—A rock in the middle of the river, the point just appearing above the water.

(¾ mile)—*Chota Chokey "tur"*—4 feet water, not difficult.

(¼ mile)—*Motta Chokey "tur"*—4 feet water, but rocks in the channel, narrow passage, boats of more than 6 feet beam could not pass without great danger. Laden boats are let or eased down with the ropes, and empty ones dragged up.

(½ mile)—*Kote Keira.*—A deserted village on the left bank.

(¼ mile)—*Sillanee.*

9¾, *by the Natives 5 coss from Dharee.*—Some rocks from above Kote Khera hidden under water, to be carefully looked after.

6th. (2 miles)—*Byron purun "tur"*—4 feet water, passage narrow, with 3 turnings, difficult for laden boats, which are let down with ropes, and empty ones handed over through small outlets, with less than one foot of water.

*On Karjee Mandhata.*

(¼ mile)—*Markundee "tur"*—4 feet water, narrow passage.

(¾ mile)—*Kookaree. "tur"*—4 feet water, narrow passage.

(½ mile)—*Bhallarow "tur"*—4 feet water, considered (and is) a very difficult one, extending for more than one hundred yards. Laden boats are carefully let down with ropes.

(4¼ miles)—A very deep and broad pool all the way from Kathar (or Kothoun) Ghat, some hidden rocks here and there, but not dangerous.

(½ mile)—*Choario "tur"*—4 feet water, rocks in the channel, passage, narrow as usual; Chorour river joins here on the right bank.

( $\frac{1}{4}$  mile)—*Dherra Ghat.*

( $1\frac{1}{2}$  mile)—*Kheiree ditto.*

(1 mile)—*Myly Kheiru.*—A Goojer village on the right bank.

( $\frac{1}{4}$  mile)—*Katghurra "tur."*—This rapid extends about 600 yards, and is studded with rocks, channel dangerous. Between 4 and 5 feet water. Laden boats let down with ropes; it must in the present state of the river be always difficult.

( $\frac{1}{2}$  mile)—*Bimlay Sur.*—Temple and Dhurrumsallah on the right bank.

( $\frac{1}{2}$  mile)—*Alliagram.*—On the left bank, one Bunneeah.

( $12\frac{1}{4}$  miles)—*By the Natives 6 coss from Sillanee.*—Fowls procurable with trouble.

N. B. It appears to me from the present state of the river between Dharee and Alliagam, that boats of more than 6 feet beam, 30 or 35 feet in length, with  $2\frac{1}{2}$  feet wall sides, flat bottom 1, the bottom side planks of one log scooped out, would be the only one that could be generally used. During the very height of the river in the monsoons, I think no boats could live at some of the places where most dangerous whirlpools and high waves must be formed. The boatmen corroborate this opinion.

8th, *Sunset.* (1 mile)—*Semala.*—Right bank, left bank, just below Gowmookh Dhurrumsallah.

(1 mile)—*Pithnuggur*—left bank.

*Kupas-thul*—right bank.

( $\frac{1}{4}$  mile)—*Wa ke "tur"*—5 feet water, 8 feet channel, in the middle, numerous rocks on either side. With one foot water, going over them, the boat struck constantly.

(1 mile)—*Krian*—right bank.

*Khygam.*—Left bank.

NOTE.—The Rapid "Vakee tur" may be said to extend almost the whole way. Channel in some places not more than 8 feet wide; in some parts very bad, only 1 foot water over the rocks. Boat let down with ropes.

(2 miles)—*Saugoor.*—Right bank, *Oomatter* left bank; fine broad and deep pool.

(1 mile)—*Rawere.*—Left bank, broad deep pool the whole way.

*Setoke and Kowreea.*—Right bank.

( $\frac{1}{2}$  mile)—*Ditto*.—Rapids the whole way, very difficult and dangerous. In several places not more than 1 foot water over the rocks, with which the bed is studded.

( $\frac{1}{2}$  mile)—*Surkaree* “*tur*”—300 yards, 6 feet water, but dangerous from high waves, side rocks, and a fall of 3 feet.

*Bakawan*—left bank.

( $\frac{1}{4}$  mile)—*Bhandwarra* “*tur*”—5 feet water, in one place very bad.

( $\frac{1}{4}$  mile)—*Murdana Ghat*.—Left bank.

*Bysesan*—right bank.

( $7\frac{3}{4}$  miles)—*Ditto*.—4 Coss according to natives from Alligam; left at 11 A. M. arrived at sunset.

9th. Left Murdana Ghat at sunrise, and arrived at Mundlaiser at 2 P. M.

( $\frac{1}{4}$  mile)—*Murdana* “*tur*.”—Extending 300 yards; channel, in some places, 8 feet wide, 2 feet water.

(1 mile)—*Puthrar*—Right bank. *Nagawan*—left bank.

(1 mile)—*Bhutyan*—left bank.

(2 miles)—*Soolgam*.—Rocks all the way and shallow in many places.

( $7\frac{3}{4}$  miles)—*Mundlaisir*.—In many places very shallow, with rocks the whole way, but nowhere dangerous, though very tedious for laden boats, studded also with low grass islands.

13th. Evening at Myhesur.

(1 mile)—Shallow with rocks.

(3 or  $2\frac{1}{2}$ ,  $3\frac{1}{2}$  miles)—Fine deep pool and broad.

15th. Evening at Sasradarra.

(1 mile)—Fine deep broad pool.

*Sasradarra falls and rapids* extend for about 400 yards; *Surruh* falls of 314 feet, channel 8 to 10 feet wide, very bad rocks in the channel. Empty boats let or eased down with ropes with great difficulty.

16th. Left Sasradarra at 12 o'clock, and arrived at Akbarpore at 5 P. M. Here the Assa and Bombay road crosses the Nerbudda.

( $\frac{1}{4}$  mile)—Channel narrow and deep, it would be very bad, I think, in the rains.

( $\frac{1}{2}$  mile)—Channel widening to 100 yards, 18 inches water at one place; boats led over.

( $\frac{1}{2}$  mile)—Broad pool, not very deep.

*Zallem pore.*—Left bank.

( $\frac{1}{4}$  mile)—Deep and broad pool.

*Tulkootee.*—Right bank.

(1 mile)—Channel between rocky islands.

*Lussungaum.*

*Manwa Phal* “*tur.*”—Channel 8 feet, 4 feet fall, 2 and 3 feet water, very bad rocks on either hand. The boats were half emptied, and let down with ropes, and men holding on each side. Re-laden at the bottom of the rapid, 30 or 40 yards. The rapid winds along for 30 or 40 yards, dashing against the rock on either hand with great force. The boatmen behaved remarkably well and the bildars were very useful.

( $2\frac{1}{2}$  miles)—Shallow in a few places, but generally broad, open and deep.

*Akbarpore.*

(5 miles)—3 coss by the natives.

17th. Left Akbarpore at 9 A. M. ; two of the boats changed, being old and in a leaky state ; arrived at Kuthra at near sunset.

*Moorgurree.*—Opposite to Akbarpore.

(1 mile)—*Chota and Burra Khul.*—Right bank. River open and deep all the way.

*Akbarpore* “*tur.*”—50 yards, 15 inches water over the rocks, loose stones removed from the channel, rapid not dangerous but tedious. Boats handed over, or rather dragged along. Three hundred yards below there is a ford.

( $\frac{1}{4}$  mile)—*A rapid.*—18 inches water over the rocks ; boats let down with ropes about 50 yards.

( $\frac{1}{4}$  mile)—*Peepulda.*—Right bank, a little above there are some rocky islands, but the channel is deep, and a pool the whole way from the last rapid.

( $\frac{1}{2}$  mile)—*Chiklee.*—Left bank, many bad rocks.

*Nimbalee.*—Right do. Channel along the left bank.

( $3\frac{3}{4}$  miles)—Pencil memorandum lost on board.

( $1\frac{1}{4}$  mile)—*Adulpoor.*—Left bank, pool all the way from Cheklee.

*Bhowa.*—Right do.

*Bhowns sur* “*tur.*”—40 yards, 2 feet water over the rocks, 8 feet passage, channel winding, difficult and dangerous. Boats let down

with ropes with much trouble. This is one of the worst rapids in the river; at the bottom there is a fall of 3 feet, 7 feet passage; rocks on each hand, and a very bad and dangerous one in the middle of the outlet, to be feared the most. This rock should be removed.

(1 mile)—Pool, deep water, rocks here and there.

*Burreea*.—Left bank.

*Kola "tur."*—100 yards, 2 feet water and less, very bad and difficult at the end from a rock in the middle of the channel.

( $\frac{1}{2}$  mile)—*Kathora*.—Left bank pool all the way.

( $8\frac{1}{2}$  miles)—4 coss by the natives.

18th. Left Kuthora at 6 A. M. arrived at Kirmee at 5 P. M.

( $\frac{1}{2}$  mile)—*Bilkeswar Pagoda*.—At the point of Dhurmapooree (Cheit island) 2 miles long. Right channel dry, left channel a broad pool, 6 feet deep, a rock in the middle opposite the temple.

*Dhurmpooree*.—Right bank.

*Khooj Nuddee*.

( $\frac{1}{2}$  mile)—*Khoojawan*.—Good pool, 6 feet water.

( $\frac{1}{4}$  mile)—*Burreea*.—Left bank, good pool, Jhow jangle along the right bank.

( $1\frac{1}{2}$  mile)—*Huthnawar*.—Left bank.

*Kinkoto*.—Right bank, pool all the way to this.

*Huthnawar "tur."*—Shallow rapids for 500 yards, boats dragged over the loose stones in several places.

*Ghatmora "tur."*—Fall of 3 feet, 7 feet passage, and very bad. Boats led down with ropes held on each bank, 4 feet water. This rapid is called Ghatmora tur.

( $\frac{1}{2}$  mile)—*Ghatmora Phal*.—5 feet water, 10 feet channel: a fall of 2 feet, boats taken over with bamboo poles very dexterously.

( $\frac{1}{2}$  mile)—Rocky island and shallow.

*Khutargam*.—Right bank.

*Nundgaum*.—Left bank.

( $\frac{1}{2}$  mile)—*Soolgaum*.—Right bank.

*Bahmongaum*.—Left bank, river studded with rocks and low islands, shallow all the way.

( $\frac{1}{4}$  mile)—*Viswanath Khera*.—Pool, with rocky islands. A narrow passage along the left bank, a small rapid with 4 feet water. Rocks in the channel.



(3 miles)—*Moharpur*.—Right bank, a small Pagoda. Good pool the whole way, with some rocks here and there.

( $\frac{1}{4}$  mile)—*Nuktiaki Phal* “*tur.*”—Not bad, 5 feet water, 10 feet channel.

( $\frac{1}{2}$  mile)—Deep pool, Cheekly, left bank.

( $\frac{1}{4}$  mile)—Bad rocks, some under water, some just appearing above, 6 feet water with a slight stream.

( $\frac{3}{4}$  mile)—*Mân* River joins here on the right bank, pool with rocks here and there. A rapid with rocks of loose stones, 2 feet water.

( $\frac{1}{2}$  mile)—*Neemla* “*tur.*”—Bad rocks in the channel, boats let down by the hand, 2 feet water, channel 8 feet.

( $\frac{1}{2}$  mile)—Broad deep pool.

*Nulwae*.—Left bank. Deb Nuddee joins here on the left bank.

*Kuthwa*.—Right bank.

( $1\frac{1}{4}$  miles) Lohara.—Left bank.

*Mullingam*.—Right bank. Broad, deep pool all the way.

( $1\frac{1}{4}$  mile)—*Kirmee*.—Left bank.

*Burdha Bagory*.—Right bank. Deep and fine broad pool the whole way.

( $12\frac{1}{2}$  miles)—6 coss according to the natives.

19th. Left Kirmee at 7 A. M. arrived at Lahna Burda at 5 P. M.

( $1\frac{1}{2}$  mile)—Pool with sunken rocks and rocky islands.

( $\frac{1}{2}$  mile)—Pool ditto ditto ditto.

*Ansurpoora*.—Left bank.

*Surwapoora*.—Right bank. River covered with sunken rocks, and rocky islands, deep channels in some places, and 2 feet water in others. Intricate passage, but not dangerous.

( $\frac{1}{2}$  mile)—The same state of the river continued.

*Cherasein* “*tur.*”—Very winding and bad channel for 300 yards. In one place 15 inches water, boats let over by the hand.

A bluff high isolated rock in the middle of the river 150 yards below the rapid.

( $\frac{1}{2}$  mile)—*Marrpoora*.—Left bank.

A small rapid.

*Oordhumia*.—Right bank.

Shallow continued.

A very shallow part, 9 inches water, a channel had to be made by removing the loose stones from the middle and piling them up on each side for 150 yards, to deepen the stream to 15 inches, when the boats were dragged over. Half the day taken up in the above work.

Another shallow 6 inches water. The stones removed as above, and a channel formed of 15 inches depth for 30 yards.

At 300 yards another similar shallow overcome in the same way.

A bad rapid to be worked through very cautiously, though deep, the channel being very narrow with rocks.

( $\frac{1}{2}$  mile)—*Dunterwarah*.—Left bank.

(1 mile)—Pool full of rocks under water, the boats striking on them constantly.

*Gollatta*.—Left bank.

*Peerkheira*.—Right bank.

( $1\frac{1}{4}$  mile)—Rocks and shallows and deep channels, intricate passage.

*Lahna burda*.—Left bank.

*Semurla*.—Right bank.

(6 miles)—3 coss by the natives.

The laden boats require 18 inches of water to float freely. The largest boat is 31 feet long and less than 5 feet wide, laden with  $2\frac{1}{2}$  Manas.

20th. Left *Lahna burda* at 7 A. M., arrived at *Chikulda* at 2 P. M.

(1 mile)—*Achohta*.—Right bank.

Pool with rocks here and there.

( $1\frac{1}{4}$  mile)—Fine deep pool, some rocks along the left bank.

*Ekeelara*.—Right bank.

*Orohee*.—Left bank; a ferry here; a tope of fine tamarind trees.

Five hundred yards, dangerous hidden rocks with some of their points just appearing in the middle of the river.

(1 mile)—Good pool.

*Kawthee*.—Right bank.

Shallow, 2 feet water, studded with rocks; no regular channel.

300 yards, *Keemana* "tur" (bow-shaped) 2 feet water deepest channel, with bad rocks in the middle, boats constantly striking on them. In one place the boats were let down with ropes.

(1 mile)—Shallow with rocks and loose stones the whole way. Boats continually striking on them; there is a ford here.

*Ganglee*.—Right bank.

*Peeplohdh.*—Left bank.

( $\frac{1}{4}$  mile)—Shallows.

*Domee Khul* “*tur.*”—A very bad rapid, 15 inches water, rocks in the channel, against which the current rushes with great force. A fall of 3 feet boats; dragged over, some loose stone being removed.

(1 mile)—Shallows and rocks; 15 inches water in some places.

*Bhaboot.*—Left bank.

*Jowhoor.*—Right bank.

( $\frac{3}{4}$  mile)—A bad sunken rock in the middle of the river, one of the boats got over it, and was nearly rolling over. The rest of the river a fine broad pool with 5 or 6 feet water generally.

( $\frac{1}{4}$  mile)—Pool, 5 feet water.

*Kusrawath.*—Left bank.

( $1\frac{1}{2}$  mile)—Rocks and shallows; channel between irregular low rocks, &c. &c.

*Chikulda.*

( $8\frac{1}{2}$  miles)—4 coss by the natives.

22nd. Left Chikulda in a boat 30 feet by  $4\frac{1}{2}$  feet.

( $1\frac{1}{4}$  mile)—Pool, 6 to 8 feet water.

*Bilkhera.*—Left bank; 4 feet water.

Shallow, 18 inches water.

Rocks.

A small rapid, 1 foot water.

( $1\frac{1}{4}$  mile)—Shallow in some places with less than 1 foot water, little rapids and rocks.

*Nand gaum.*—Left bank.

*Kaper Khera.*—Right bank.

( $\frac{1}{2}$  mile)—Shallow the whole way, boat stroved along. In some places not 6 inches water sandy bed all across the river.

( $\frac{1}{2}$  mile)—Ditto.—A nice little pool, 5 feet water, no rocks.

Rocks scattered all across the river with irregular channels of 4 and 5 feet water.

( $\frac{1}{2}$  mile)—A bed of rocks, narrow channel, 3 and 4 feet water.

( $\frac{1}{2}$  mile)—River spread with rocks, a small pool, 4 feet water.

*Kutora.*—Left bank.

( $\frac{1}{2}$  mile)—A fine broad, deep pool. River spread with low detached rocks. Channels between deep water.

( $\frac{1}{2}$  mile)—The same as above.

*Sonearil*.—Left bank.

*Kuronje*.—Right bank.

( $1\frac{1}{2}$  mile)—Fine deep pool. A small bed of rocks in the middle of the river, dangerous.

— ( $\frac{1}{4}$  mile)—*Kotra*.—Right bank.

Pool continued.

Ooree Nuddee joins here on the right bank.

Pool continued.

Rocks on the right hand.

( $\frac{1}{2}$  mile)—2 feet water, low sunken and some appearing rocks spread all over.

( $\frac{1}{4}$  mile)—*Megnaiik* “*tur*.”—9 inches water, full of rocks in the channel. Scarcely any passage at all. The laden boats could not have got over a fall of 3 feet.

A small old pagoda on the right hand, exactly opposite the fall. My boat was literally lifted over.

Another similar rapid, but not so bad.

Gooee Nuddee joins here on the left bank.

( $1\frac{1}{2}$  mile)—Deep pool, two or three boats just above the water.

( $\frac{1}{4}$  mile)—*Goulia* “*tur*”—4 feet water, bad rocks in the channel, and at its outlet.

( $\frac{1}{4}$  mile)—A small rapid, 9 inches water, no regular channel.

( $\frac{1}{4}$  mile)—Bluff peak of the first hill on the immediate banks of the river; right bank.

Fine deep and broad pool.

( $\frac{1}{4}$  mile)—Pool continued, sunken rocks, some just showing themselves above the surface of the water.

Ruins of the Gurhee of Deheir on a hill on the right bank.

*Deheir*.—Right bank.

(1 mile)—Pool continued broad and deep.

*Beyasein Phal*.—A shallow; stones to be removed; not 6 inches water.

( $\frac{1}{4}$  mile)—*Peyasein*.—Left bank.

(1 mile)—Deep broad pool with numerous sunken rocks; Jhow jungle on the right hand, resort of tigers.

*Moorgutta* “*tur*”—3 and 4 feet water, channel winding and bad with rocks.

( $\frac{1}{4}$  mile)—*Moorgutta*.—Left bank.

( $1\frac{1}{2}$  mile)—Pool with sunken rocks, shallow; no regular channel.

“*Tur*” shallow, &c., good for  $\frac{1}{2}$  mile.

*Dhurmsray*.—Right bank.

( $14\frac{1}{2}$  miles)—According to natives 7 coss.

23rd. Left Dhurmsray at 6 A. M. for the Hirnphal.

*Dharm Ray* “*tur*.”—Considered the head of the Hirnphal passage, 18 inches water, had rocks for 200 yards.

(1 mile)—Small pool with rocks, 4 feet water, a rapid, 18 inches water, 6 feet channel.

River full of rocks; deep water.

*Hirnphal*.—Deep channel, 8 feet wide, current not strong, no fall; two bluff rocks in the middle of the river, one on either hand from the Phal.

( $\frac{1}{2}$  mile)—Deep channel between rocks, 10 or 12 feet wide.

( $\frac{1}{4}$  mile)—Deep narrow pool, slight current.

*Hirnphal Ghat*.—A fall of 6 feet in our passage, 8 or 10 feet, with projecting pointed rocks on each side, very bad and dangerous, 100 yards rapid.

Fall 3 feet, not so bad as the first, but difficult from the water dashing on a projecting rock on the right hand; channel 10 or 12 feet.

100 yards rapid.

Fall 4 feet, much like the above.

Deep channel below the rapid.

Left hand channel from Hirnphal.

300 yards deep and clear; channel between rocks, deep and clear.

Channel between rocks, deep water.

( $\frac{3}{4}$  mile)—Fine deep broad pool, no rocks.

The bed of the river covered with low, sunken and small isolated rocks. No regular channel, in some places 6 inches water, over the rocks, and then suddenly deep; no passage at all.

At 10 A. M. returned to Dhurm Ray, and at 11 o'clock set sail for Chikulda, with a fresh westerly breeze; arrived at 3 P. M.

## MISCELLANEOUS.

*Tibetan type of Mankind.*—By B. H. HODGSON, *Esq.*

Pénjúr of Lhasa, 30 years old.

Total height, .....	5	9	$\frac{1}{2}$	} Rectilinear measurements.
Length of head, .....	0	9	$\frac{1}{4}$	
Girth of head, .....	1	10	$\frac{1}{4}$	
Crown of head to hip, .....	2	5	0	
Hip to heel, .....	3	4	$\frac{3}{4}$	} by curve.
Breadth of chest only, .....	1	4	0	
Sh. point to Sh. point, .....	1	5	0	} Rectilinear measurements.
Arm and hand, .....	2	6	$\frac{1}{8}$	
Girth of chest, .....	3	0	0	
Girth of arm, .....	0	11	0	
Girth of forearm, .....	0	9	$\frac{3}{4}$	
Girth of thigh, .....	1	6	$\frac{1}{2}$	
Girth of calf, .....	1	1	$\frac{1}{2}$	
Length of foot, .....	0	10	0	
Breadth of foot, .....	0	3	0	
Length of head, .....	0	7	$\frac{3}{4}$	
Breadth of head, .....	0	4	0	

A fine young man but low in flesh from sickness, and the muscles flaccid. Colour a clear ruddy brownish or brunet rather deep hued, as dark as any of the Cis-Himálayans, and as most high caste Hindus. No red on cheeks which are sunk and hollow. Hair moderately coarse, black, copious, straight, shining, worn long and loose, divided from the top of head. Moustache very small, black. No symptom of beard nor any hair on chest: sufficient on mons martis where it is black and on armpits also. No whiskers. Face moderately large, sub-ovoid, widest between angles of jaws, less between cheek-bones which is prominent but not very. Forehead rather low and narrowing somewhat upwards; narrowed also transversely and much less wide than the back of head. Frontal sinus large, and brows heavy. Hair of eye brows and lashes, sufficient. Former not arched but obliquely descendant towards the base of nose. Eyes of good size and shape but the inner angle decidedly dipt or inclined downwards, though the outer not curved up. Iris a fine deep clear chesnut brown. Eyes wide apart but well and distinctly separated by the basal ridge of nose, not well opened, cavity

being filled with flesh. Nose sufficiently long and well raised even at base, straight, thick and fleshy towards the end, with large wide nares nearly round. Zygomæ large and salient, but moderately so. Angles of the jaws prominent, more so than zygomæ, and face widest below the ears. Mouth moderate, well formed, with well made closed lips hiding the fine regular and no way prominent teeth. Upper lip long. Chin rather small, round, well formed, not retiring. Vertical line of the face very good, not at all bulging at the mouth, nor retiring below, and not much above, but more so there towards the roots of the hair. Jaws large. Ears moderate, well made, and not starting from the head. Head well formed and round but larger à parte post than à parte ante or in the frontal region, which is somewhat contracted cross-wise and somewhat narrowed pyramidally upwards. Body well made and well proportioned. Head well set on the neck, neither too short nor too thick. Chest wide, deep, well arched. Shoulders falling, fine. Trunk not in excess of porportionate length compared with the extremities, nor they compared with the trunk and whole stature. Arms rather long, within 4 inches of knees. Legs and arms deficient in muscular development from sickness. Hands and feet small and well formed with instep hollow and heel moderate. Toes not spread, nor splay foot. Mongolian cast of features decided, but not extremely so, and expression intelligent and amiable.

*Darjeeling, 30th April, 1848.*

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*The Gum Kino of the Tenasserim Provinces.—By the Rev. F. MASON.*

In a valuable article by Dr. Royle on Gum Kino, reprinted in the *Journal of the Agricultural and Horticultural Society of India*, which ostensibly enumerates all the various regions from which it has been imported into England, there is no mention of this article being imported from this Coast. Yet long before Dr. Royle compiled that communication, more than one consignment had been made by parties in Maulmain to houses in London of Gum Kino to the amount of a thousand pounds.

It was brought to Maulmain by an English merchant from the Shan States, and stated by him, as our Commissioner at the time informed

the writer, to be the production of the *Pa-douk*, the same tree as the one in Maulmain thus denominated by the Burmans. Several years before I had directed attention to this tree as producing an astringent Gum resembling Gum Kino, but the Medical Officer to whom I submitted specimens of the Gum, said it was "a kind of Dragon's blood;" but after it was known that the Gum of the *Pa-douk* had been sold in London for the veritable Gum Kino, another medical gentleman tried in his practice the exudation of the tree in his compound in the place of the Gum Kino in his stores, and reported the effects the same; that their medical virtues were alike.

The next inquiry that arises is for the genus and species of the *Pa-douk*. When I first came to the Coast, all the English residents of my acquaintance called it "Burman Senna," and the surgeon of the station told me that he believed it was a species of *Senna*. The Rev. H. Malcom, D. D. President of Georgetown College Kentucky, who came out to India a dozen years ago in order to go back again and write a book, has stereotyped in his travels, "*Pa-douk*, or Mahogany, (*Swietenia Mahogáni*) is plenty in the upper provinces, especially round Ava, found occasionally in Pegu. In a native Pali Dictionary, found in the Burmese monasteries, *Pa-douk* stands as the definition of *Pe-tá-thá-lá*, and the corresponding Sanscrit word in Wilson's Dictionary, पौतशास्त्र, is defined *Pentaptera*; but the *Pa-douk* does not belong to that genus. In Piddington's Index, however, *Peetshala* stands as the Hindee name, and in Voigt's Catalogue, *Peet-sal* as the Bengalee name of *Pterocarpus marsupium*; and this brings us nearer the truth, for *Pa-douk* is a name common to two different species of *Pterocarpus*, but which look so much alike that they are usually regarded as one species. Undoubtedly one species is *P. Indicus* and the other, I presume, is the one named by Wight, *P. Wallichii*, but which was marked in Wallich's Catalogue, *P. Dalbergioides*, from which differs in no well marked character excepting that the racemes are axillary and simple, while in that they are terminal and "much branched." Wight says, of *P. Wallichii* in his Prodrumus, "stamens all united or split down on the upper side only;" so they are sometimes in our tree. In the figure that he gives in his Illustrations they are represented as diadelphous, nine and one, and so they are seen occasionally in our tree; but the more common form is that of being



split down the middle into two equal parts, of five each, as in *P. Dalbergioides*. The wood two resembles it. "Not unlike Mahogany, but rather redder, heavier, and coarser in the grain." It is often called "red wood" at Maulmain, and from the color of the wood, some of the natives distinguish the species "red Pa-douk" being *P. Dalbergioides*, and "white Pa-douk," *P. Indicus*.

Both these trees produce an astringent gum, which has been exported for Gum Kino, or whether it was a mixture of both it is not possible to say. Probably the latter, as the native collectors would not probably make any distinction. Possibly it is the production of neither. It may be that *P. marsupium* is found in the Shan States; for it grows, I believe in Assam, and the man that did not distinguish the two species, in Maulmain, would not distinguish them from a third, at Zimmay. Be that as it may, this is certain, that these provinces can furnish the commercial world with a large quantity of Gum Kino. If the result of the experiment which was made be correct, we have a great abundance of it within our own borders, for the Pa-douk is one of the most common forest trees in the provinces from the Tenasserim to the Salwan. It furnishes a considerable portion of the fuel that is sold in Maulmain. But if not it is certainly abundant in the neighbouring provinces, whose only avenue to market is through our territories.

To enable the Members of the Society to detect any errors into which I may have fallen, accompanying this paper are three packages, viz.

No. 1. A flowering branch, and young fruit of *P. Wallichii*.

No. 2. A flowering branch of *P. Indicus*.

No. 3. A specimen of the Gum Kino brought from the Shan States and exported from Maulmain.

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*To the Secretaries of the Asiatic Society.*

SIRS,—I had recently the honor to transmit to you the last relics of the Library of the Catholic Mission in Tibet. I have now the honor to forward to you transcripts and translations of those grants of land by

virtue of which the Mission, after its expulsion from Lassa, was established at Pátan, in the valley of Nepal, under the late or Névári dynasty of that kingdom.

The original deeds are inscribed on copper, and they were put into my hands recently by Doctor Hartman, the Catholic Bishop of Patna, (who is also superior of the Nunnery here,) with the observation that, though frequently shown to learned Pandits and Europeans, the Mission since its ejection from Nepal had never been able to gain the least inkling of the meaning of these documents. The fact is that the deeds are in the Névári language, or that of the aborigines of the great valley of Nepal proper; and, as I believe the Society possesses no sample of that tongue, I fancy that the two transmitted may be acceptable, though interlarded with a deal of Sanscrit; the circumstances of the case giving the deeds an interest for Europeans, which most of them in India will probably recognise. I am glad to hear that the books forwarded to His Holiness the Pope have been graciously accepted, and I apprehend that transcripts or printed copies of the present communication will be likely to prove an acceptable addition to those singular relics of the once famous Christian Missions of China and High Asia.

I have the honor to be,

Sir,

Your most obedient servant,

B. H. HODGSON.

स्वस्ति श्रीमत्पशुपतिचरणकमलधूलिधूसरितशिरोरुह श्रीमन्मा-  
 नेश्वरीष्टदेवतावरलब्धप्रसाददेदीयमानमानोन्नत श्रीरघुवंशावतार  
 रविकुलतिलकहनूमद्वजनेपालेश्वरमहाराजाधिराजराजराजेन्द्रसकल  
 राजचक्राधीश्वरनीजेष्टदेवदेवेश्वरीकृपाकटाक्षबलितविक्रमोपार्जितपा  
 लनकर समुद्भूत गजेन्द्रपति श्रीश्री जयजयप्रकाश मल्लदेव-  
 परमभट्टारकानां सदा समरविजयिनाम् । प्रमूथाकुलसन वन-  
 रयत सचोडं पाद्रिकापूचिनि आक्राक्तत्रोचिबने नाम प्रसादोक्तं  
 आंतुटोलतोलसिथलिलनत्ताजाबगृहनाम संज्ञकं जयधर्मसिंहया-  
 गहनपश्चिमतः धंजुशूर्यधन पुर्से श्वरश्वपतिस्यङ्गस्यागृह्न दक्षिणतः

मार्ग षट् पूर्वउत्तरतः एतेषाम्मध्येष्वतेचात्राघातनदुसप्तांगुलि सार्द्धषोड-  
 शहस्ताधिक चतुःखापरिमितं चूकपाताल सार्द्धद्वादशहस्ताधिक  
 त्रिपादपरिपरिमित लवोपाताल द्वाविंशति हस्ताधिक त्रिपादपरि-  
 मित पुष्पवाटिका चतुरस्रंगुलि त्रिहस्तत्रिपादाधिक त्रयोदश  
 खापरिमितं अंकतोविक्रिखा ४ कु १६ अंगुल ७ चुकपाताल चूल ३  
 कु १२ लवोपाताल चूल ३ कु २२ कवखा १३ चूल ३ कु ३ अंगु  
 ४ तुथिसोवोगुलो ॥ प्रत्तैत श्रीश्रीनवकसीसप्रसन्नजुया ॥ अत्रपत्रार्थे  
 दृष्टसाक्षि श्रीश्री राजप्रकाश मल्लदेव सम्बत् ८६२ मार्गशीर शुदी  
 १० शुभं ॥



खलि श्रीमत्पशुपतिचरणकमलघूलिधूसरित शिरोरुह श्रीमन्माने-  
 श्वरीष्टदेवतावरलब्धप्रसाददेदीव्यमानमानोन्नतरविकुलतिलक हनू-  
 मद्भजनेपालेश्वरसकलराजचक्राधीश्वरमहाराजाधिराजश्रीश्री जय-  
 राजप्रकाशमल्लदेवपरमभट्टारकानां सदा समरविजयिनाम् । प्रमू-  
 थाकुरसन बनरयत सचोडं पाद्रिकापुचिनि आक्राक्ष्ये गोक्खिबने  
 नाम्ने प्रसादीकृतं तानिग्रटोलईतिफुसचाकलंचौताजाव गृहसंज्ञकं  
 रथमार्गनपश्चिमतः तबवाहारओने मार्गन उत्तरतः कचिंगलका-  
 यद्यया भूम्या पुर्वतः अम्बरसिं वावुया गृहभूम्या दक्षिणतः एतेषां  
 मध्येष्वतेचात्राघातन दु अस्तत्रिंसहस्ताधिक षष्ठखापरिमितं पुष्प-  
 वाटिका एक विंशतिहस्ताधिक चतुर्दशखा परिमितं । अंकतोपि  
 क्खेखाषु ६ कुसुयच्चा ३८ केवखास्सरमपि १४ कुनीयाक्के २१ बते युलो ॥  
 प्रतीत श्रीश्रीनवकसीसप्रसन्नजुया अत्र पत्रार्थे दृष्टसाक्षि श्रीचन्द्रशेखर  
 मल्लथाकुर सं ८७४ चैत्रवदि ६ दैवज्ञकोटिराजेनलिखितं ॥ शुभं ॥

*Translation of two Tumbapatras granted to the Catholic Church in Nepal by the late or Nêwâr dynasty of that country :—*

(Titles omitted.)

Rajya Prakás Malla Deva, Prince of Nepal, hereby grants for the Padri's establishment a beautiful garden situated in unappropriated ground without and above the Dhára (fountain) of Tánigal Tol, and also an open quadrangled house of four stories. The boundaries of the location are as follows: West from road of Matsyéndra's Rath,\* North from the Tavo Bahál road, East from the land of Kachingal Káyasth, South from the house and land of Amersinh Bábú. And the following is the extent of the grant, viz., for the house, the measure of six house allotments,† and thirty-eight cubits square in excess, and for the garden, fourteen house measures and twenty-one cubits in excess thereof. Such are the boundaries and extent of which the above illustrious Prince has been pleased to give, whereof is eye witness Chandra Sékar Mall, and the inscriber of the deed of gift is Kotiráj Jóshi,‡ and the date of gift, 874 of the Nêwâr æra,§ dark half of the month of March, 6th day.

(Titles omitted.)

Jaya Prakása Malla Deva, Prince of Nepal, is pleased to assign for the establishment of the Padri, a beautiful garden situated in Tálsithali of Wóntú Tol, in an unoccupied place,|| and also a two stories openly quadrangular house. The bounds of the location are, West from Jaya Dharma Sinh's house, South from the houses of Dhanjú, Súryadhan, and Púranéswar, East and North from the main road. The subjoined is the extent of land assigned, viz., for the house itself, the fixed measure for four houses and 16 cubits, 7 fingers' breadth in excess; and, for the open quadrangle within the house, three quarters of one house allowance and twelve and half cubits in excess, exclusive of a private road or access of three quarters of one house measure with twenty-two cubits over. For the garden or grounds the space assigned, is the

\* See note to transcript, in Roman letters.

† Khá in the original. It is the quantum of land allowed for an ordinary house in a town; a house and land measure in towns.

‡ Daivagya in Sancrit, is Jóshi in the vernacular of Nepal.

§ 104 years back.

|| That is, without infringement on private property, which is, and was then, perfectly respected, the Government tax being not  $\frac{1}{8}$  of the net produce, and the land selling for 25-30 years purchase, even beyond the limits of house building.

allowance fixed for 13 houses, and  $\frac{3}{4}$  and 3 cubits and 4 fingers' breadth in excess,\* such are the boundaries and extent of the gift of the above named illustrious Prince. Eye witness, Raj Prakas Malla Deva; date, 862 of the Nepal æra, November, 10th dark half of the month.

True translations.

B. H. HODGSON.

*Transcript in Roman characters of one of the deeds.*

Swasti srimat† Pasúpati charana kamala dhúli dhúsarita sirárúha sriman manéswaríshta dévatá baralabdha prasáda dédibyémán mánónnata ravikúla tilaka hanúmáddhaja nepalésvara sakalarája chakrádhísvara mahárájádhirája sri sri Jaya Rája Prakása Malla Deva paramabhat-tarakánáng sadá samara vijayináng. Prabhú thakúra sana banarayatasa chongno Pádríká púchini sákrakwóngré gócehiwané namné prasádi kiritam tániglá tóla itiphúsá chákalang choutajawo griha sangyakang rathamárgéna‡ paschimatah Tawo Báhár oné márgena úttartah kachingla káyashthayá bhumyá púrba tah Amar sinh Bábúyá griha bhumyá daksinatah étesang madhyé thótéchatra ghatana dú ashta tringsa hastadhika shashta khá parimitang pushpya batiká ékving sati hastádhika chaturdasa khá parimitang ákatopi ché khalshú kúsúyé-chmá kebo khá slaramapí kú nýéchi§ vaté yulo Pratita sri sri ná bak-sish prasanna júyá atra patrárthe drishta sákshi sri Chandra Sekara Malla Thákúra sambat 874 Népálya chaitra badi 6 Daivágya kótirájena likhitang subham.

B. H. HODGSON.

*Darjeeling, 1st July, 1848.*

\* This extreme precision may seem remarkable. But it is the mere indication of what is still more remarkable, viz. an admirable system of land measurement and of public record and registry which prevailed under the Névári dynasty and which would do honour even to the British Government of India. The professional land measurers, called Dóngú or Dóngúl, were a separate craft, carefully instructed and exceedingly jealous of intrusion on their mystery. The institution is still to be found under the present or Górkháli dynasty, but in a state of decadence.

† Pasúpati is the great orthodox Deity of Nepal, whose symbol is the four-faced Ling or Phallus.

‡ Matsyéndranáth is the great heterodox or Búddhist Deity. His car festival or Rathyátra, is so famous that in the above deed the street is designated, as that through which the car annually passes (rathmárg) without even specification of the name. Nulius secundus is the Matsyéndra of Pátan.

§ In the original the ciphers as well as the names of the Névár numbers are inserted. I have omitted the forn-er, which are those in use in the plains.

*Temperature of the hot springs at Peer Mungul, or Munga, or Mungear.\**

The following means of Temperature was taken from Major Baker's note-book, and were taken by him, Lt. Maclagan, and myself.

*Temperature of 1st Spring.*

4th	Sept. 1844.	11.30	A. M.	Temp. of water,	119° F.	Temp. of air,	89° 25' F.
—	Do.	4.45	P. M.	Do.	118-25'	Do.	86.
—	Do.	9.5	—	Do.	117.	Do.	86.
5th	Do.	5.45	A. M.	Do.	119.	Do.	78.
—	Do.	9.5	—	Do.	119.	Do.	83.

*Temperature of 2nd Spring.*

4th	Sept. 1844.	11.45	A. M.	Do.	127.5	Do.	91.
—	Do.	4.55	P. M.	Do.	126.25	Do.	86.5
—	Do.	9.25	—	Do.	126.05	Do.	80.
5th	Do.	5.50	A. M.	Do.	128.25	Do.	78.
—	Do.	9.15	—	Do.	128.	Do.	83.

2° 25' hotter than the hottest Spring of Switzerland.

Temperature of 3rd and principal Spring which is the saint's shrine, and which feeds the Alligator ponds.

4th Sept. 1844. 5.30 P. M. Temp. of water, 99. F. Temp. of air, 85.5 F.

The water of these springs, where it first issues, has a slightly sulphureous smell and taste, but after a short exposure to the air, becomes perfectly sweet and pure; it leaves a slight blackish deposit on the pebbles. The rocks in the vicinity are found in ridges nearly concentric curves. The strata appear to dip from the centre of the curves at an angle varying from 50° to 80°. They consist of an upper cap of coarse limestone overlaying coarse soft sandstone, below which the strata is hidden by debris. The rocks abound with exuviae of zoophites, echini and pectines, a few coats of small spiral and bivalve shells are met with, but in no abundance, till nearing the Hub or Pub river beyond the basin formed by the curved ridges, small fossil crabs and other fossils similar to the Kurrachee fossils are met with in abundance, but none of the rarer sort that distinguish the Kurrachee bed from all the other formations in Scinde. There are a few other springs in the neighbourhood of these hot springs, but they are cold

\* All three names were given me.

and chiefly salt. The other hot springs of Scinde that I am acquainted with, are the Lukkee and Gazee Peer springs; the latter I have not myself seen, but Lt. Maclagan gave me the following account of it. "There is a hot spring on a considerably elevated plateau upon the hill called Bhil, above Gazee Peer, a saint's shrine, a few miles west of Shah Hus-sun, on the Munchar Lake. Temperature of the spring not observed; I could not hold my hand in it for any length of time. The water fills a small reservoir under a clump of trees, then escapes in a narrow stream which flows along to the edge of the plateau, and throws itself over the rock in a white cascade." I was unable to visit it, as I had intended doing, but the sulphur springs near the village of Lukkee, I visited; the following is a memorandum of their temperature. Like the springs a Mungul Peer, they are three in number, but are much more highly im-pregnated with sulphur, but their temperature is not so great.

*Temperature of sulphur springs near Lukkee pass, lower Scinde.*

1st Spring at 12 A. M. Temp. of water 102° Farh. of air in shade 82° Farh.

2nd Spring at 1212 A. M. Do. Do. 103° " Do. in sun 86 Farh."

3rd Spring at 2 P. M. Do. Do. 105° " Do. in shade 68 Farh."

Water boiled at third spring by my Thermometer, at 212° 75', and at Kurratchee by same Thermometer at 214°—Difference, 1° 25'.

Nos. 1 and 2 might almost be called one spring, as they are separated only by a foot or two of rock. No. 3, being some little distance from them at the foot of left hand, and largest cleft, but the waters of all unite and flow through the lower range or rather ridge of rocks, and are then lost in the sandy bed of what must, during the rains, be a mountain torrent; the water collected in the pools, while I was there had an azure hue: there is a great deal of sediment contained in it on first issuing from the rocks, which is deposited, as it flows along the margins of the stream and on the stones at its bottom in a red, yellow and white, and all three combined crust-like congealed froth, but what it contains I know not, I had no means of analysing the water properly, for I had no scales to weigh the water experimented upon, or the residuum after evaporation; but on adding a little nitrate of silver to about a wine glass full of the water, a considerable flaky white deposit fell immediately to the bottom, which shortly after acquired a violet hue, and on exposure to the sun's rays became

almost black ; on adding a few crystals of Barytes to another glass full, the water in which was perfectly clear, it at once became like milk and water, but shortly after it settled, a considerable white deposit falling to the bottom of the glass. On addition of a little potass to another glass of water, a few minute bubbles of air or gas escaped from the crystal, but eventually the water became slightly turbid, and on clearing, a slight white deposit, but very slight indeed, on the bottom of the glass, but I had no means of weighing the deposits, and have since lost them. The high range of rocks in their vicinity are a kind of soft limestone, at least the parts exposed to the weather and air are soft and white, almost like chalk, but with small crystals of I think sulphur in it. The lower range or rather ridge is coarse sandstone, capped with lime ; the strata in some parts is almost perpendicular, and in others curved. I scrambled up to the top, the view from which was most curious, a jumble of hills of all sizes, shapes and colours ; the lower ones, apparently full of beds of gypsum, as the continuation of them beyond the Lukkee pass, which I examined, was full of that substance. Nasseer Khan attempted to work the sulphur here, but found it a losing speculation owing, I fancy, to his not having descended deep enough, through the blue marl at the base of ridge.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1848.

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At a meeting of the Asiatic Society, held at the Town Hall, on Wednesday, 2nd August, 1848,

J. W. COLVILLE, Esq. President, in the Chair.

The Proceedings of the former meeting were read and confirmed, and the accounts and vouchers were laid on the table.

Mr. Edward Colebrooke, having been duly proposed and seconded at the July meeting, was balloted for and elected a member of the Society.

Cudbert Bushy Thornhill, Esq. was proposed for election at the September meeting by J. H. Batten, Esq. and seconded by H. M. Elliot, Esq.

Babu Gobind Chundra Sen, proposed by Raja Satya Churn Sen, seconded by Mr. Colvile.

Read notes, intimating the withdrawal of Jas. Hume, Esq., E. Lindstedt, Esq. and Major Goodwin, from the Society.

Read a letter from H. M. Elliot, Esq. Secretary to Govt. of India, forwarding, by order of the Governor General in Council, copy of a letter from Lieut. W. H. Parish, with the specimens of rocks and plants therein alluded to.

From the same, forwarding, by order of Government, the Diary of a trip to Pind Dadun Khan and the Salt Range, by Andrew Fleming, Esq. M. D.—Ordered for publication in the Society's Journal.

From M. Luzac, Netherlands minister for Home Affairs, dated Hague, 17th April, 1848, announcing the despatch to the Society's address of

the Zoological, Geographical, and Ethnological portions of the work recently published on the Natural History of the Netherlands Foreign Possessions.

Ordered, that the marked thanks of the Society be returned to M. Luzac for this handsome donation.

From Dr. Cantor, a Catalogue of Malayan fishes, collected principally at Penang.—Ordered for publication in the Journal.

From the Rev. John Barlow, M. A. Secretary to the Royal Institution, Albemarle Street, acknowledging receipt of the Society's Journal, Nos. 185, 186.

From Messrs. Allen & Co. announcing receipt of 77£ 10s. from the Paris Agency, and the shipment of the spare volumes of the Researches.

From Dr. McClelland, communicating a note on the Coleoptera of Hong Kong, by Capt. Champion.

From Dr. Albrecht Weber, dated Berlin, 3rd May, 1848, regarding the contemplated Oriental Publications of the Society, with a note from Dr. Roer on the same subject. Referred to the Oriental Section.

A note on the Singapore Rock inscription, of which fragments had been forwarded by the Hon. Col. Butterworth, and Lieut.-Col. Low, by Mr. Laidlay.

From S. G. T. Heatly, Esq. presenting for the Society's Library, a set of the "Repository of Arts," in 50 vols.

Mr. Heatly being present at the meeting, the thanks of the Society for this handsome donation were tendered him in person by the President.

Read the following communications from the Council of the Society.

*Council of the Asiatic Society.*

An application having been made by Mr. Frith, for the presentation to Charles Huffnagle, Esq. Consul of the United States of America, and a member of the Society, of one of the specimens of Flexible Sandstone in the Museum, the Council, having referred to the Section of Mineralogy and Geology for their advice, have the honor to present the report of the Section, in which the Council concur.

W. B. O'SHAUGHNESSY,

*Secy. of the Asiatic Society.*

July 28th, 1848.

Resolved, that one of the specimens of Flexible Sandstone be presented to Dr. Huffnagle.

*Council of the Asiatic Society.*

The Council of the Asiatic Society unanimously recommend that Dr. McClelland be elected a member of the Sections of Natural History and of Mineralogy and Geology: Dr. McClelland's consent has been obtained to this proposition.

W. B. O'SHAUGHNESSY,

*Secy. of the Asiatic Society.*

July 29th, 1848.

On the question being put to the vote, Dr. McClelland was unanimously elected a member of the Sections of Natural History, and of Geology and Mineralogy.

*Council of the Asiatic Society.*

The Council submit a report from the Oriental Section, regarding the proposed publication by the Society of two Arabic MSS., the one containing definitions of Grammatical terms, the second a brief Cyclopædia of all the sciences cultivated by the Arabs. The Council concur in the recommendations of the Oriental Section.

W. B. O'SHAUGHNESSY,

*Secy. of the Asiatic Society.*

July 29th, 1848.

To Dr. W. B. O'SHAUGHNESSY, *Senior Secretary of the Asiatic Society,*  
Dated, *Asiatic Society, the 21st July, 1848.*

SIR,—By direction of the Oriental Section I have the honour to transmit to you a letter from Dr. Sprenger to the address of Mr. H. M. Elliot, dated the 30th May last, forwarding two Arabic MSS. which he proposes to be published in the Oriental Journal.

2. The Section beg to support the proposition and to recommend, that the Society should also avail themselves of the kind offer of Dr. Sprenger to superintend the printing of the text at Allahabad. They would at the same time suggest, that agreeably to the scheme laid down for the publication of Oriental works by the Society, Dr. Sprenger be requested to favour the Society with a translation of the text.

3. Should the Council approve of the proposition, I will lose no time in making such arrangements with Dr. Sprenger as to secure uniformity of paper, title page, &c. of his work, with the preceding number of the *Bibliotheca Indica*.

I have the honour to be, Sir,

Your most obedient servant,

E. ROER,

*Secy. of the Oriental Section of the Asiatic Society.*

*Lucknow, 30th May, 1848.*

MY DEAR SIR,—I take the liberty of enclosing two small Arabic works which the Asiatic Society might perhaps consider worthy to form part of the proposed Bibliotheca Indica. The smaller contains definitions of grammatical terms, and is tolerably correct the larger is a short Encyclopædia of all the sciences cultivated by the Arabs. It gives a definition of each science, its subject, and the names of the principal works thereon. The MS. is unfortunately not free from clerical errors. To form a good octavo volume I would recommend that Jusy's Bibliography of Shiah Literature and Shah-rashub's appendix to the same, be added; they are both very small, useful and so rare that, as far as I am aware, not even their name is known in Europe. I have an old copy of both, and can obtain the loan of one or two copies.

It would be necessary to edit these four treatises with great care, and I would have great pleasure in superintending the printing. It would be cheaper to have them printed at Allahahad or Agra, than at Calcutta. Paper might be sent up by the Society in order to maintain uniformity of shape.

I take this opportunity to recommend two works of Kalkachardy (of the 9th century of the H.) which would form one good volume, and which appear to me to be of the highest importance; one is called *نهاية الارب في انساب العرب* and the other *فلا يد الجمان في التعريف بقبايل عرب الزمان*. They both treat on the Genealogy and history of the Arabic tribes, and are the ground-work of Arabic history. Two copies of these two works are available here, and I am very anxious to publish them. I am certain they would be well received in Europe. The latter is the smaller and rarer of the two; if the Society should not like to undertake both at once, they might first publish this alone.

I am your's very faithfully,

A. SPRENGER.

Resolved unanimously, that the proposal of the Oriental Section be adopted, and measures taken immediately for the publication of the Arabic Works as suggested by Dr. Sprenger.

*To Dr. W. B. O'SHAUGHNESSY, Senior Secretary of the Asiatic Society,*

*Dated, Asiatic Society, the 21st July, 1848.*

SIR,—By direction of the Oriental Section I have the honour to forward to you the accompanying list of works selected by Babu Hurry Mohun Sen from the list of lithographed and printed books which Moulavee Abdullah submitted to the Society.

2. The Section do not attach much value to the greater portion of these works, but as they are offered in exchange of our publications, of which a

great number of superfluous copies is on our shelves, the Section have approved of the selection, and beg to recommend the exchange of these works for those publications of the Society which the Moulavee has mentioned in his letter.

3. The original application of Moulavee Abdullah is herewith returned.

I have the honour to be, Sir,

Your most obedient servant,

E. ROER,

*Secy. of the Oriental Section of the Asiatic Society.*

The above recommendations are approved of by the Council of the Asiatic Society.

W. B. O'SHAUGHNESSY,

*Secy. of the Asiatic Society.*

July 29th, 1848.

Resolved that the recommendation of the Section be adopted.

Read the following communication from the Oriental Section, recommending the purchase of 50 copies of Mr. B. H. Hodgson's work on the Aborigines of India.

To Dr. W. B. O'SHAUGHNESSY, *Senior Secretary of the Asiatic Society.*

*Asiatic Society, August 1st, 1848.*

SIR,—I have the honour to acknowledge the receipt of your letter of the 30th ult., forwarding for the examination of the Section a copy of the first part of Mr. Hodgson's work On the Aborigines of India.

2. The Section recommend the purchase of 50 copies of this very interesting work by the Society, the expense to be borne by the Oriental Publication Fund,

3. The copy of the Aborigines is herewith returned.

I have the honour to be, Sir,

Your most obedient servant,

E. ROER.

*Secy. of the Oriental Section of the Asiatic Society.*

On the question being put, Mr. Laidlay moved as an amendment, which was seconded by Mr. Mitchell, and carried, that the Society subscribe for 100 copies of the work, paying for the same from the Oriental Fund.

The communications for the Council and the Sections having been disposed of, Mr. Mitchell brought forward a proposition to the effect that a Sub-committee be formed, consisting of Dr. McClelland, Dr. Falconer, Mr. Blyth, and Mr. Piddington, for the purpose of arranging and cataloguing the fossils. As this proposition were not seconded, it was not put from that chair.

Mr. Laidlay submitted specimen plates of a proposed work in folio, entitled "Illustrations of the Archaeology of India." It is proposed to issue this work in *occasional* numbers, affording the means of publishing in a more satisfactory manner than can be done in the Journal, the results of Antiquarian Researches undertaken under the patronage of Government or otherwise. The plates submitted were prepared from the beautiful drawings of Lieut. Herbert, and were much admired. Referred to the Council of the Society.

J. W. COLVILLE, *President.*

J. W. LAIDLAY, *Secretary.*

LIBRARY.

The following books have been received since the last meeting.

*Presented.*

Bishop Burnet's History of his own Time: from the restoration of Charles II. to the treaty of Peace at Utrecht, in the reign of Queen Anne. London, 1840, 2 vols. Rl. 8vo.—PRESENTED BY J. W. GRANT, ESQ.

An Analytical Digest of all the reported Cases decided in the Supreme Courts of Judicature in India, in the Courts of the Hon. East India Company and on appeal from India, by Her Majesty in Council. By W. H. Morley. London, 1848, 6 parts.—BY THE GOVERNMENT OF BENGAL.

The Journal of the Indian Archipelago, Vol. II, Nos. VI, VII.—BY THE SAME.

Ditto ditto.—BY THE EDITOR.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of July, 1848.—BY THE OFFICIATING DEPUTY SURVEYOR GENERAL.

The Calcutta Christian Observer, for September, 1848.—BY THE EDITOR.

The Oriental Baptist, No. 21.—BY THE EDITOR.

The Upadeshaka, No. 20.—BY THE EDITOR.

The Oriental Christian Spectator. Vol. IX. No. 7.—BY THE EDITOR.

Tatwabodhini Patricā, No. 61.—BY THE TATWABODHINI SABHA.

Nityadharmamuranjicā, Nos. 62—65.—BY THE EDITOR.

Madras Journal, No. 33.—BY THE EDITOR.

On the Aborigines of India, by B. H. Hodgson, Esq. being Essay the first, on the Kocch Bodo and Dhimal Tribes.—BY THE AUTHOR.

The Pilgrimage of Fa hian, presented by J. W. LAIDLAY, Esq.

*Exchanged.*

Journal Asiatique, No. 53.

The London, Edinburgh and Dublin Philosophical Magazine, Nos. 217—18.

The Picnic Magazine, No. VI.

The Athenæum, Nos. 1073—5.

*Purchased.*

Lectures on the Physical Phenomena of Living Beings. By Carlo Matteucci. London, 1847, 12mo.

Waterhouse's Mammalia, Vol. II.

Journal des Savants, Jan. to Avril.

The Quarterly Journal of the Geological Society, No. 14.

The Annals and Magazine of Natural History, No. 6, N. S.

Comptes Rendus, Hebdomedaires des Séances de l'Academie des Sciences. Tome XXVI. Nos. 18—20.

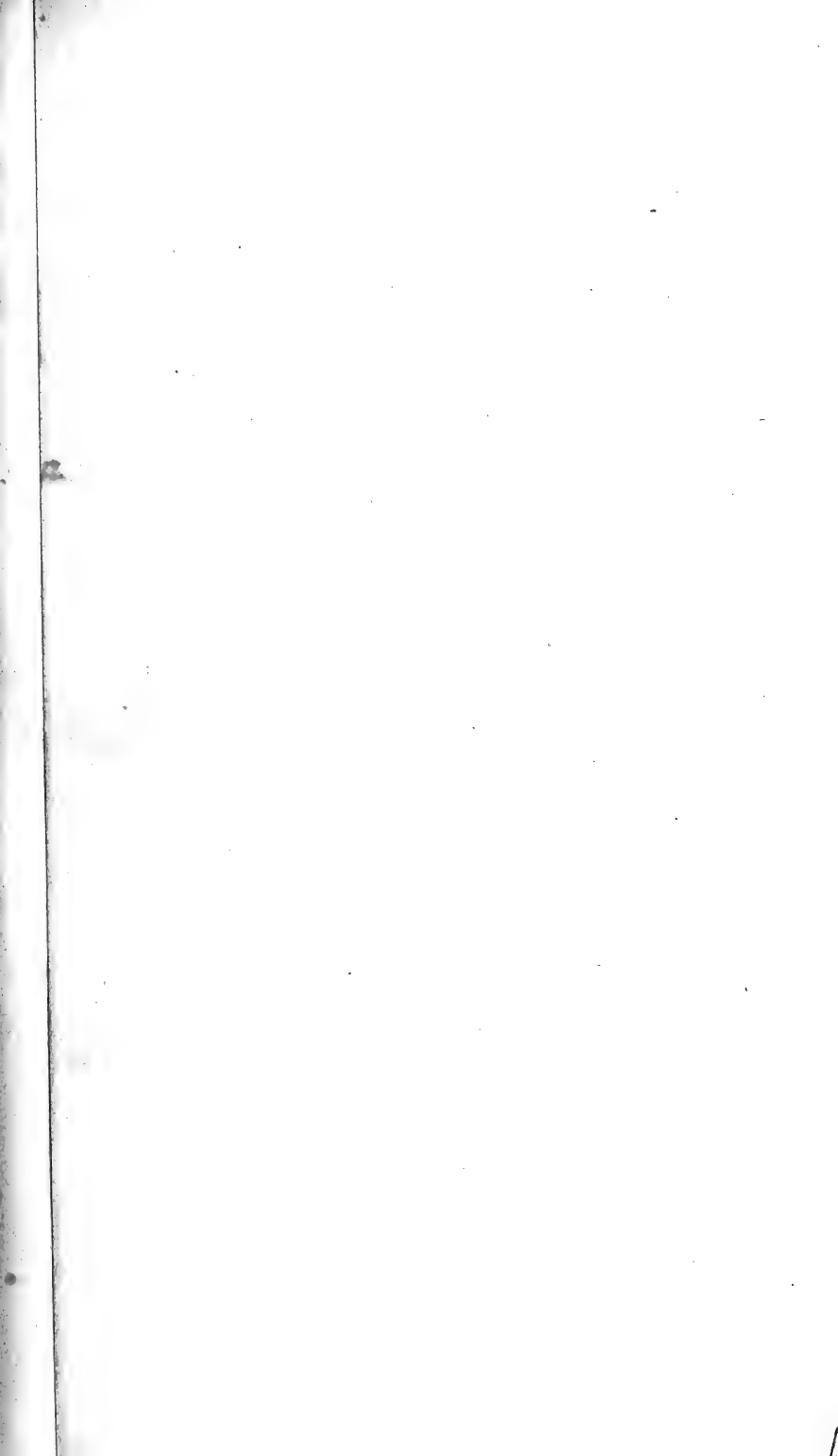
The History of Hyder Shah. By M. M. D. L. T. Calcutta, 1848, 8vo. 2 copies.—PRESENTED BY PRINCE GHOLAM HYDER.

Karomu i Hydari, in Persian. 4to. 2 copies.—BY THE SAME.











SACRED SITES  
 showing the positions of the different Temples in  
**KASHMIR.**



JOURNAL  
OF THE  
ASIATIC SOCIETY.

SEPTEMBER, 1848.

*An Essay on the Arian Order of Architecture, as exhibited in the Temples of Kashmír. By Captain A. CUNNINGHAM, Engineers. (Communicated by H. M. ELLIOT, Esq. Secretary to the Government of India.)*

INTRODUCTION.

1. The architectural remains of Kashmír are perhaps the most remarkable of the existing monuments of India, as they exhibit undoubted traces of the influence of Grecian art. The Hindu temple is generally a sort of architectural pasty, a huge collection of ornamental fritters huddled together either with or without keeping; while the Jain temple is usually a vast forest of pillars, made to look as unlike one another as possible, by some paltry differences in their petty details. On the other hand, the Kashmírian fanes are distinguished by the graceful elegance of their outlines, by the massive boldness of their parts, and by the happy propriety of their decorations. They cannot indeed vie with the severe simplicity of the Parthenon, nor with the luxuriant gracefulness of the monument of Lysicrates: but they possess great beauty; different indeed, yet quite their own.

2. The characteristic features of the Kashmírian architecture are its lofty pyramidal roofs, its trefoiled doorways covered by pyramidal pediments, and the great width of its intercolumniations. The Grecian pediment is very low, and its roof exceedingly flat: the Kashmírian pediment, on the contrary, is extremely lofty, and its roof, high. The former is adapted for a sunny and almost rainless climate, while the

latter is equally well suited to a rainy and snowy climate. But besides the difference of climate, there was perhaps another reason for the form of roofing peculiar to the two countries, in the kind of material most readily procurable for building. In Greece, it was stone; in Kashmir, it was timber. The former imposed low flat roofs with small intercolumniations: the latter suggested lofty roofs and wide intercolumniations.

3. In the Kashmirian architecture the great width of the interval between the columns (which is constant) is perhaps the most characteristic feature of the order. Indeed, I have a suspicion that this distinctive mark of the Kashmirian style was well known to the Greeks; for an intercolumniation of four diameters, an interval seldom, if ever used by themselves, was called *Araïostyle*, a name which would appear to refer to the intercolumniation common amongst the Hindus or Eastern *Aryas*, the *Ἀρειοί* of Herodotus. The vulgar etymology of *Araïostyle*, from *ἄραιος* "rare," seems extremely far-fetched, if not absurd; while the etymology of the "*Arian columnar interval*," appears both natural and appropriate, as the intercolumniation followed by the *Aryas* of Kashmír was never less than four diameters.

4. Now the interval between the Kashmirian pillars being always *Araïostyle*, I feel inclined to call the style of architecture used by the *Aryas* of Kashmir, the "*ARIAN ORDER*." This name it fully merits; for it is as much a distinct order of architecture as any one of the more celebrated classic orders. Like them it is subject to known rules which confine the genius of its architects within certain limits. A Kashmirian pillar is indeed distinguished from all Indian pillars by having a base, a shaft, and a capital, and each, besides, bearing a certain proportion to the diameter. How unlike is this to the columnar vagaries of the Hindus, which are of all shapes, and of all dimensions. A favorite Hindu pillar has the lowest fourth of its height square, the next eight-sided, the third sixteen-sided, and the upper part round; another has a double capital with a low flat base; whilst a third has a shaft of only one-fourth of its height; the remaining three-fourths being all base and capital: and yet these three pillars may be neighbouring columns of the same temple.

5. The superiority of the Kashmirian architecture over all other Indian buildings would appear to have been known to the Hindus themselves; for one of their names for the people of Kashmír is *Shástras*

*shilpina*, शास्त्रशिल्पिन, or “architects,” a term which could only have been applied to them on account of their well known skill in building. Even now the Kashmírís are the most expert handicraftsmen of the East; and it is not difficult to believe that the same people who at present excel all other Orientals as weavers, as gun-smiths, and as calligraphers, must once have been the most eminent of the Indian architects.

6. Before entering upon any details of the Arian order of architecture, and upon the comparisons naturally suggested between it and some of the classical orders, I will first describe the present state and appearance of the principal buildings that still exist in Kashmír, all of which were accurately measured by myself in November 1847. They are entirely composed of a blue limestone, which is capable of taking the highest polish, a property to which I mainly attribute the present beautiful state of preservation of most of the Kashmírian buildings; not one of these temples has a name excepting that of Marttand, which is called in the corrupt Kashmírian pronunciation, matan, but they are all known by the general name of *Pándavón-ki-lari*, or “*Pándus-houses*,” a title to which they have no claim whatever, unless indeed the statement of Ptolemy can be considered of sufficient authority upon such a subject. He says, “circa autem Bidaspum Pandovororum regio”—*The kingdom of the Pándus is upon the Betasta* (or Behat), that is, it corresponded with Kashmír. This passage would seem to prove that the Pándavas still inhabited Kashmir so late as the second century of our era. Granting the correctness of this point, there may be some truth in the universal attribution of the Kashmírian temples to the race of Pandus, for some of these buildings date as high as the end of the 5th century, and there are others that must undoubtedly be much more ancient, perhaps even as old as the beginning of the Christian era. One of them dates from 220 B. C.

7. Most of the Kashmírian temples are more or less injured, but more particularly those at Wantipur, which are mere heaps of ruins. Speaking of these temples, Trebeck\* says, “It is scarcely possible to imagine that the state of ruin to which they have been reduced has been the work of time, or even of man, as their solidity is fully equal to that of the most massive monuments of Egypt; earthquakes must have been the chief agents in their overthrow.” I have quoted this

\* Travels, v. 2—p. 245.

passage to show the utter confusion that characterises the ruins of the Avantipura temples. In my opinion their *overthrow* is too complete to have been the result of an earthquake, which would have simply *prostrated* the buildings in large masses. But the whole of the superstructure of these temples is now lying in one confused heap of stones totally disjoined from one another. I believe therefore that I am fully justified in saying, from my own experience, that such a complete and *disruptive overturn* could only have been produced by gun-powder. I have myself blown up a Fort, besides several buildings, both of stone and of brick, and I have observed that the result has always been the entire *sundering* of all parts, one from another, and the capsizing or *bouleversement* of many of them. Neither of these effects can be produced by an earthquake. It seems also that Trebeck and Moorcroft would most likely have attributed their destruction to the same agency, had they not believed that the use of gun-powder was unknown at that time: for, in speaking of a traditional attempt made by Shah Hamadan to destroy Marttand, they say, "It is fortunate he was not acquainted with the use of gun-powder." I admit that this destructive agent was most probably unheard of in Kashmir so early as the reign of Shah Mír Shah of Hamadán: but the destruction of the Kashmírian temples is universally attributed both by history and by tradition to the bigotted Sikander, whose idol-breaking zeal procured him the title of *But-shikan*, or "Ikonoklastes." He was reigning at the period of Timur's invasion of India, with whom he exchanged friendly presents, and from whom I suppose that he may have received a present of the "villainous saltpetre." This is not at all unlikely; for the furious Tamerlane was as great an idol-breaker as Sikandar himself. Gibbon, it is true, denies that either the Mogals or the Ottomans in 1402 were acquainted with gun-powder: but as he points out that the Turks had *metal* cannon at the siege of Constantinople in A. D. 1422,\* I think it is no great stretch of probability to suppose that gun-powder itself had been carried into the East, even as far as Kashmír, at least ten or twenty years earlier; that is, about A. D. 1400 to 1420, or certainly during the reign of Sikandar, who died in 1416.

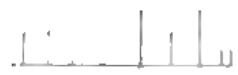
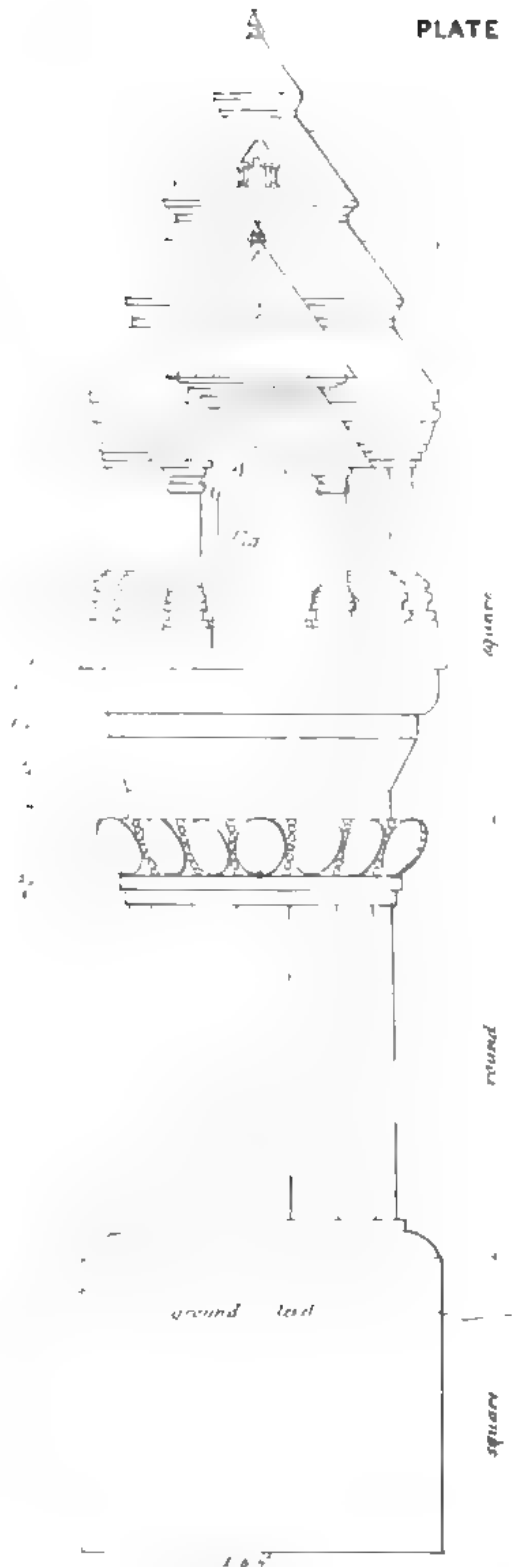
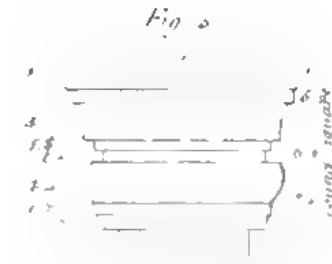
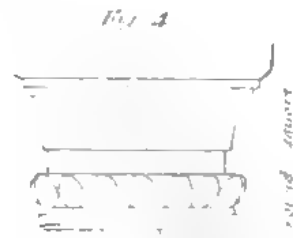
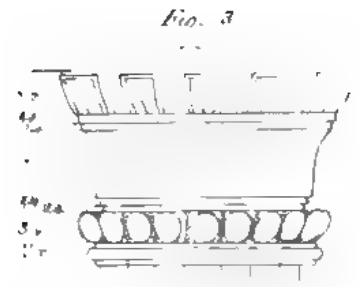
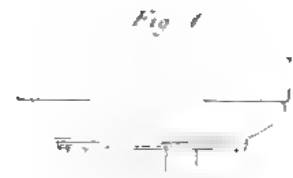
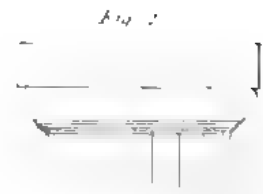
8. Even if this be not admitted I still adhere to my opinion that the complete ruin of the Avantipura temples could only have been

\* Decline and Fall, c. 65—note 93.

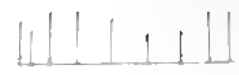
ELEVATIONS OF KASHMIRIAN PILLARS

GRECIAN PILLARS

DORIC



CORINTH



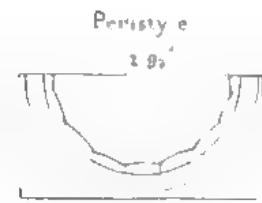
ATHENS  
Parthenon



MARTTAND.



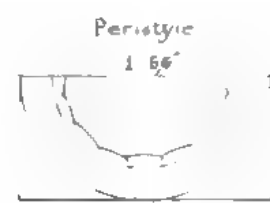
Porch



Peristyle



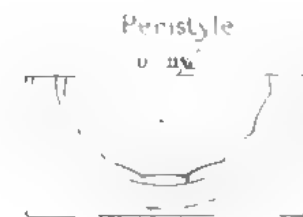
AVANTIPUR.



Peristyle



PAMPUR.



Peristyle



SRINAGAR.



Isolated Pillar

N.B. Radius of Flutes = one half of Lower Diameter

A. Cunningham's coll.







effected by gun-powder, and I would then ascribe their overthrow to the bigotted Aurangzeb. Ferishta\* attributed to Sikandar the demolition of all the Kashmírian temples save one, which was dedicated to Mahadéva and which only escaped "in consequence of its foundation being below the surface of the neighbouring water." In A. D. 1580-90 however Abul Fazl† mentions that some of the idolatrous temples were in "perfect preservation;" and Ferishta himself describes many of these edifices as being in existence in his own time, or about A. D. 1600.‡ Besides, as several of them are still standing, although more or less injured, it is quite certain that Sikandar could not have destroyed them all. He most likely gave orders that they should all be overturned; and I have no doubt that many of the principal temples were thrown down during his reign. For instance, the tomb of his own Queen in Srinagar is built upon the foundation, and with the materials of a Hindu temple: likewise the wall which surrounds the tomb of his son, Zein-ul-Áb-ud-din, was once the enclosure of a Hindu temple—and lastly, the entrance of a Masjíd in Nowa-Shehra of Srinagar, which according to its inscription was built during the reign of his son Zein-ul-Áb-ud-din, is formed of two fluted pillars of a Hindu peristyle. These instances prove that at least three different temples in the capital alone must have been overthrown either by Sikandar or by one of his predecessors. But as the demolition of idol temples is not attributed to any one of the earlier kings, we may safely ascribe the destruction of the three above mentioned to Sikandar himself.

9. But besides the ruthless hand of the destroyer, another agency less immediate, but equally certain in its ultimate effects, must have been at work upon the large temples of Kashmír. The silent ravages of the destroyer who carries away pillars and stones for the erection of other edifices, have been going on for centuries. Pillars from which the architraves have been thus removed have been thrown down by earthquakes, ready to be set up again for the decoration of the first masjíd or tomb that might be erected in their neighbourhood. Thus every Mahomedan building in Kashmír is constructed either entirely or in part of the ruins of Hindu temples. An instance of the transfer of

\* Briggs, v. 4—p. 465.

† Ayin Akbari, v. 2—p. 124.

‡ Briggs, v. 4—p. 445.

materials I saw myself in November, 1847, when the ruins of Nur Jehán's palace (itself built of Hindu materials) were daily being removed for the construction of additional buildings attached to the Sher-garhi. To the other cause I would attribute the disappearance of the second pillar that within the last 25 years adorned the gateway of the Wantipur temple. One only is now standing (see Plate XIX.), but Moorcroft\* in 1823 saw *two*, "each supporting masses of stone of extraordinary size."

10. From the description of these temples given by Ferishta it is evident that some of them were much more perfect in his time than any of those are which now exist. He describes them correctly enough,† as being situated within quadrangles and resting upon raised terraces—but they had transferred the "massive solid columns, each of a single stone," from the peristyles to the temples themselves. The apartments within, he adds, are small, being in general only 12 feet square, and on the walls are sculptures of human figures, some representing mirth, others grief. In the middle of one of the temples there is a throne, cut out from the solid rock, on which is a minaret with a dome." The last was most probably a Buddhist temple with an interior *chaitya*. Unfortunately, no trace of this now exists, unless indeed the description may be taken as bearing a distant resemblance to the Buddhist cave temple of Bhaumajo.

11. The great size of most of the blocks of limestone and the enormous massiveness of others, which have been used in the construction of the Kashmírian temples, perhaps first led the people to ascribe their foundation to the race of Pándu: for even now they gravely assert that none but giants could have raised such ponderous masses. When I assured them that I had seen blocks of twice the size of the largest drawn upon carts in England, they politely shrugged their shoulders, and seemingly assented, saying, "It may be so" (*hoga*), but they evidently did not believe it. I am convinced however that none of them knew the exact size of these blocks of limestone, and that they have only a vague impression of their magnitude being much too great for the weakened powers of man in this iron age to move. I measured several of these stones—one lying to the right of the gateway of the

\* Travels, v. 2—p. 244.

† Briggs, v. 4—p. 446.

1000 of the year in the Pratihara period



N<sup>o</sup> 1

N<sup>o</sup> 2

N<sup>o</sup> 3

N<sup>o</sup> 4

N<sup>o</sup> 5

CARIATID FIGURE  
FROM THE  
PORTICO OF THE ERECTHEUM,  
AT ATHENS



VIEW  
OF THE

**PRAVARESWARA SYMBOL OF MAHADEVA,**

AT PANDRETHAN, KASHMIR,

ERECTED A.D. 400 - 417



4 1/2 h. 1.00

Part



Avantipura temple (Plate XIX.) was  $10 \times 5 \times 2\frac{1}{2}$  feet—and Vigne\* mentions one of almost exactly the same size, over the entrance to the inner chamber of Márttand. Its dimensions were not less than 10 feet in length, by about a yard in thickness. The lower roofing stone of the Payach temple is 8 feet square by 4 feet in height. As a cubic foot of the Kashmírian limestone weighs  $166\frac{1}{2}$  lbs., each of the above blocks must weigh nearly 17 tons.—But even such massive blocks, although heavy enough for all purposes of solidity, and sufficiently large for the greatest stretch of Kashmírian intercolumniations, were much too small to suit the exaggerated ideas which had been formed of Pándavan architecture. Accordingly we find even the sober Ferishta† gravely asserting that “many of the stones are from 40 to 60 feet in length, and from 3 to 15 feet in thickness and width”—or just four times the actual size of the blocks which I have measured. The other dimensions given by him are also much exaggerated: thus, he says that the walls of the quadrangles are from “500 to 600 feet in length, and in many parts nearly 100 feet in height.” The longest side of the Márttand quadrangle is 249 feet on the exterior, and the height of the gateway was about 54 feet, or just one half of the dimensions stated. I have quoted these passages to show how little dependence can be placed in the most detailed dimensions even of the most trustworthy native authors; and I now proceed to describe the temples themselves from my own notes and measurements, with occasional illustrations from Moorcroft, Hugel, and Vigne.

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## II.—*Temple on the Takht-i-Sulimán.*

1. The oldest temple in Kashmír, both in appearance and according to tradition, is that upon the Takht-i-Sulimán hill. It is now called *Sankaráchúrya*; but the Bráhmans in the valley were unanimous in their belief that its original name was *Jyeshteswara*. Its erection they ascribed to Jaloka, the son of Asoka, who reigned about 220 B. C. The old Hindu name of the hill however was *Sandhimána-parvata*, which is said to have suggested the Mahomedan designation of *Takht-i-Sulimán*, from the similarity of sound between the two. The name

\* Kashmír, v. 1—p. 390.

† Briggs, v. 4—p. 445.

of Sandhimána was derived from the Bráhmaṇ minister of Jayendra, who reigned from A. D. 341 to 360, or no less than five centuries and a half after Jaloka. Now the attribution of the Jyeshtheswara temple to Jaloka rests solely upon the authority of the following verse of the Raja Tarangini, B. 1, v. 124 :—

प्रतिष्ठां ज्येष्ठरुद्रस्य श्रीनगरीं वितन्वता ।  
तेन नन्दीशसंस्थिता न मेने सोदरं विना ॥

which is thus translated by M. Troyer :—

“Après avoir répandu à Srinagari la vénération du premier Rudra, il se ralentit de sa ferveur pour Nandisa par l’absence de la fontaine (sacrée.)

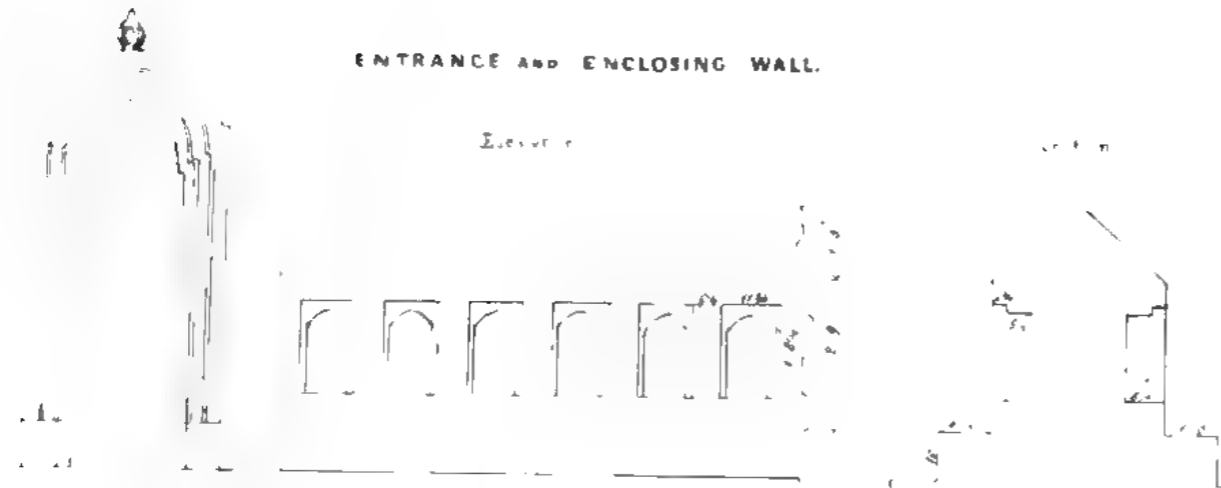
2. In the original the word which is translated “premier Rudra,” is *Jyeshtha-Rudra*, a name of exactly the same meaning as *Jyeshtheswara*, the “supreme lord,” and which is used here only as a synonyme of Siva, who in this same verse is likewise designated by another name, as *Nandisa*, or “Lord of Nandi,” his attendant bull. It is true that the verse distinctly attributed to Jaloka the extension of the worship of Jyeshtheswara throughout the city of Srinagar; and that the temple of Jyeshtheswara on the Takht-i-Sulimán was within the bounds of the old capital, which extended from the Takht-i-Sulimán as far as the present Pánthasok to the south-east. Both the position and the name of the old temple therefore agree very well with the record of the Raja Tarangini, and which is still further borne out by the undoubted antiquity of the building itself. On the very same authority the Bráhmaṇs likewise ascribe the building of a temple to Nandisa, at the place now called Nandymarg, behind Bij Bihára.—But as the actual erection of a temple to Jyeshtheswara is not distinctly mentioned, some shadow of doubt must always rest upon this attribution.

3. It would naturally be supposed that the hill must have been known by the name of the temple that crowned its summit: instead of which it is called Sandimána-parvata. Perhaps some part of this hill may have been the scene of the burning of Sandhimána’s body; for after the cremation, when he became regenerated as Arya Raja, he is said to have built on that very spot a temple named *Sandheswara*.\* The belief in this miracle would have been quite sufficient for the attri-

\* Raja Tarangini, B. 2—v. 134.

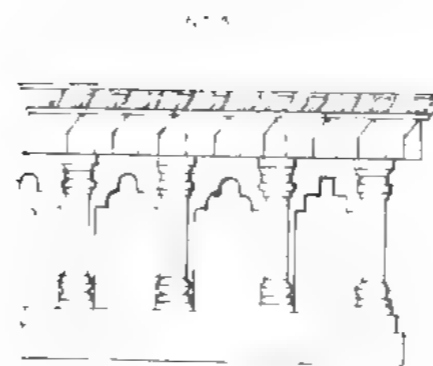
TEMPLE OF JYESHTESWARA  
ON THE TAKHT I-SULIMAN HILL.

ENTRANCE AND ENCLOSING WALL.

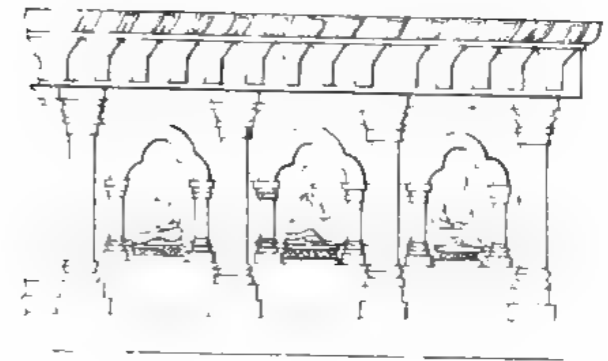


FRIEZES

SRANAKAR

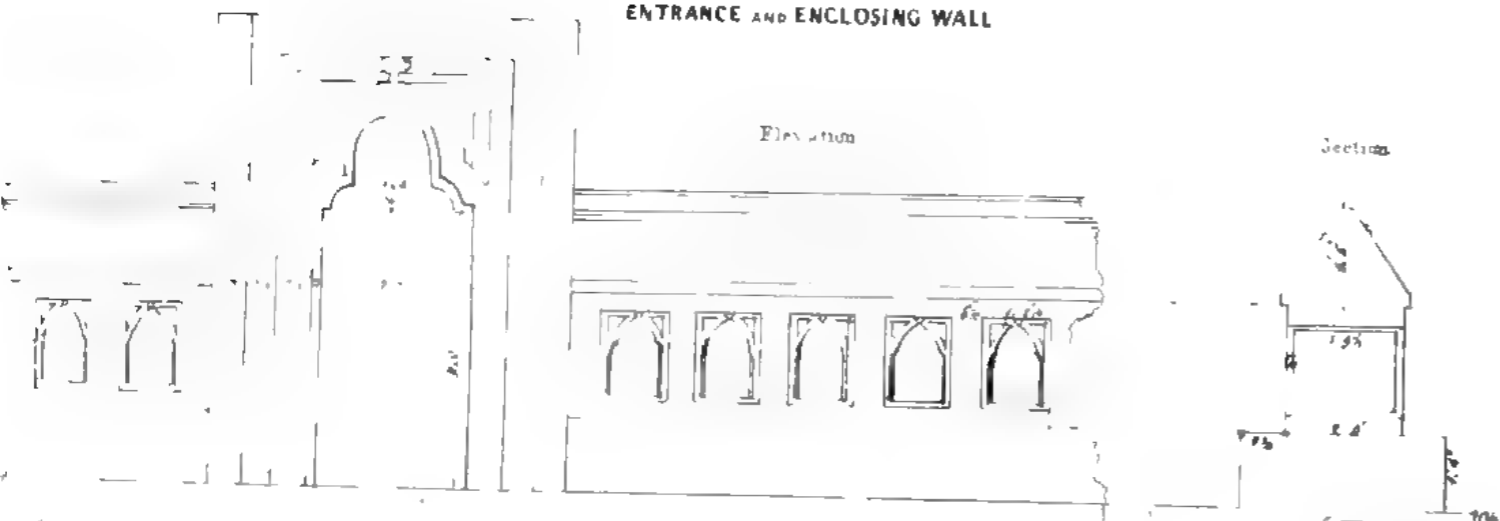


N° 2  
MARTTAND  
A D 760



TOMB OF ZEIN-UL-AB-UD-DIN

ENTRANCE AND ENCLOSING WALL

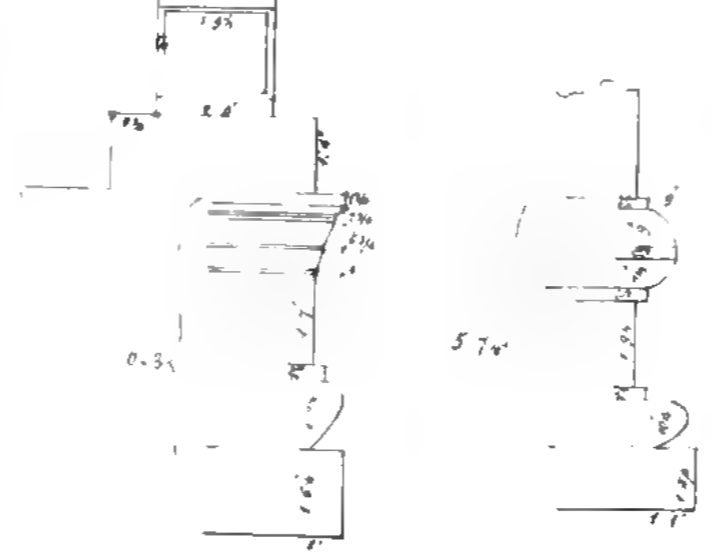


N° 1  
MARTTAND  
A D 700



BASEMENTS

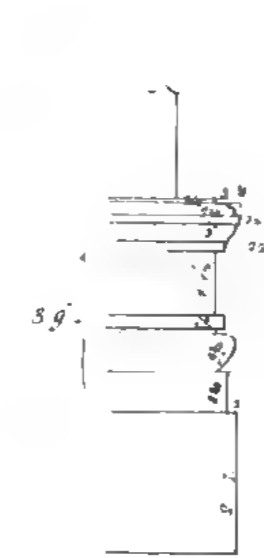
TAKHT I-SULIMAN



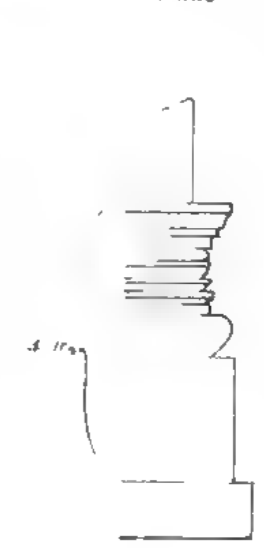
BHAUMAJI



PAYACH.



MARTTAND



A Cunningham del.

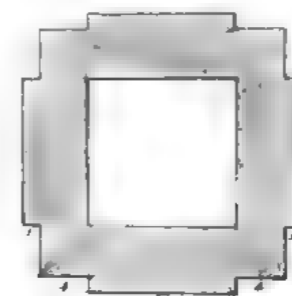






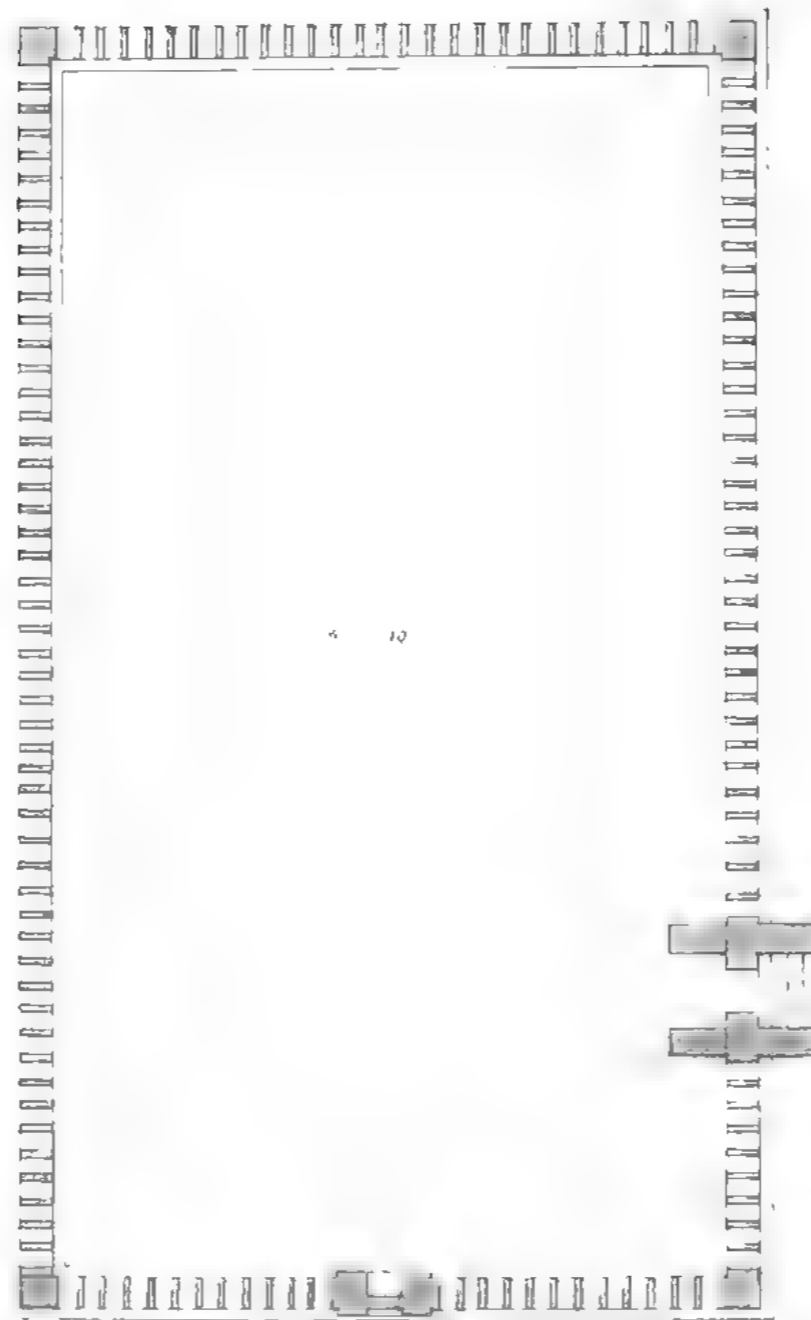
PLANS OF TEMPLES AND ENCLOSURES, KASHMIR.

TEMPLE OF PADMASWAMI, PAMPA



TOMB OF ZEIN-UL-AB UD-DIN'S MOTHER

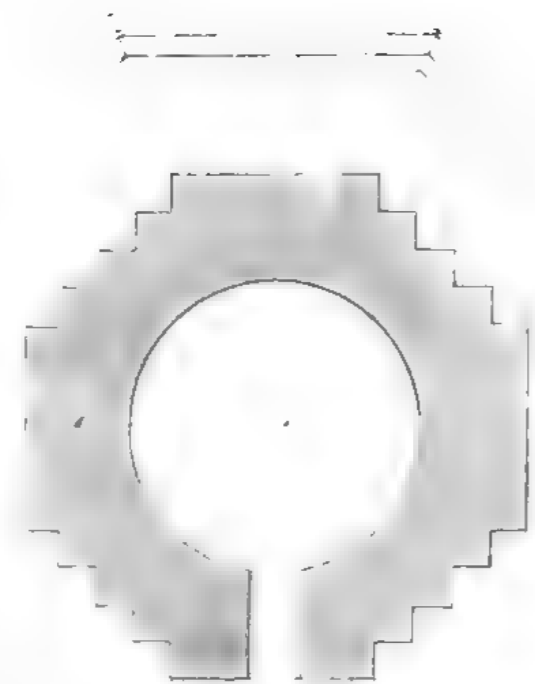
SRINAGAR



ENCLOSURE OF ZEIN-UL-AB UD-DIN'S TOMB.

SRINAGAR

Scale 1/4" = 1 Foot

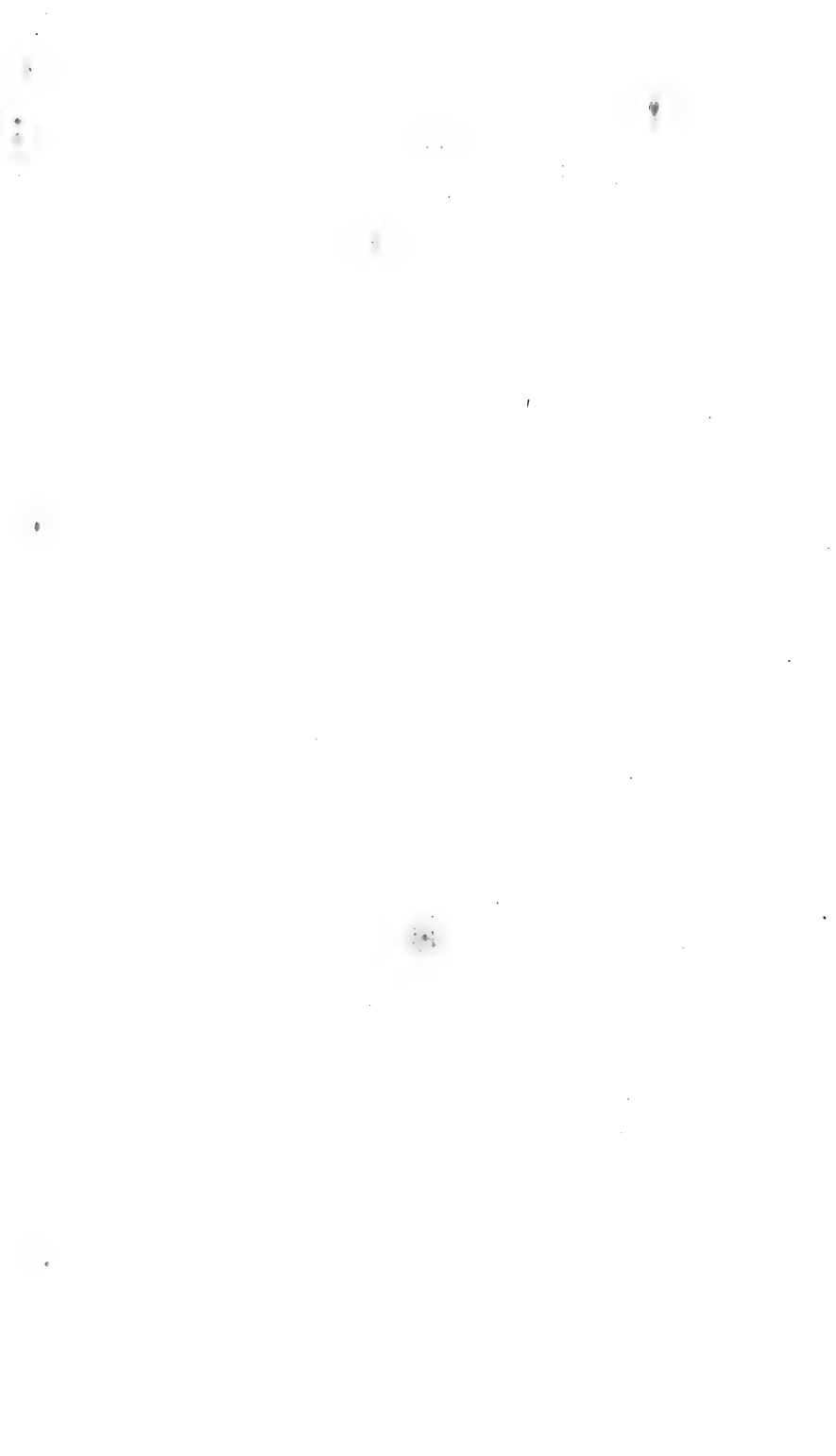


EAST

TEMPLE OF JYESHTESWARA OF SANKARACHARYA

ON THE FAULT OF SHIVIMAN HILL

Scale 1/4" = 1 Foot



bution of a new name even to an old locality; and as the name of Sandhimána still clings to the hill, we must perhaps rest content with the assumption that such was the fact: and that the temple of Jyeshteswara on its summit was most probably built by Jaloka about 220 B. C. In this case the ruins which exist just below the temple may be the remains of that named Sandheswara. They are mentioned by Vigne,\* who likewise considered them to be the remains of a temple.

4. Vigne also assigns the building of the upper temple to Raja Gopaditya; but the *Raja Tarangini*† merely states that he erected a Jyeshteswara upon mount Gopa, which may be, and probably was, only another name for the Takht-i-Sulimán: but of this we have no evidence. Now Gopaditya reigned from A. D. 238 to 253. It is quite possible therefore that the temple of Jyeshteswara may have been either repaired or rebuilt by Gopaditya, who at the same time may have imposed his own name upon the hill.

5. The situation is a noble one, and must have been amongst the first throughout the whole valley which was selected as the position of a temple. It stands one thousand feet above the plain, and commands a view of the greater part of Kashmír.

6. The plan of this temple is octagonal, each side being 15 feet in length. The entrance, the back, and the two flank walls are perfectly plain; but the other four walls are broken into a succession of salient and re-entering angles, as shown in Plate IX. The light and shade thus produced offer an agreeable variety to the bald massiveness of the other walls. The height of the original temple cannot now be ascertained,‡ as the present roof is a modern plastered dome which has, I believe, been built since the occupation of the country by the Sikhs. The interior, which is a circle of  $21\frac{1}{2}$  feet in diameter, is perfectly plain and very dark; the entrance being a narrow passage only  $3\frac{1}{2}$  feet in width. The walls are therefore 8 feet thick; which I consider as one of the strongest proofs of the great antiquity of the building.

7. The basement of the temple has much the same style of moulding as those of the Bhaumajo and Páyach temples: but it differs from them in being but slightly projected beyond the face of the wall. The

\* Kashmír, v. 2—p. 59.

† B. 1—v. 343.

‡ See Note in the Section on Basements.

different members are altogether more massive; and in my opinion betoken an earlier style of building.

8. It is surrounded by an octagonal enclosure parallel to the walls of the temple, at only  $7\frac{1}{2}$  feet distance. This enclosing wall is 3 feet 2 inches in thickness and 4 feet 2 inches in height; and stands upon a basement 5 ft. 2 inches broad, and 10 inches high. The lower portion,  $2\frac{3}{4}$  feet in height, is ornamented both on the outside and inside by small rectangular panels, 1 foot  $8\frac{1}{2}$  inches in height by  $11\frac{3}{4}$  inches in breadth, and  $2\frac{3}{4}$  inches in depth: and in each of these panels there is a pointed arched recess  $5\frac{1}{2}$  inches in depth. There are twelve of these recesses in each of the seven unbroken sides of the octagonal enclosure. The whole number of recesses is therefore 84: and in each of these I presume that there was once a miniature *lingam* or emblem of Siva, as in the larger chambers of the Saiva temples at Avantipura and Pathan, to be hereafter noticed. The top of the wall, 1 ft. 4 inches in height, is triangular in section and perfectly plain. See plate VIII. In this primitive example I think that I can trace the germs of that style of enclosure, which, by gradual development, was afterwards expanded into the noble colonnade of Márttand.

9. The temple is approached by a flight of 18 steps, 8 feet in width, and enclosed between two sloping walls. At the foot of the steps there is another wall of the same upper section as that of the enclosing wall of the temple: and in the middle of this wall is the entrance, which is closed by a wooden door. An elevation of this entrance with part of the enclosing wall is given in Plate VIII. It is 6 ft. 10 inches in height, and 1 ft.  $11\frac{1}{2}$  inches in width. The top is semi-circular, with a few parallel and perfectly plain mouldings, which are joined to the similar mouldings of the sides by short horizontal returns. The perpendicular mouldings rest upon plain bases, which are made flush with the outermost building. The top is surmounted by a melon-like ornament, similar to that which crowns the summit of most of the Kashmírian buildings.

10. A further notice of this most ancient example of the Kashmírian entrance and enclosing wall will be given hereafter, as well as a comparison between it and the later specimens.

11. In the right hand flank wall, at the point marked A, there is a small slab about 10 inches square, which formerly bore a Persian inscrip-

tion dated in A. H. 1069 or A. D. 1659. I copied this inscription in 1839: but since then it has been so completely defaced by the Dogar soldiery that I could with difficulty trace the name of Takht-i-Sulimán. How little did the idol-breaking Aurangzeb anticipate such a reverse of fortune!

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### III.—Cave Temple of Bhaumajo.

1. This little temple, which is only 10 feet square, and not quite 16 feet high, is the most perfect of all the existing buildings of Kashmír. It stands in a cave which is partly a natural fissure, and partly an excavation of the limestone cliff at a short distance from the holy spring and village of Bhavana or Bháwan, and at about 4 miles to the N. E. of Islámábád. At this point the hill projects into the plain, and has been naturally scarped by the action of the river Lambodari, or Lidar, of which a considerable branch still washes the base of the cliff immediately beneath the great cave. There are also many other narrow fissures at different heights above the ground, which are known as Siva's cave, Bhimá-Devi's cave, &c.; and there are likewise numerous square chambers hewn out of the solid rock at its base, which once were most probably the monastic dwellings of Buddhist priests. The large cave in which the temple stands, is situated considerably higher than the others, it being upwards of 60 feet above the level of the river.

2. The cave and temple are both known by the name of Bhaumajo; which in the Kashmírian *Tákra* character, is written ठंभरौब Bhaumajova. But I cannot help suspecting that it is only the Sanskrit भौमज्योतिस् *Bhauma-jyotis*, the "Planet Mars." This derivation however, the Kashmírian Bráhmans would not allow, though they admitted that *Bhauma* was the name of a Rishi. Now as Vrihaspati, or the planet Jupiter, is also the name of a Rishi, *Bhauma* may certainly be considered as the Regent of the planet Mars, if not as the actual star itself.

3. There is not even a traditional clue to the date of the building: but I have little doubt that it is one of the oldest of the Kashmírian temples. Indeed its massive simplicity, its unadorned pilasters, its unbroken tympanum, and its plank-like roof, all point to a much earlier period than that of the most ancient of the authenticated structures,

excepting only that upon the Takt-i-Sulimán. The wonderful temple of Márttand, as the Hindu historian himself calls it, with its lofty roof and highly ornamented walls, was built either in the third or the fourth century; and as its style differs fully as much from that of the plain low-roofed temple of Bhaumajo, as the style of the Parthenon does from that of the temples of Pœstum, a considerable interval must have elapsed between the dates of their construction. The building of this temple cannot therefore be placed much later than the commencement of the Christian era.

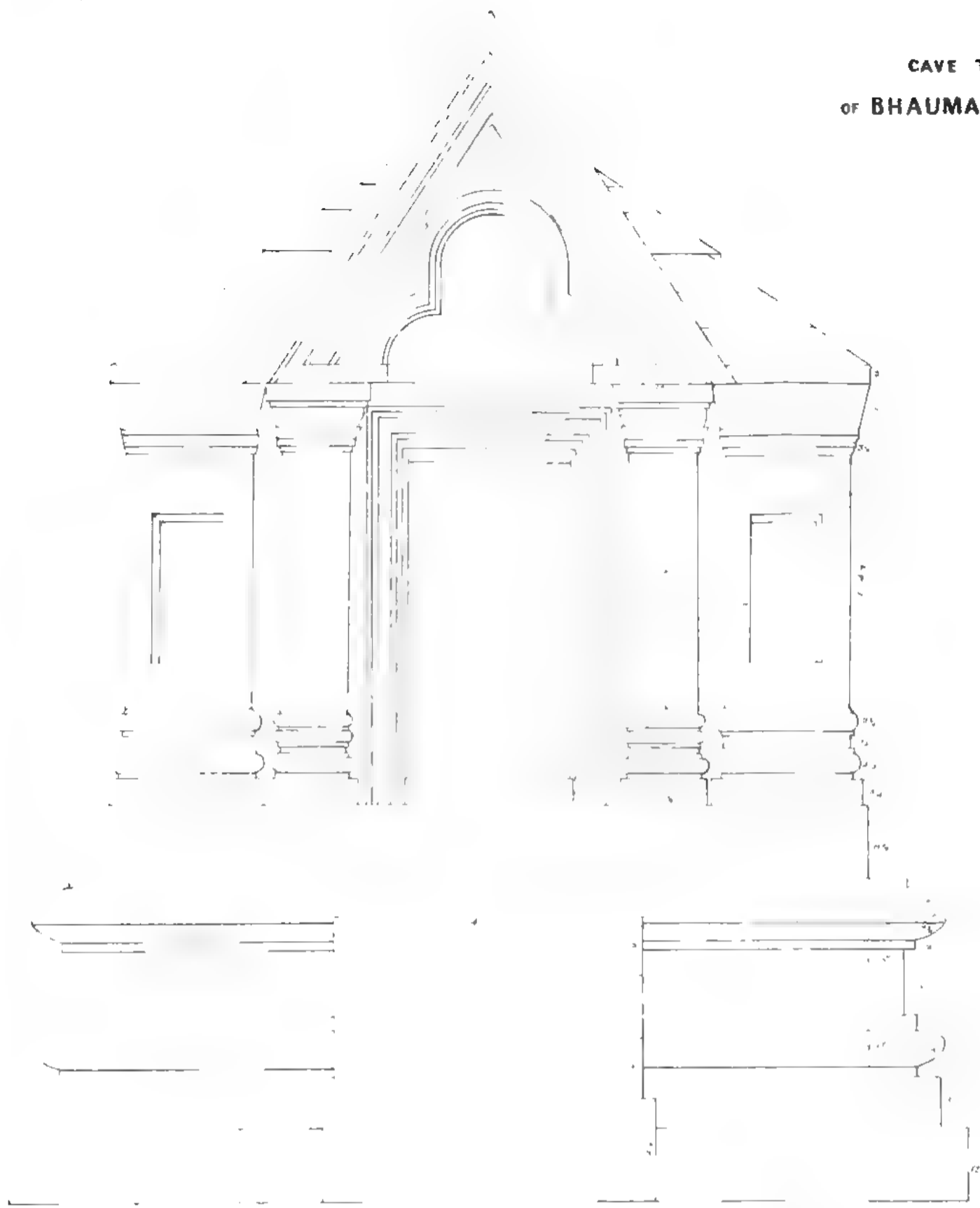
4. In plate X. I have given a plan and an elevation of this temple: together with plans of the caves of Bhaumajo and of Bhimá-Devi. The latter is a straight narrow fissure, 160 feet in length, which gradually widens out towards the end into two small chambers, from 16 to 20 feet across, and from 12 to 15 feet in height. In each of these there is a shapeless waterworn stone, which is considered holy by the Hindus. The larger cave of Bhaumajo is 55 feet long, 25 feet broad, and from 10 to 20 feet in height. Baron Hugel\* erroneously states that this cave is about "20 feet long and 12 feet high and broad," but these dimensions must certainly have been recorded from memory, for mine are given from measurements made by myself. Moorcroft did not visit these caves, and Vigne† was deterred from entering by the stench of innumerable bats. Before I visited it I had all the bats turned out, and their dung removed: but still the task of measurement was rendered extremely unpleasant by a villanous smell, and still more by the myriads of bugs which were swarming over the glistening walls of the temple.

5. There are numerous dressed stones in the interior of the cave, and there are also two low stone walls flanking a narrow pathway, which leads to the steps of the temple. The same arrangement I have observed in most of the Buddhist temples in Ladák and in Upper Kanáwar: and I am therefore disposed to consider this building as a Buddhist structure. The existence of the numerous excavated cells at a short distance from the cave would seem to prove the correctness of this appropriation, as they appear to have been the usual accompaniments of the monastical institutions of the Buddhists; being destined either for the reception of figures or for the dwellings of the priests.

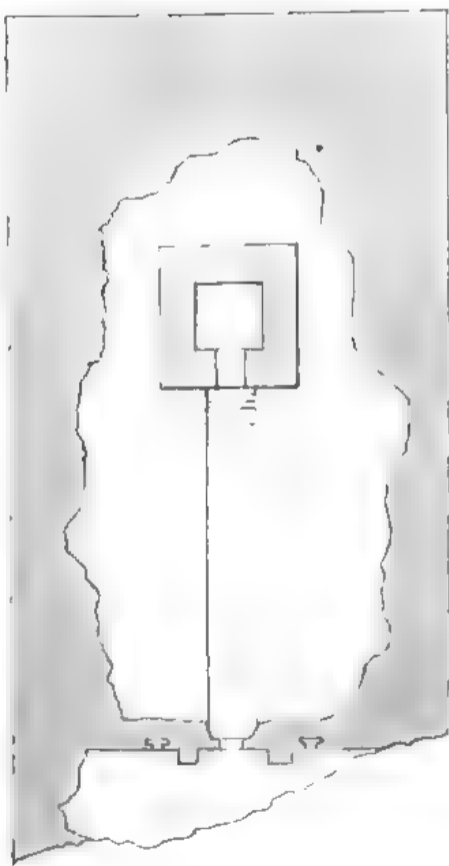
\* Eng. translation, p. 36.

† Kashmír, v. 2—p. 4.

CAVE TEMPLE  
OF BHAUMAJO, KASHMIR.



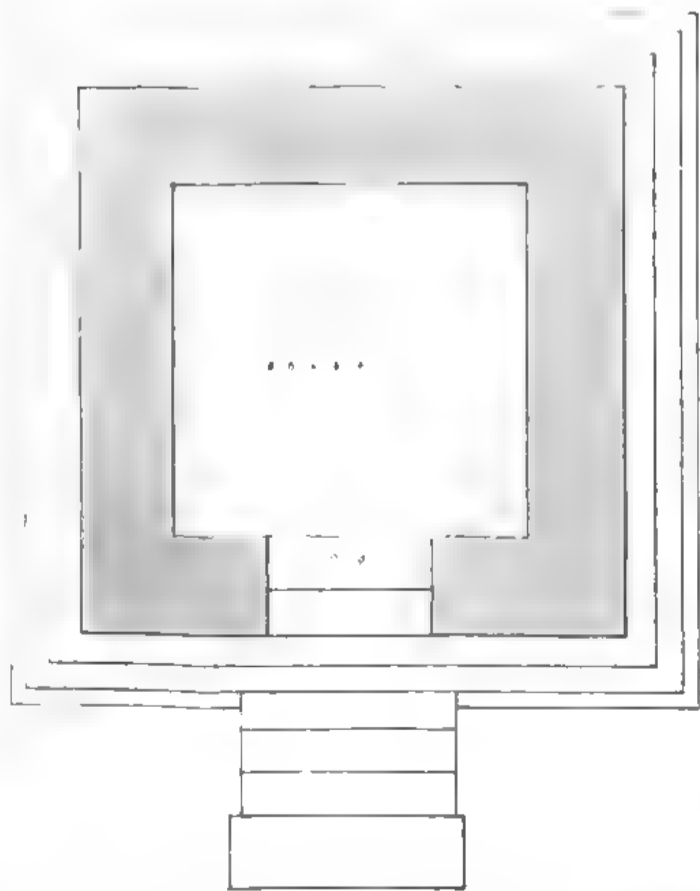
Scale 1/2 Inch = 1 Foot



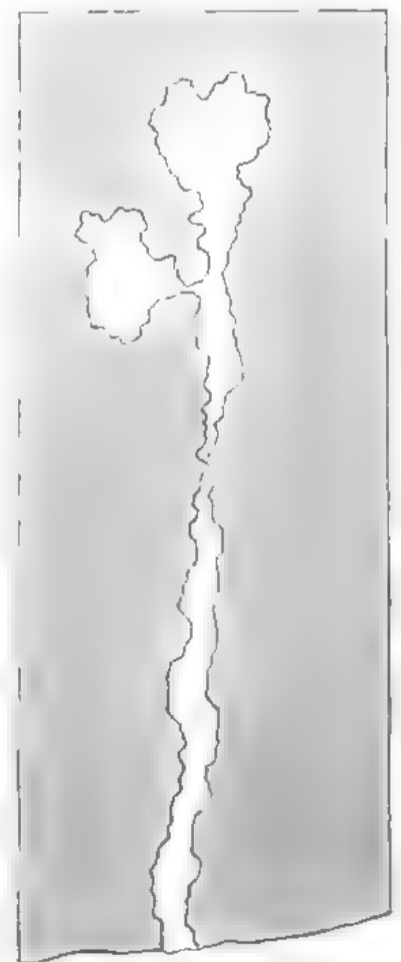
Scale 1/2 Inch = 1 Foot

Cave of Bhau-majo

*J. Cunningham del.*



Scale 1/2 Inch = 1 Foot



Scale 1 Inch = 40 Feet

Cave of Bhrua Dev

*Free Scale*





6. The temple of Bhaumajo is a square of  $6\frac{1}{2}$  feet, interior side, with walls 1 foot 10 inches in thickness. The doorway is small and low; being only  $2\frac{3}{4}$  feet broad, by  $4\frac{3}{4}$  feet high. It is surmounted by a pediment, of which the tympanum is occupied with the trefoiled decoration common to all the Kashmírian buildings. In this instance however the trefoil is a mere ornament, as it rests upon the architrave which covers the pilasters of the doorway, instead of being supported, as is always the case in other examples, upon slender independent pilasters of its own. Yet even in this temple, although the architrave is unbroken, it is still somewhat retired in the central portion immediately above the doorway. Its erection must therefore have preceded in date that of all the other temples of Kashmír, in which the architrave is always completely broken through, and the base of the tympanum is reduced to two short returns of the horizontal mouldings of the pediment, each of which serves as a sort of upper abacus to the pedimental pilasters. In the oldest of the Kashmírian buildings the architrave forming the base of the pediment was no doubt preserved in its full integrity; but I was unable to discover a single example of so early a date.

7. Another peculiarity in this temple consists in the height of the doorway pilasters, which are made flush with the top of the main pilasters and walls of the building: whereas in all other examples the crowns of the doorway pilasters are generally made of the same height as the bases of the main pilaster capitals, or even lower, as at Márttand.

8. Lastly, the pyramidal roof of the Bhaumajo temple is remarkable for its extreme lowness, the height being only one half of the breadth of the temple, instead of being exactly equal to it, as in most other examples. Like them it is broken into two portions; but it wants the dividing band of ornament, which characterizes all the other temple-roofs. In this respect the roof is an exact copy in stone of the sloping timber roofs usual in Kashmir; such for instance as those of the buildings in the Shálimár garden. I therefore consider this as an undoubted proof of the antiquity of the temple.

9. The entrance to the cave of Bhaumajo has a structural doorway covered by two pediments; one within the other, and each having a trefoiled tympanum. The smaller trefoil rests upon the architrave of the pilasters, which, as in the temple itself, is partially retired in

the middle; but the outer trefoil is supported upon independent pilasters; and the architrave, which would have interfered with the inner pediment, is altogether omitted. Perhaps it was this necessity, of either breaking or omitting the architrave of the *outer* pediment that eventually led to the same treatment with the *inner* one. This entrance was formerly gained by a flight of steps, of which some of the stones still remain, but not in position, and I obtained access at first with some difficulty.

#### IV.—Temple of Páyach.

1. This elegant specimen of Kashmírian architecture is situated on the bank of a small sparkling brook at the little village of Páyach, or as it is written in Nágari पायच्छ Páyachchha, which most likely derived its name from the stream: पाय páya signifying “water” and अच्चा, achcha “clear.” The full name of the hamlet is Payachchha-gráma, the “village on the clear stream.” The name of the temple itself has been forgotten; but three different Bráhmans informed me that it was built by Raja *Nal*, *Nar*, or *Nand*. This is not indeed very precise; but in the absence of all other records this close agreement in the name becomes of value. Even the slight variations of the traditional name would seem to give a clue to the right one; for there is but one Raja throughout the Kashmírian list to whom these different names can be applied. This prince is *Narendráditya* who was also called *Nandravat*, in which names we have both the *Nar* and *Nand* of my informants. Now in the following verse of the Raja Tarangini the erection of a temple is directly attributed to this very prince. B. 3—v. 383

पद्मावत्यां सुतस्तस्य नरेन्द्रादित्य इत्यभूत् ।

लक्षणापरनामा यो नरेन्द्रस्वामिनं बधत् ॥

which I translate as follows:—

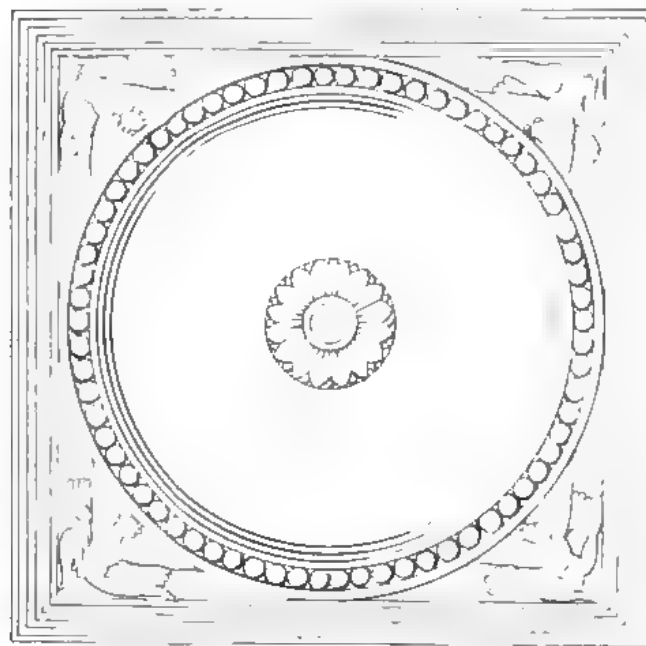
“Padmávati bore a son named *Narendráditya* or *Lakshana*, who built the temple of *Narendraswámi*.” This Raja reigned between the years 483—490. A. D.

2. There are but two other princes of similar name posterior to *Nandravat*, namely *Nirjita-varmma*, and *Nandi-gupta*. As each of them however reigned only one year, and as the Raja Tarangini does not mention any temples of their construction, it seems highly probable



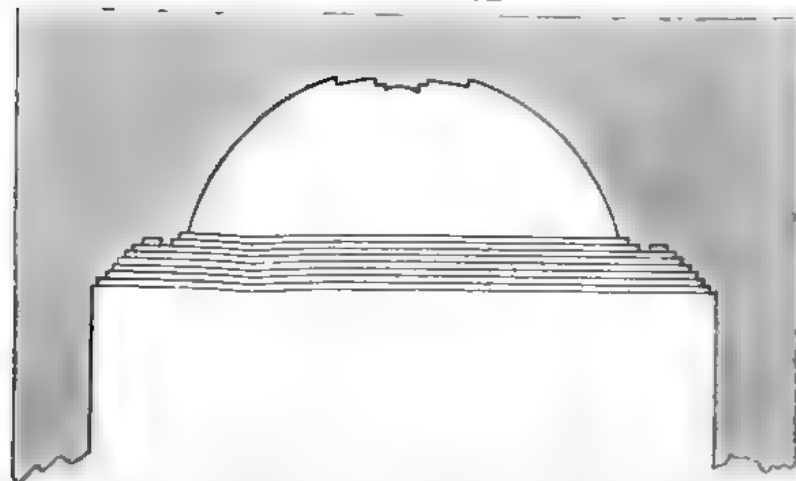
TEMPLE AT PAYACH, KASHMIR

PP. 84-85 DATE R. U. 1883-1891



Plan of Roof

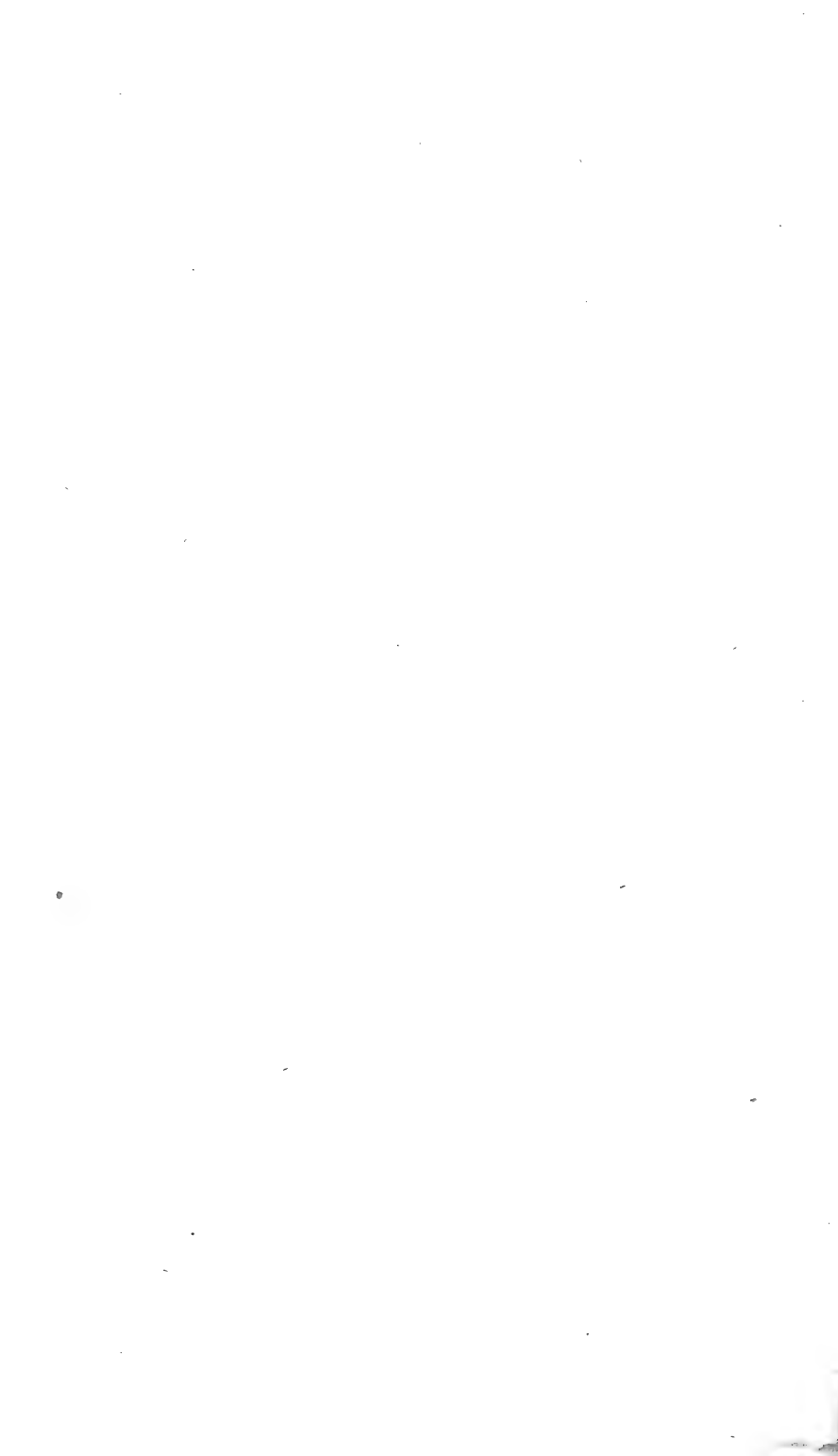
Section of Roof



Scale, 1/4 Inch = 1 Foot.

Inches 1/4 = 1 Foot

Foot

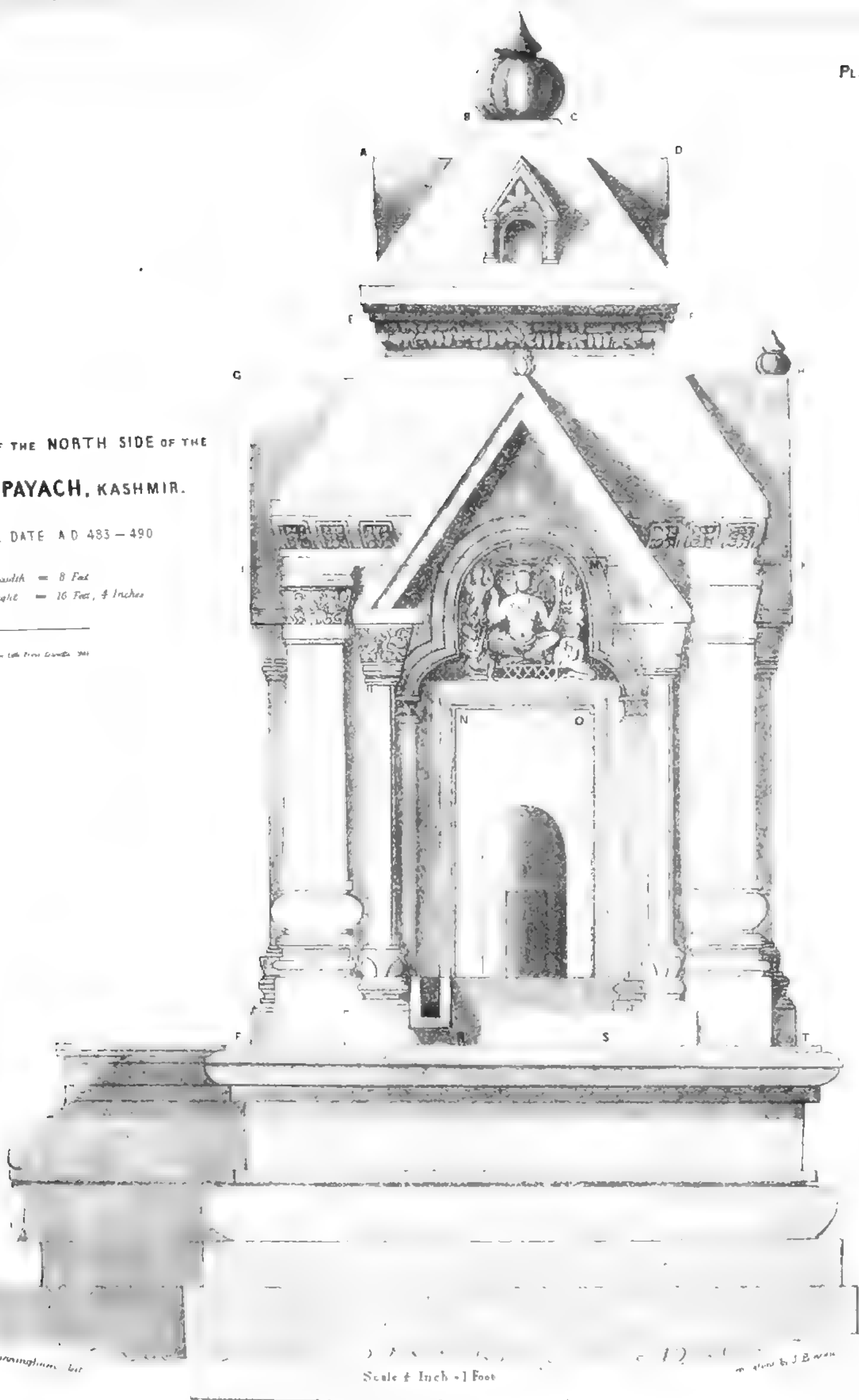


ELEVATION OF THE NORTH SIDE OF THE  
TEMPLE OF PAYACH, KASHMIR.

PROBABLE DATE A D 483 - 490

Width = 8 Feet  
Height = 16 Feet, 4 Inches

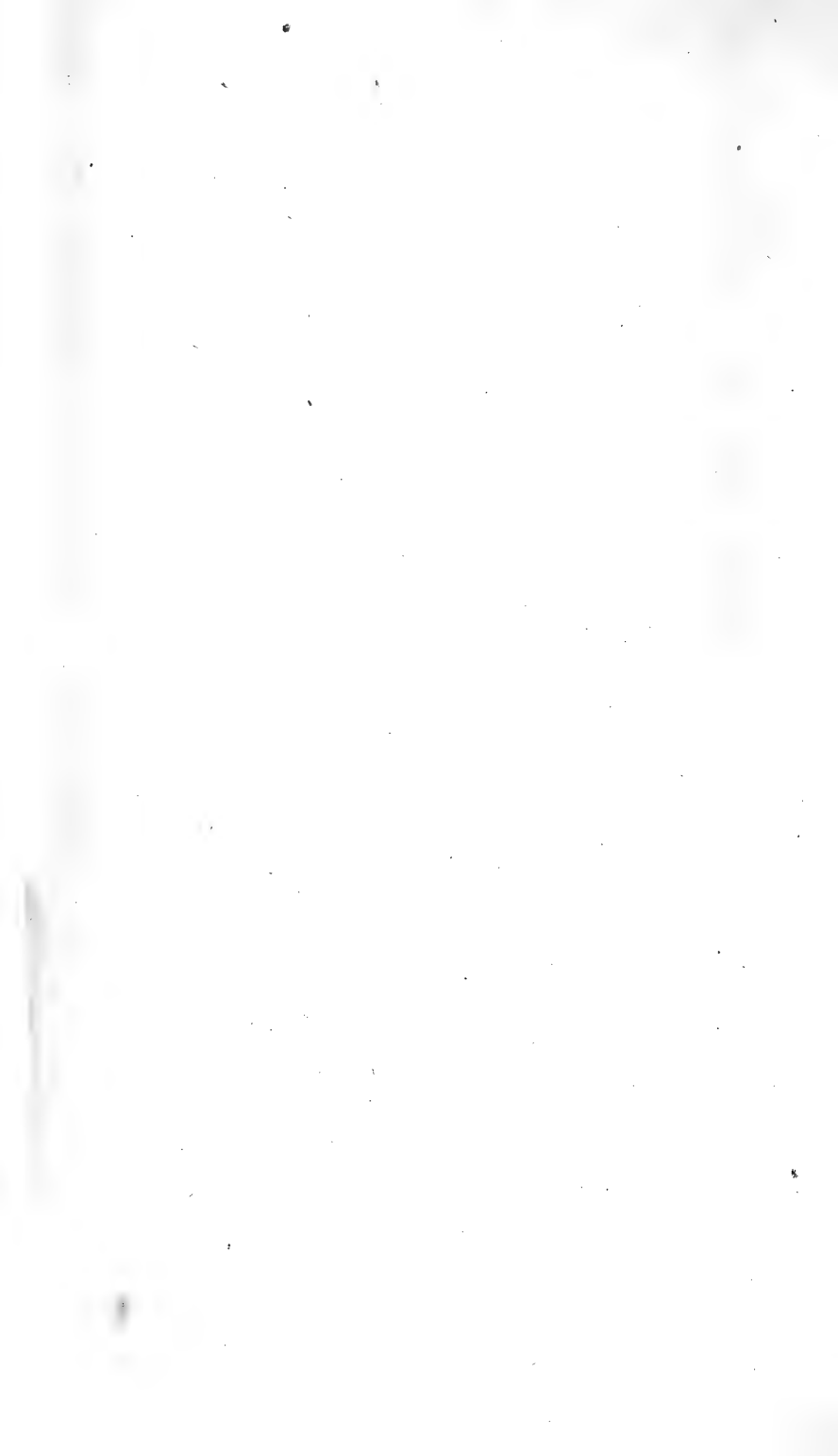
*Black Stone with Iron Clamps 1901*



*A Carving from the*

Scale 1/4 Inch = 1 Foot

*12 - 11  
in stone by J.B. Mack*



that the attribution made by me is correct. Indeed the fortunate agreement of the tradition with the record of the native history of the country almost increases the probability to certainty. And yet in spite of this remarkable concurrence I cannot help harbouring a suspicion that this temple owes its erection to the same period as that of the well authenticated structure at Pándrethán. Vigne\* also was of opinion that this was the most modern of the Kashmírian temples. I have been led to this suspicion solely by the great similarity of the internal decorations of the two temples. But at the same time I must confess that the ground-plan of the Páyach edifice assimilates more closely with that of Márttand, than with those of later date at Avantípura, Pathan and Pándréthan.

3. But there is another evidence in favor of this appropriation in the fact that both the temples of *Páyach* and of *Narendraswámi* were undoubtedly dedicated to Siva. The dedication of Páyach is known by the presence of a *lingam* which still stands intact in the middle of the building, and by the representation of the Bull Nandi upon the capitals of the supporting pilasters of the trefoiled niche. The name of the enshrined Deity in the temple of Narendraswámi is ascertained by the title of *Swámi*, which is one of the names of Siva. It is true that a *Swámi* does not necessarily signify a Saiva temple; but unless otherwise specified it is always intended as such. Altogether therefore the balance of evidence and of probability is decidedly in favor of the early date which I have assigned to the temple on the concurrent authority of tradition and of the record of the Raja Tarangini.

4. The remarkably perfect state in which this temple still exists is no doubt, as suggested by Vigne, partly owing to its retired situation on the westward and immediately beneath the steep side of the Karewat (or elevated alluvial flat) of No-nagar. This position is some miles to the eastward of the high road leading into Kashmír, and entirely screened from observation by the Karewah from any point of the great thoroughfare along the bank of the river. But I attribute its preservation chiefly to the extreme solidity of its construction: the walls being made each of a single stone, and the roof of no more than two stones. A reference to plates XI. and XII. will show the disposition of the six stones, which form the superstructure of this temple. In the former

\* Kashmir, v. 1—p. 392.

Plate, A. B. C. D. E. F. and G. E. F. H. K. I. are the two roofing stones, and I. L. N. R. P. and M. K. T. S. O. are two of the four stones which form the walls. In the latter Plate, A. B. C. and D. are the four wall stones.

5.—An attempt has once been made, as noticed by Vigne, to pull down this temple ; but either through accident or superstition, or perhaps solely owing to the difficulty of moving such massive stones from their positions the attempt was fortunately abandoned. The design certainly could not have been to destroy the temple, but only to remove it to some other position ; for the attempt was made with the upper stone of the roof which still remains displaced about five inches to the eastward. In the elevation of Plate XI. I have, for the sake of symmetry, restored this stone to its original position. A destroyer would no doubt have made sure work by beginning below ; as the removal of a single corner-stone would have completely overthrown the building.

6.—The removal and appropriation of the Hindu temples would appear to have been a favorite practice with the Mahomedan saints of Kashmír, who thereby acquired a double benefit : renown during life by the overthrow or desecration of Idol houses, and a lasting tomb after death by the appropriation of the Idol houses to themselves. Thus Syad Mahomed Feroz appropriated the Hindu temple of Pánthasok पान्थशोक, of which one cloistered recess yet exists ; and Syad Mahomed Madani appropriated another temple, of which two of the fluted pillars of the peristyle, and the intervening trefoiled recess, with the human-headed birds, are still standing within the tomb.

7.—This elegant little temple is only 8 feet square in the superstructure and 21 feet high, including the basement, which is almost a literal copy of that of the cave temple of Bhaumajo. The mouldings indeed are exactly the same both in form and in disposition, which may perhaps be taken as another indication of the antiquity of the Páyach temple, although there are some slight differences in the relative proportions of the different members. The temple has four doorways with a flight of steps to the eastward : and in the niches formed by the trefoils over each doorway there are sculptured representations of Siva and of other Hindu deities. The roof as usual is broken into two distinct portions by an ornamental band. This band is divided into square spaces alternately projecting and retiring. The latter are occupied by flowers ; but the pro-



jecting ends are carved into three upright mouldings slightly rounded at top and bottom and surmounted by a straight and horizontal band. The resemblance which these bear to the dentils of classical architecture is remarkably striking: and I suspect that these diglyph ornaments are a direct imitation of the Doric, and not an accidental likeness. In either case they represent the ends of beams. In the former they are the ends of the beams overlying the architrave: in the latter the lower set are the ends of the beams which supported the pyramidal roof, while the upper set are either the ends of the horizontal ties of the wooden tresses; or of the beams of an upper floor in the roof, a construction particularly common throughout the eastern hills of the Punjáb.

8.—Each of the blank sides of the upper roof is appropriately occupied by a niche similar in form to the doorway of the temple: but the head of the niche is semi-circular and not trefoiled, while the upper part of the tympanum is filled by a flowered ornament. The common trefoil was however also used in this position as may be seen in the small temple which crowns the isolated Srinagar Pillar represented in Plate VI, as well as in the upper part of the roof of the Pándrethán temple. Lastly the top is crowned by a melon-like ornament surmounted by a concave-sided cone, which forms a very suitable finish to the building by preserving the pyramidal form which is the characteristic feature of the Kashmírian architecture.

9.—In the interior the walls are plain, but the roof is hollowed out into a hemispherical dome, of which the centre is decorated by an expanded lotus flower. Vigne\* erroneously says that the “ceiling of the interior is radiated so as to represent the Sun.” But, in addition to my experience and knowledge of Hindu decorations in general, I have the testimony of the accurate Trebeck, who states that the interior of the temple of Pándrethán was “quite plain with the exception of a large *lotus* sculptured on the roof.” A reference to my drawings of the two roofs, which were made from measurements, will prove the truth of Trebeck’s description as well as of my own. Vigne was probably misled by his belief that the temple was dedicated to Vishnu, as *Surya* or the *Sun-god*; but the presence of the *lingam* as well as the representations of the bull Nandi, decides, beyond all possibility of doubt, that the temple was appropriated to Siva.

\* Kashmír, v. 2.—p. 41.

10.—The lower edge of the dome is ornamented by three straight-edged fillets and by a beaded circle. The spandrels are filled by single naked and winged figures (of rather spirited execution), who with outstretched arms and legs would appear to be supporting the roof. Vigne calls these three figures *jins* or *genii*, which unfortunately are Mahomedan creations, and have no more right to a place in a Hindu temple, than the angels Gabriel and Raphaël. They are probably *Yakshas*; the demigod inhabitants of mount Kailása—which was the favourite residence of Siva. The dome itself rests upon the cornice which is formed of six plain straight lined mouldings, as shown in Plate XI. An enlarged and beautiful specimen of this roof may be seen in that of the Pándrethán temple delineated in Plate XXI.

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#### V.—Temple of Márttand.

1.—Of all the existing remains of Kashmírian grandeur the most striking in size and situation is the noble ruin of Márttand. This majestic temple stands at the northern end of the Karewah (or elevated table-land) of Matan and between three and four miles to the eastward of Islámábád. This is undoubtedly the finest position in Kashmír. The temple itself is not now more than 40 feet in height; but its solid walls and bold outlines towering over the beautiful fluted pillars of the surrounding colonnade give it a most imposing appearance. There are no petty confused details; but all are distinct and massive and most admirably suited to the general character of the building.

2.—Many vain speculations have been hazarded regarding the date of the erection of this temple, and the worship to which it was appropriated. It is usually called *Pándavon-ki-laré* or “House of the Pándus” by the Bráhmans, and by the people *Matan*. The first is exactly the same as Moorcroft’s *Khána Pánduwa* which is only a Persian rendering, that was most likely derived through his Mahomedan Munshi. The name recorded by Hugel and Vigne of *Kaura-Pandu* has, I believe, no reference whatever to the Kaurawas as supposed by them, but bears precisely the same meaning as the other terms; *Gharo-Pándava* being another Kashmírian name for “House of the Pándus.” The true appellation however is preserved in *Matan*, which is only a corruption of the Sanskrit Márttand मारुतन्द, or “the Sun,” to whom the temple was de-

TEMPLE  
RANAPRASANNI

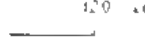
TEMPLE  
OF  
AMR TESWANA

PLAN  
OF THE  
**TEMPLE OF MARTTAND, OR THE SUN,**  
NEAR BHAWAN, KASHMIR.

*The existing portions are shaded*  
*The restorations are plain*

TEMPLE BUILT A D 490 - 555  
COLONNADE " A D 693 - 729

Scale, 20 Feet = 1 inch



J. Cunningham del.

J. D. Cross Lith. Press Calcutta.

WEST



VIEW

OF THE

TEMPLE OF **MĀRTTAND**, OR THE **SUN**,

NEAR BHĀWAN, KASHMIR

WITH ITS

PYRAMIDAL ROOF RESTORED

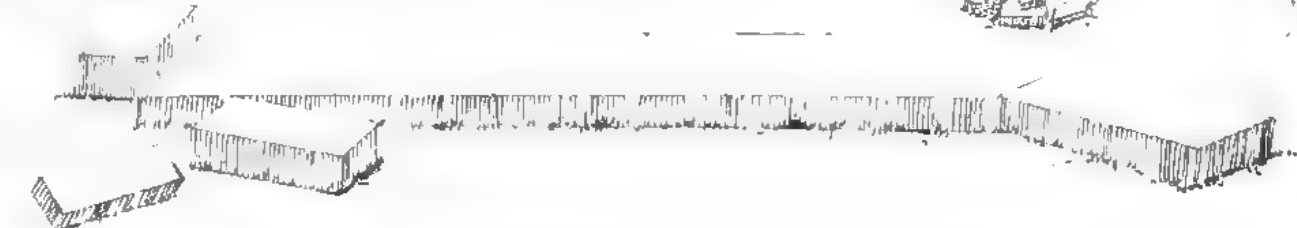
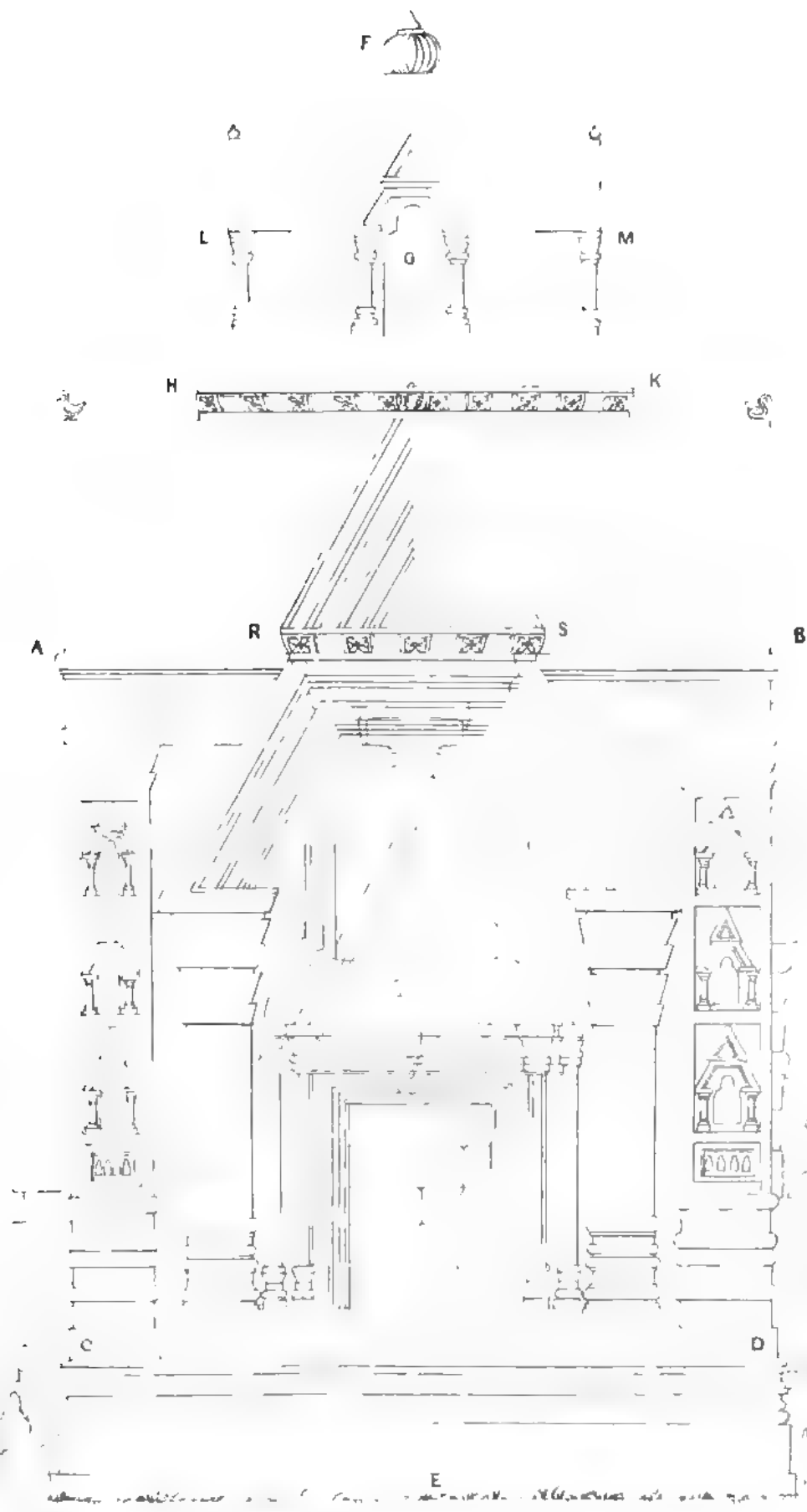
*The existing portions are shaded*

*The restorations are plain*

TEMPLE BUILT A.D. 417-20

COLONNADE " A.D. 12-19

Scale 8 Feet = 1 Inch



*3. Exterior with front colonnade.*



icated. The temple itself is mentioned in the following verse of the Raja Tarangini : B. 3—v. 462.

ख्यातिं रणपुरखामिसञ्जया सर्वतोगतं ।  
स सिंहरोत्थिग्रामे मार्त्तण्डका प्रत्यपादयत् ॥

which is thus translated by M. Troyer, vol. II. pp. 112—462. “ Il construisit aussi dans le village Sinharotsika un sanctuaire au soleil, lequel, sous le nom de Ranapurawámi, acquit une renommée répandue partout.”

2.—In the original the term used for the Sun is *Márttand* ; and there can be no doubt therefore that the celebrated temple of Matan or Márttand is the edifice referred to. But the name of the temple which was erected by the King is *Ranapurawámi*, or as it is called in the next verse *Ranesa*, both of which terms have precisely the same meaning, as “ Lord of Rana” or Ranaditya, and would usually imply the king’s devotion to Siva. In M. Troyer’s translation however the temple is expressly said to have been dedicated to *Márttand* or the Sun ; and as this name has adhered to the building down to the present day, there can be little doubt of the correctness of my appropriation. There would appear to be a slight error however in M. Troyer’s translation in the transfer of the epithets from the *sun* himself to the title of *Ranapurawámi*. I have consulted two intelligent Bráhmans upon this point, and as their opinion agrees with mine I will venture to give my own rendering of the above couplet, as follows :—

“ He in the village of Sinharotsika, erected (a temple) named Ranapurawámi to the famous all-pervading Sun.” The true name of the temple would therefore appear to be *Ranapurawámi*, which has been completely superseded by that of *Márttand* ; the deity to whom it was dedicated.

3.—I have a suspicion however that two different edifices may possibly be indicated in the above verse. In support of this we have 1st, the probability abovementioned that the temple of Ranapurawámi must have been dedicated to Siva, and 2nd, the fact that the author of the Raja Tarangini in mentioning the erection of the surrounding colonnade calls the temple by the name of *Márttand* and not by that of *Ranapurawámi*. Judging from these two points alone, I conclude that two different temples are most probably referred to ; the principal one dedi-

cated to the sun as *Márttand*, and the smaller one to Siva as *Ranapura-swámi*. This view receives further support from the record of the next succeeding verse of the Raja Tarangini. B. 3.—v. 463.

अमृतप्रभया तस्य राज्ञः पत्न्यान्यथा कृतः ।

दक्षिणस्मिन् रणेभ्यस्य पार्श्वे देवोऽमृतेश्वरः ॥

which I translate thus :— “ Amrita prabhá, one of the king’s wives erected an *Amriteswara* close to the south side of *Ranésa*.” Here the substitution of *Ranésa* as a synonyme of *Ranapurawaswami* increases the former probability almost to a certainty that the temple so named must have been dedicated to Siva, as *Isa* is a title *peculiar* to that God.

4.—We have thus the mention of no less than three distinct temples which correspond exactly both in number and position with the existing buildings now known by the general title of *Matan* or *Márttand*. To the northward, within  $4\frac{1}{2}$  feet of the principal temple, which I assign to *Márttand* or the Sun, there is a small edifice containing two chambers, which from their shape and dimensions could only have been intended for the reception of *linga* or emblems of Siva ; and this I suppose to be the fane of *Ranapurawaswami* or *Ranésa*. Again, *due south* from this, exactly as described by the Kashmírian author, there is a corresponding Saiva building that can only be the temple of *Amriteswara*. The accuracy of the description, as well as the names of the different fanes, are thus verified by the relative positions of the existing buildings. These are faithfully represented in Plate XIII. in which the northern detached building or wing must be the temple of *Ranesa*, and the southern one that of *Amriteswara*.

5.—If the correctness of this attribution be admitted, some slight alteration must be made in the translation of the first quoted couplet of the Raja Tarangini, which might I think be rendered with almost equal accuracy as follows : “ He, in the village of *Sinharotsika*, erected (a temple) named *Ranapurawaswami*, near (that) of the famous all-pervading Sun.” All difficulties are thus removed by this slight change, which has every probability in its favour, although perhaps not strictly allowable.

6.—The period of *Ranaditya*’s reign must next be determined. According to the native historians, \* he was the most powerful Prince of the line of *Gonerda*, and equal to *Ráma* amongst the race of *Raghu*.

\* Raja Tarangini, B. 3—v. 473.



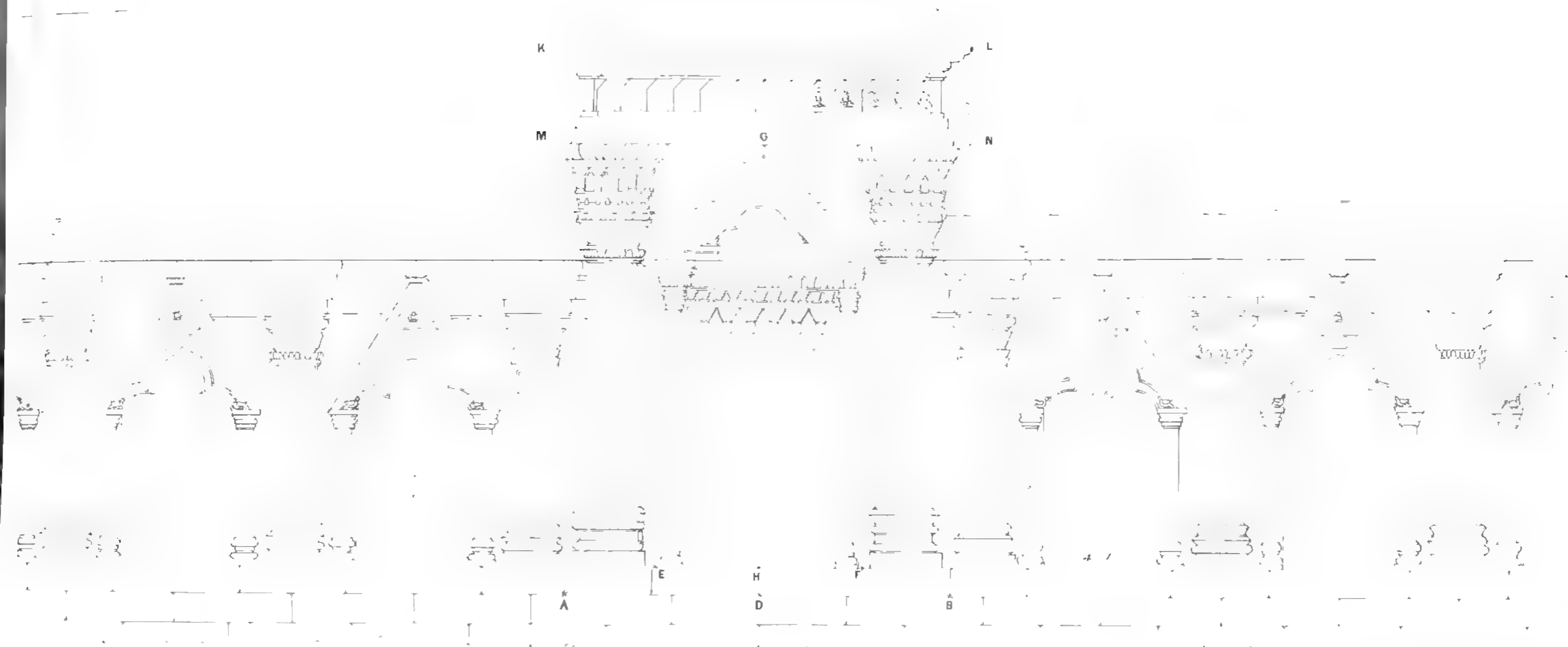
ELEVATION OF THE PERISTYLE

OF THE TEMPLE OF MĀRTTAND, OR THE SUN;

PLATE XV.

NEAR BHĀWAN,

KASHMIR

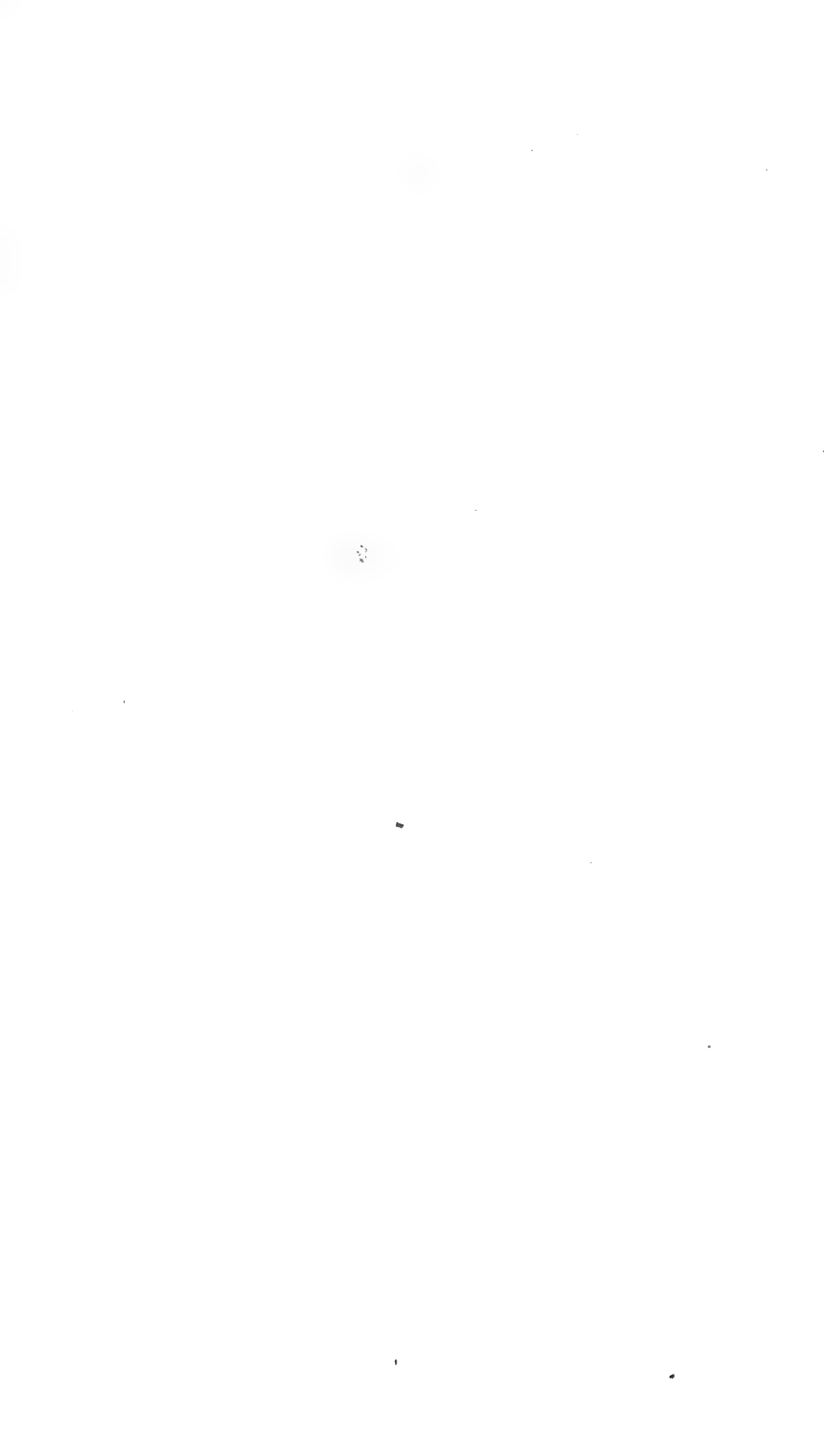


J. Cunningham del.

Engraved by

Scale 1/2 Inch = 1 Foot

Printed by



The same authority also says that he reigned for 300 years ; and M. Troyer, the learned translator of the *Raja Tarangini*, has attempted to unravel this knotty point of Kashmírian chronology, but in my opinion without the least success. I believe that the native author must have mistaken the Vikramádivya of Ujain, who placed Matrigupta upon the throne of Kashmír for the celebrated Vikramádivya Sákári of Ujain. Now the mention of *Dinars* in the reign immediately preceding, proves that the author's Vikramádivya could not have lived until after the period of Roman ascendancy in the east, when the Indian trade was followed by Roman sailors, and when, as we learn from the *Periplus*, the Roman *denarii* were exchanged with advantage against the gold coin of the country. Now *Dinars* are also mentioned in the *Sáchi* tope inscription of Chandragupta of Magadha, who flourished during the end of the 4th and the beginning of the 5th centuries, who was also Lord of Ujain, and who on his coins takes the title of Vikramádivya. These facts no doubt must have misled the Kashmírian author, who, to fill up the gap that thus resulted, could fortunately invent no better plan than the miraculous lengthening of one Prince's reign to 300 years.

7.—I published this identification of the Vikramádivya of Kashmírian history with Chandragupta Vikramádivya no less than six years ago, in the *Numismatic Chronicle* of London ; and I still adhere to the general correctness of my Kashmírian chronology published at the same time, which places the reign of Ranaditya between the years 480—555, A. D. In a disputed point of chronology however which involves the true date of the erection of a temple, the wonder of Kashmír, it may be as well to quote the dates given by other authorities. According to the *Raja Tarangini*, which is followed by Troyer, Ranaditya flourished between the years A. D. 217—517. According to Wilson's corrected chronology, he reigned from A. D. 545 to 568 ; but this date must be curtailed by 21 years, the amount of Wilson's own error, which will place Ranaditya's reign between the years 524—547, A. D. Now as the different dates of Ranaditya's death correspond within a few years, or between 517—555, A. D. it seems quite certain that this Prince must have flourished in the earlier part of the first half of the 5th century. We may therefore safely assume A. D. 500, as being within a few years of the true date of the erection of the two subordinate temples of Ranesa and Amriteswara.

8.—The date to be assigned to the large temple of Márttand itself can only be conjectured, as I can find no mention of it in the *Raja Tarangini*. The plan of the body of the temple, as already noticed, is very similar to that of Páyach, which I have assigned to the reign of Narendraditya, the predecessor of Ranaditya. In the later temples of Avantipura, Pathan, and Pándréthán, all the porticos of the four sides project considerably more beyond their main walls than those of the older temples of Bhaumajo, Páyach, and Márttand; of which the porticos are almost flush with the rest of the building. Taking these indications as slight proofs of rather an earlier style, I think that the erection of the great Sun-temple may perhaps be ascribed to a somewhat earlier period than that of the building at Páyach. Now amongst the predecessors of Narendraditya I find only two who were sufficiently powerful to have erected such an extensive and costly building: namely, Arya Raja, who reigned from 360 to 383, A. D.; and Meghaváhana, who reigned from 383 to 400, A. D. As the latter however was a zealous Buddhist, the erection of a sun temple can scarcely be attributed to him. The date of its foundation may therefore be fixed approximately at A. D. 370, during the reign of the zealous Saiva prince, the regenerated Arya Raja.

9.—As the temple of Márttand is the most celebrated specimen of the Kashmírian architecture, I think it right to state every suggestion which presents itself for the determination of the true period of its erection, I will therefore give another version of the recording couplet of the *Raja Tarangini*, which appears to me quite as probable as the former one. This new rendering is as follows: “He, in the village of Sinharotsika, erected (a temple) named Ranapurawámi, (and another) to the famous all-pervading Sun.” This version attributes the erection of both temples to Ranaditya, who reigned about A. D. 500. But whichever rendering may be accepted as the correct one, the date of the foundation of the temple will still be within the limits of little more than one century—or between A. D. 370 and 500.

10.—Fortunately there is no doubt regarding the date of the erection of the noble peristyle of Márttand, which, thanks to the author of the *Raja Tarangini*, is distinctly recorded in the following verse, B. 4—v. 192—

सो ऽखण्डिताश्मप्राकारं प्रासादान्बर्धय च ।

मार्त्तण्डस्याद्भूतं दाता द्राक्षास्फोतं च पत्तनं ॥

which I translate thus :—

“This benefactor likewise built an *enclosure* of polished stone around the wonderful temple of *Márttand*, and the town of *Drákshásphita*, (abounding-in-vines).” The compound word *akhanditasma* is rendered “solid stones” by Troyer, but although it means “unbroken” or “uncut,” it also signifies “without crack or flaw”—and I have therefore translated it by “polished” to make the description agree with the actual peristyle alluded to, of which the walls are *not* solid, while the stones are certainly *polished*.

This statement refers to the celebrated *Lalitáditya*, who reigned over *Kashmír* from A. D. 693 to 729, or certainly 200 years after the latest date to which the erection of the temple itself can be attributed. This long interval is sufficient to account for many improvements of style which are observable in the colonnade, and more especially in the mouldings of the bases and capitals. The practice of constructing enclosures around the old existing temples, as well as of repairing and re-building the ruined ones, would appear to have been less uncommon in *Kashmír* than in *India*. Thus we find that *Asoka*\* built a stone enclosure around the old brick temple of *Vijayesa*; and that *Diddá Ráni*† repaired the surrounding walls of all the temples that had suffered by age or fire, and erected stone enclosures around other temples.

11.—The mass of building now known by the name of *Matan* or *Márttand*, consists of one lofty central edifice with a small detached wing on each side of the entrance; the whole standing in a large quadrangle surrounded by a colonnade of fluted pillars with intervening trefoil-headed recesses. The central building is 63 feet in length—by 36 feet in width at the eastern end, and only 27 feet in width at the western or entrance end. It contains three distinct chambers, of which the outermost one, named *Arddha-mandapa*, or the “half temple,” answering to the front porch of the classical fanes, is 18 feet square. The middle one, called *antarála*, or “mid temple,” corresponding to the *pronaos* of the Greeks; is 18 feet by 4½ feet; and the innermost one named *garbha-griha* or “womb of the edifice,” the *naos* of the Greeks,

\* *Raja Tarangini*, B. 1—v. 105.

† *Ibid.*, B. 6.—v. 307.

and the cella of the Romans, is 18 feet by  $3\frac{1}{2}$  feet. The first is open and highly decorated, in accordance with its name, *mandapa*, meaning literally "the ornamented." The middle chamber is likewise decorated in the same style: but the inner chamber is perfectly plain and closed on three sides. The walls of the temple itself are 9 feet thick, and its entrance chamber only  $4\frac{1}{2}$  feet thick, being respectively one-half and one-fourth of the interior width of the building.

12.—On each side of the porch or *arddha-mandapa*, flush with the entrance wall to the westward, and with the outer walls of the temple, or *garbha-griha*, to the northward and southward is a detached building or wing, 18 feet long by  $13\frac{1}{2}$  feet broad, with a passage  $4\frac{1}{2}$  feet wide between it and the wall of the entrance chamber. These wings, called *paksha*, correspond in some degree with the *περωματα* of the Greeks. It is true that the latter were *attached* colonnades, while the former were distinct buildings. But as both were attached to the main edifice by a roof supported upon architraves, there is much similarity between them. That such was the case with the wings of Márttand I feel confident; for the width of the passage between the *paksha* and the *arddhamandapa* being exactly one-third of that of the wing itself, the roof which covered the two would have been an exact square, which is the very form required as the basis of the pyramidal roof of the Kashmírian architecture. I am happy to be able to quote the opinion of so sensible and accurate an observer as Moorcroft\* in favor of my views. His words are, "Opposite to these extremities also were the two wings or chambers, *connected formerly* by a colonnade *with the centre.*" As my opinion was adopted some months before I was aware that Moorcroft had formed the same, the coincidence of our independent conclusions may perhaps be considered as the next thing to positive proof.

13.—Vigne† also would appear to have come to a somewhat similar conclusion, for he gives an opinion that these wings were joined "by a flying buttress to the upper part of the central building; particularly as the remains of part of an entablature projecting from the top of the left wing towards the centre building would seem to countenance such an opinion." The existence of this piece of the entablature, which entirely escaped my observation, most satisfactorily proves the correctness

\* Travels, v. 2—pp. 255, 256.

† Kashmir, v. 1—p. 391.

of my proposed restoration of the roofs of these detached buildings. The connexion was formed by the prolongation of the entablature of the wings over the intervening passages to the walls of the entrance-chamber. A similar connexion of a detached pillar with a building may be seen in the view of the Avantismami temple, Plate XIX. Vigne is however undoubtedly wrong when he says that these wings appear to have been a mass of *solid masonry*, for a reference to Plate IX. will show that each of them contained two chambers, which were most probably destined for the reception of the Saiva emblems called *Ranésa* and *Amriteswara*.

14.—As the main building is at present entirely uncovered, and as the upper portions of the detached buildings have long since disappeared, the original form of roof can only be determined by a reference to other temples, and to the general form and character of the various parts of the Márttand temple itself. In Plate XIV. I have restored the roof of the principal building by continuing the pedimental mouldings of the porch upwards until they meet at G. The horizontal denticulated member R. S. is borrowed from the temple of Páyach, and from the little temple which crowns the Srinagar column in Plate VI. The interposition of this member is fully authorized by its occurrence in all the pedimental niches of the interior of Márttand, as well as in those of the recesses of the colonnade as shown in Plates XIV and XV. The angle of the roof itself was obtained by making the sides of the pyramid parallel to the sides of the doorway pediment; a rule which I deduced from the same treatment being observed in the interior niches of Márttand itself, as well as in the roofs of the Páyach and Pándrethán temples. The same rule is also followed in the niches of the great temple at Pathan, and with the small temples in the Baráhmula Pass. The denticulated member H. K. is inserted for the same reasons as are given above for the pediments of the porch. The crowning pinnacle, or *Kalasa*, F, is added on the authority of the Páyach temple; and lastly, the small projecting pedimental niches G. L. and M, are taken from the Páyach temple and from the small Srinagar column in Plate VI.

15.—Now it is remarkable that the total height of the temple, E. F, thus obtained, is exactly equal to twice its width, C. D: for this proportion would seem to have been the favorite and most usual practice (if indeed it was not the invariable rule) followed by the Kashmírian archi-

fects. Thus the height of the Páyach and Pándrethán temples, of the Márttand and Avantipura cloistered recesses, and of the porch-pediments and niches of Márttand itself, were all just double their respective widths. This agreement in the relative proportions of my restored roof of Márttand with those deduced from other examples, is a presumptive proof of the correctness of my restoration.

16.—The entrance-chamber and the wings I suppose to have been also covered by similar pyramidal roofs. There would thus have been four distinct pyramids, of which that over the inner chamber must have been the loftiest, the height of its pinnacle above the ground being about 75 feet. That of the entrance-chamber must have been about 65 feet, and that of each of the wings about 40 feet. If pyramidal tops be added to the three buildings in Vigne's front view of this temple,\* a very good general idea of the original appearance of Márttand may be readily obtained.

17.—Such was once the grand mass of building dedicated to the worship of the Sun: a mass, 75 feet in height, 63 feet in length, and the same in breadth, including the wings. The entrance was gained by a wide flight of steps, which are now covered by ruins. On each of the other sides was a closed doorway, surmounted by a trefoiled arch, and covered by a pediment which rose to a height of 60 feet. At the angles of the building on each side of the doorway were stout pilasters, which were divided into panels, each decorated with a miniature representation of the Arian style of temple. These pilasters sustained the entablature, and gave a look of strength and solidity to the walls which was absolutely required for the support of the vast and massive roof. This lofty pyramid of stone was itself rendered lighter, and more elegant in appearance by being broken into two distinct portions separated by an ornamental band, and by the addition of small niches with pointed roofs and trefoiled recesses, all of which were in strict keeping with the general character of the building.

18.—The interior was equally imposing. On ascending the flight of steps the votary of the Sun entered a highly decorated chamber, with a doorway on each side covered by a pediment, with a trefoiled headed niche containing a bust of the Hindu triad. This representation was

\* *Kashmír*, v. 1—p. 388.





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VIEW OF THE INTERIOR OF THE TEMPLE OF MARTTAND, OR THE SUN.



itself only another symbol of the Sun ; who was Brahma, or the Creator at Morn, Vishnu or the Preserver at Noon, and Siva or the Destroyer at Even. This is the “Mystic orb triform” of Sir William Jones’s hymn to Surya. On the flanks of the main entrance as well as on those of the side doorways were pointed and trefoiled niches, each of which held a statue of a Hindu divinity. That in the larger niche I presume to represent the Sun himself, while those to the right and left are probably intended for some of his wives, for *Chandri* or the “Moon,” when in conjunction, for *Sajnya* or “Intellect ;” for *Prabhá*, or “brightness”—or for *Aswini*, one of the constellations. The same representations were repeated in the niches of the opposite wall. In Plate XVI. I have given a sketch of the northern wall of this chamber ; and a view of the southern wall may be found in Vigne’s travels.\*

19.—In his sketch of this chamber however the decoration of the entablature which surmounts the niches is altogether misrepresented. Its true character will be seen in Plate XVI. where the leading feature is a niche formed of a trefoiled-headed arch resting upon half engaged semicircular pillars. Each of these niches contains a seated figure connected with the Hindu Mythology, and is separated from its neighbour by a plain pilaster.

20.—The interior decorations of the roof can only be conjecturally determined, as I was unable to discover any ornamented stones that could with certainty be assigned to it. Baron Hugel doubts that Márttand ever had a roof ; but as the walls of the temple are still standing, the numerous heaps of large stones that are scattered about on all sides can only have belonged to the roof. The northern wing has still a portion of its roof remaining ; and there are besides two curved stones lying on the top of a heap to the northward or right of the temple, as shown in Plate XVI. which certainly must once have formed part of the circular portion of the ceiling. A reference to Plates XI. and XXI. of the Páyach and Pándrethán temples, will show the arrangement and decoration of two of the smaller Kashmírian roofs. The same treatment, which is also of common occurrence in India, was most probably followed with Márttand. The corners of the square were first covered by overlapping stones, which reduced the opening to

\* Kashmír, v. 1—p. 390.

an eight-sided figure ; the angles of the octagon were next covered by other stones which formed a figure of sixteen sides ; and lastly, an upper course of curved stones completed a circular opening which was covered either by one or by two large blocks, hollowed out so as to form a dome like that in the Páyach example. I have been led to conclude that such was the style of the Márttand ceiling, from the existence of the two curved stones mentioned above ; which as the trefoiled arches are still perfect, could only have formed part of the circular portion of the ceiling of one of the principal chambers.

21.—The interior of the *naos* or *cella* called, *garbha-griha*, or “womb of the edifice” by the Hindus, was quite plain. This want of ornament was perhaps designed to prevent the votary’s attention being withdrawn from the contemplation of the chief object to which the temple was dedicated. No vestige of the consecrated image has escaped the destructive zeal of the Musalmáns : but there can be little doubt that the chamber once contained a figure of the Sun-god, *Márttand*, in his chariot, drawn either by seven or by four green or yellow steeds. The former is the number usually seen in modern representations : but the latter is found upon a very ancient copper seal which was discovered amongst the ruins of Ayodhya. The *green* color is that given in the present day ; but the *yellow* is that assigned by the venerable Vedas. The chamber was lighted during the day by semi-circular openings over the closed doorways on the three sides, but in the evening, as the entrance was to the westward, the image of the glorious Sun was illumined by his own setting beams.

22.—Indeed I can almost fancy that the erection of this Sun-temple was suggested by the magnificent sunny prospect which its position commands. It overlooks the finest view in Kashmír, and perhaps in the known world. Beneath it lies the Paradise of the East, with its sacred streams and cedarn glens, its brown orchards and green fields, surrounded on all sides by vast snowy mountains whose lofty peaks seem to smile upon the beautiful valley below. Such is the daily prospect from this happy spot : but there are occasional scenes which for sublime magnificence, can scarcely be equalled, and certainly cannot be surpassed. Thus when the blue sky was completely shrouded by heavy masses of clouds which spanned the valley from side to side, I once saw the evening sun burst suddenly forth through the Baráhmula Pass.

The change from gloomy dark to brilliant light,  
 Was instantaneous :—then from peak to peak,  
 Through the whole length of Kashmír's happy vale,  
 The setting sunbeams, from that canopy,  
 Reflected, over hill and stream and tree  
 Poured downward such a blaze of golden light,  
 As filled the heart with joy unspeakable.  
 There as the sun went down, the dusky pile,  
 First lost the gladdening brightness of his eye—  
 And hill and dale, temple and tower and tree,  
 After his retreating footsteps, one by one,  
 Sank neath the flowing wave of murky night.

The vast extent of the scene makes it sublime ; for this magnificent view of Kashmír is no pretty peep into a half-mile glen, but the full display of a valley sixty miles in breadth and upwards of a hundred miles in length, the whole of which lies beneath the ken of the “wonderful Márttand.”

23.—The temple is enclosed by a pillared quadrangle, 220 feet in length by 142 feet in breadth, containing 84 fluted columns. This number was, no doubt, designedly fixed by the later architect, and is another proof of the dedication of the temple to the sun. For this number, the famous *chourási* (84) of the Hindus is especially emblematic of the sun, as it is the multiple of the twelve mansions of the ecliptic (typified by 12 spokes in his chariot wheel), through which he is carried by his seven steeds in one year ; or it is the product of his seven rays, multiplied by the twelve signs of the Zodiac. The 84 pillars are, therefore, most probably intended for that number of solar rays. Thus even the colonnade is made typical of the Deity to whom the temple is consecrated.

24.—The entrance or gateway stands in the middle of the western side of the quadrangle, and is of the same width as the temple itself. This proportion is in accordance with the ideas of Hindu architectural grandeur : for the rules laid down by them, as quoted by Rám Ráz, give different proportions from six-sevenths to ten-elvenths of the breadth of the temple, for that of each different style of gateway from the most simple to the most magnificent. Outwardly the Márttand gateway resembled the temple itself in the disposition of its parts and in the decorations of its pediments and pilasters. It was open to the

west and east, and was divided into distinct portions, forming an inner and an outer portico, by a cross wall with a doorway in the centre, which was no doubt closed with a wooden door. On each flank of the gateway, the pediment was supported upon massive fluted pillars,  $17\frac{1}{2}$  feet in height, or eight feet higher than those of the quadrangle. One of these is still standing to the south of the entrance; and the style of architrave and entablature which connected these pillars with the gateway, may be seen in the view of the ruined temple of Avantiswámi, represented in Plate XIX. I suspect also that the front and back pediments of the gateway were supported upon similar large pillars: but it is possible that the square foundations, which I observed in front, may have been only the remains of the wing-walls of a flight of steps. The roof was, no doubt, pyramidal; for a portion of the sloping mouldings of its pediment was still to be seen on one side, and I also observed the same at the Avantiswámi temple.

25.—It is probable that each corner of the quadrangle must have been covered by a pyramidal roof supported upon large pillars, for there is a broken column yet standing at the S. W. corner, and the bases of three others are still to be traced close to it. It was this broken column that puzzled Vigne so much, as he appears to have taken it for an isolated pillar, which once bore an inscription; but as the pillar is fluted this conjecture must be abandoned. In Plate XIV. will be seen the roofs of two of these corner buildings, according to my ideas of their size and of their connexion with the adjoining roof of the quadrangle. On the outside also at the S. W. angle, I found one of the stones of the decorated entablature,  $3\frac{1}{2}$  feet in height, (see Plate VIII. Fig. I. Márttand,) which could only have belonged to such a lofty building at the corner as I have supposed. The decoration of this entablature is similar to that of the interior of the temple, but considerably plainer. This was, perhaps, designed as being more suitable to the exterior which is throughout less highly ornamented.

26.—In the middle of each of the long sides of the colonnade there is a pair of large fluted pillars, 13 feet in height and  $8\frac{3}{4}$  feet apart, somewhat advanced beyond the line of the peristyle. On the northern pair of columns, the transverse architraves, connecting them with the wall of the peristyle, are still standing. I suppose that these pillars carried an entablature,  $3\frac{1}{2}$  feet in height, of the same description as

that which has been assigned to the corner buildings, and covered by a similar pyramidal roof. The height of the roof, in this case, is determined by making the sides of the pyramid parallel to those of the pediment over the doorway of the intervening recess. In Plate XV. I have given a restored elevation of this porch, with the adjoining parts of the peristyle, from which it will be seen that the total height of the building C. D; thus obtained, is exactly twice its width A. B. As the same proportion is observed in the height of the recessed doorway, where G. H.=2 E. F, and also in the temples of Páyach and Pándrethán, as well as in Márttand itself, there can be little doubt that the general disposition of my proposed restoration is nearly correct.

27.—Both Vigne and Professor Willis (on Vigne's authority) have taken these central porticos for side gateways; but a reference to my plan in Plate XIII. will show that the square-topped doorway leads only to a small-chambered recess, similar to those between the other pairs of pillars. There are, however, two flank entrances to the quadrangle, one on each side, between the second pair of pillars to the westward of the central porches. These I suppose to have been closed by ornamental wooden doors.

28.—The quadrangle itself contained seventy round fluted pillars, and ten square parallel pillars, which with the four pillars of the central porches, make up the number of 84, that was sacred to the sun. Of these about one half, all more or less imperfect, now remain standing, as shown in Plate XIII. Each pillar was  $9\frac{1}{2}$  feet in height, and  $21\frac{1}{2}$  inches in diameter, with an intercolumniation of 6 feet  $9\frac{1}{2}$  inches. Immediately behind each column, there was a square pilaster, one fourth engaged, appropriately called *Kudyastambha* or "wall pillars" by the Hindus. This peristyle is of the class called peripteral by the Greeks, as the pilasters were exactly one diameter distant from the pillars. Between every pair of these pillars there was a deep recess with a trefoil-headed arch, covered by a pediment, and supported upon small pilasters, or rather upon half-engaged pillars. The imposts were surmounted by human-headed birds facing each other; and a similar bird looking to the front, ornamented the horizontal mouldings of the pediments. Each pillar was connected with its pilaster, and with the main wall by a transverse stone beam, which being broader at top than at bottom, bore the appearance of an upper capital to the pillar. In my elevation, Plate

XV. where the perspective view of these transverse stones is not shown, the general effect looks rather heavy, which is not really the case; for excepting those of the pair of pillars, immediately in front, all these transverse beams are seen resting upon the wall. Their moulded ends cannot, therefore be mistaken for upper capitals. The greatest and most characteristic distinction therefore, between the Arian and Classic orders, lies in the disposition of the architrave. In the latter it lies immediately over the line of pillars; whilst in the former it is placed over the transverse beams. There are consequently no metopes in the Arian architecture.

29.—About one-third of this entablature still exists, principally on the north-eastern side of the quadrangle: but the mouldings have been so much injured by the weather, that their character could only be conjectured, from the general outline relieved against the sky, to be much the same as that of the transverse beams. The upper part of the roof of the quadrangles has entirely disappeared, but with reference to the pointed character of other Kashmirian roofs, its form might have been restored conjecturally as triangular in section, the height being somewhat less than the base. Luckily the enclosing walls of the temple on the Takht, and of the old Hindu temple now occupied by Zein-ul-ab-din's tomb are still perfect; and although they are on a small scale, and of a primitive style, without columns, yet the division of their walls into arched recesses is precisely the same as that followed in the main wall of Márttand. The roofs of the former are both triangular in section; and such no doubt was that of the Márttand quadrangle. Further, as the Zein-ul-ab-ud-din example exhibits small breaks or mouldings on each face, so might it be presumed that the roof of the Márttand peristyle was likewise broken into two portions by an ornamental band, exactly similar to that which I have assigned to the temple itself. As, however, this would impose the observance of the same treatment with the roofs of the central porches and corner buildings, I have not adopted it in my restorations; principally because I do not think that the general appearance would thereby be improved, and partly because the intervention of the ornamental band would make the total height of the central porches somewhat more than twice their own breadth, which was the proportion strictly adhered to during the best days of Kashmirian architecture.



30.—The outer walls of the quadrangle are ornamented by a succession of trefoil-headed panels, similar in shape and size to the recessed openings of the interior. Vigne,\* by some oversight, says, that the “outside is completely a blank and unornamented;” a statement that is refuted by his own sketch of the temple, which represents the exterior walls as decorated exactly in the same manner as I have described them.

31.—It appears that some other smaller temples must once have existed within the quadrangle: for there are heaps of stones as well as some traces of foundations at the different places, marked W. X. Y. and Z. in Plate XIII. I have a suspicion also, that the whole of the interior of the quadrangle was originally filled with water to a level within one foot of the bases of the columns; and that access to the temple was gained by a raised pathway of slabs, supported on solid blocks at short intervals, which connected the gateway flight of steps with that leading immediately up to the temple. The same kind of pathway must have stretched also right across the quadrangle, from one side doorway to the other. Similar pathways still exist in the Shálimár gardens, as passages across the different reservoirs and canals. On the outside of the quadrangle and close to the northern side of the gateway there is a drain, by which, of course, the surplus rain and snow water found its exit; thus keeping the surface of the water always at the same level. The temples at Pándrethán, Ledari, and in the Baráhmula Pass, are still standing in the midst of water. I have, therefore, but little doubt that the interior of the quadrangle of Márttand was once filled with water. A constant supply of fresh water was kept up by a canal or water-course from the river Lambadari or Lidar, which was conducted along the side of the mountain for the service of the neighbouring village of Sinharotsika: of which the only remains now visible, are fragments of bricks and pottery that lie scattered over the fields for about half a mile. The object of erecting the temples in the midst of water, must have been to place them more immediately under the protection of the Nágas or human-bodied and snake-tailed gods, who were zealously worshipped for ages throughout Kashmír.

32.—In conclusion I cannot do better than quote the last words of the intelligent Moorcroft† regarding Márttand. “In its present condi-

\* Kashmír, v. 1—p. 395.

† Travels, v. 2—p. 256.

tion," says he, "the palace of the Pandus is a precious specimen of ancient art, and deserves a foremost place amongst the remains of Hindu antiquity."

#### VI.—*Temple at Pámpur.*

1.—At Pámpur on the right bank of the Behat, six miles to the S. E. of the capital, and midway between it and Avantipura, are the remains of a Hindu temple, of which the basement and a few feet of the superstructure are still standing. To the westward at 100 feet is a beautiful fluted column, quite perfect, and a portion of a second fluted pillar of large dimensions, with a square-headed doorway behind them, which now forms the entrance to a Mahomedan tomb. An elevation and section of the perfect pillar is given in Plate VI.

2.—The temple was a square of 22 feet, with four porches, somewhat advanced beyond the main walls of the building. Its height, following the Kashmírian proportion, must have been about 44 feet. It was no doubt also surrounded by a colonnade of fluted pillars, with the intervening recesses, of which the smaller column and doorway mentioned above are perfect specimens. The existence of a larger column likewise shows that there were porches in the middle of each of the long sides of the quadrangle. But more than this cannot now be determined, excepting, perhaps, the name and date of the erection of the temple, which are recorded in the following verse of the Raja Tarangini. B. 4—v. 694.

पद्मस्य पद्मस्वाम्यास्ते कृतिः पद्मपुरं तथा ॥

"Padma (the maternal uncle of Vrihaspati) built *Padmapura*, and a *Padmaswami*."

Now as I could not discover any other ruins excepting those above described, it may be presumed, that they are the remains of the temple of *Padmaswami*, which was built during the reign of Vrihaspati, between A. D. 804 and 816. The modern name of *Pámpur* is the Kashmírian corruption of the Sanskrit *Padmapura* पद्मपुर —, which means "Padma's town," and has not even the most distant allusion either to the lotus, or to the beauty of its women—as suggested by Vigne.\*

\* Kashmír, v. 2—p. 31

VII.—*Temples at Avantipura.*

1.—The ruins of Avantipura are situated on the right bank of the Behat, about 18 miles to the S. E. of the capital, and midway between it and the temple of Márttand. Avantipura was built by Avanti Varmma, between A. D. 852, and 883, and the opposite Karewah (or elevated table-land) of Nonagar, or “new-town,” was so called from this recently established city, Vigne\* erroneously states that “Nonagar signifies a place where there are nine lacs of inhabitants,” which he calls an exaggeration of the former population of the Karewah. Nonagar *might* mean the “nine towns,” but it *really* signifies only the “new-town” as I have stated above.

2.—The ruins consist of four different temples, of which the two that are the nearest to the capital, one on each side of the road, are completely overturned. They are besides so entirely covered by heaps of stone and rubbish, that I found it impossible to trace their former extent. The other two temples have also been overturned, but their foundations, and the outlines of their surrounding colonnades are still existing. The larger one of the two is situated immediately upon the high road, and to the N. W. of the small village now called Wantipur. The smaller temple stands at half a mile to the S. E. of the other and close to the village.

3.—In the Raja Tarangini I find only the record of the erection of two temples at Avantipura itself. There are, however, several other temples mentioned, but without any specific localities. The Bráhmans assign the two smaller temples, which are completely ruined, to Sura Varmma, the King’s half brother; but the Raja Tarangini merely states that this Prince erected a *Swámi* and a *Gókula*, or temples to Siva and to Krishna. The larger temples they assign to Avanti Varmma, and I think that there can be but little doubt of the correctness of this attribution. For besides the probability, that the larger temples would have been built by the King himself, their names of *Avantiswámi* and *Avanteswara* declare their dedication to Siva. Now this was undoubtedly the case with one of the two existing temples, in which by an excavation that I made in the corner of its surrounding quadrangle, I discovered the pedestal of a *lingam* or emblem of Mahadeva in the trefoil-headed recess between the pillars.

\* Kashmír, v. 2—p. 39.

4.—The erection of the two temples by Avanti Varmma is assigned to different periods, in the following verse of the Raja Tarangini. B. 5, v. 45.

अवन्निखानिनं तत्र प्रायाज्याधिगमात् कृती ।  
विधाय प्राप्नसाम्राज्यसक्रे ऽवन्तोश्चरं तदा ।

“This wise one erected *Avantiswami* before he became King, and *Avanteswara* after he had attained sovereignty.”

5.—Now as there is a very considerable difference in the size of the temples, as well as in the extent of the surrounding quadrangles, it appears to me that the respective periods of their foundation may be safely inferred by assuming, that the smaller temple was built by Avanti Varmma, before his advancement to the throne, and the larger one after his accession, when his increased means enabled him to erect a more costly edifice. For the sake of distinguishing the one from the other, I have taken this assumption as correct, and have named the two temples accordingly; the smaller one as *Avantiswami*, and the larger one as *Avanteswara*, under which names I will now describe them.

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#### *Temple of Avantiswami.*

1.—As Avanti Varmma ascended the throne in A. D. 854, the erection of this temple may be placed a few years earlier or in about A. D. 850. The ground-plan is a square of 34 feet, with pilasters at the corners, 5 feet in thickness. The porches are 21 feet wide with a projection  $1\frac{1}{2}$  feet in advance of the pilasters. The superstructure of this temple has been entirely overturned; and although amongst the confused heap of stones, there are many which still preserve portions of the different mouldings and decorations almost in their original freshness, yet I feel that it would be presumptuous to attempt even the simplest kind of restoration. From the stones which still exist I can say positively, that the temple had a porch on each side, with a trefoil-headed arch covered by a pediment; similar in general appearance to the *Márttand* example, but differing somewhat in details. For instance the imposts of the smaller pediments, within the trefoils, were surmounted by human-headed birds, and the horizontal lines of mouldings of the larger pediments were surmounted by colossal human heads similar to those represented on the *Pravareswara* Pillar in Plate VII.



GATEWAY AND RUINED TEMPLE OF AVANTISWAMI AT AVANTIPUR, KASHMIR.  
A.D. 852 - 854



In the interior niches too the figures were not carved out of the projecting mass of wall, as at Márttand, but were detached images placed in the recesses prepared for them. If the height of this temple bore the same proportion to its breadth, which was followed in other examples, as at Páyach and Pándrethán, and as in the small temple which crowns the Sri Nagar column, it must have stood about 68 feet above the plain.

2.—The size of the surrounding quadrangle can be distinctly traced on the south by some broken pillars which are still standing, and on the North and East by the line of *superstructure* resting upon the columns; and not as stated by Vigne,\* by the line “of stone work that formed the *base* of the colonnade.” Vigne’s mistake was a very natural one: for the whole of the interior of the quadrangle has at some time been silted up as high as the top of the entablature of the peristyle. When I first saw this ruin I felt certain that such was the fact, by observing that the line of stone work on the North was much higher than the tops of the broken pillars to the South. I therefore made an excavation, 20 feet in length, in the North-eastern corner of the quadrangle, which fully proved the correctness of my anticipations. And further, that the silting must have taken place before the reign of Sikandar Butshikan, in A. D. 1396-1416, as the human-headed birds are not in the least injured, every feature being as perfect as when they were first carved. This excavation also showed that the filling up of the quadrangle must have been gradual at first, for the floors of the trefoiled recesses of the peristyle were built up with stone flush with the upper portions of the bases of the columns; an unsightly work, which I can only suppose to have been rendered necessary by an unforeseen influx of water and its attendant silt.

3.—The final and complete silting up of the quadrangle, whether by the gradual process of years, or by some sudden catastrophe, had fortunately been the means of preserving the greater part of this peristyle from the defacing fingers of time, as well as from the destroying hand of Mahomedan bigotry; perhaps at some future day to be unveiled by European archaeologists in all its virgin beauty.

4.—In the inside the quadrangle is 172 feet in length by  $146\frac{1}{2}$  feet in breadth, the longest sides being to the North and South. In the

\* Kashmír, v. 2—p. 25.

middle of the West face stands the gateway, which is somewhat similar in plan to that of Márttand, excepting that the outer porch is only one half as long as the inner one. It is besides not more than 22 feet wide, or two-thirds of the breadth of the building, a proportion much smaller than any of those used in southern India, as detailed by Rám Ráz. To the right and left of the gateway there were the same pillars as at Márttand; but these had 24 fluted sides instead of 20. One of these pillars is still standing, as shown in the view, Plate XIX., but when Moorcroft visited Wantipur in A. D. 1823, there was a pillar on *each* side of the gateway, for he particularly remarks\* that “two masses are each side of the entrance, and *each supported by a single pillar*, were of an extraordinary size.” The large fallen stone to the right of the gateway measures  $10 \times 5 \times 2\frac{1}{2}$  feet, and is probably one of those noticed by Moorcroft. The roof I suppose to have been pyramidal, with projecting pediments similar to that of Márttand.

5.—In the middle of each of the long sides of the quadrangle there was a porch supported as at Márttand, upon a pair of large fluted pillars, of which those on the south are still visible above the ground; and I presume that there were similar buildings at the four corners, as suggested in the description of Márttand. The peristyle itself consisted of 10 square pillars, disposed in the corners, and on each flank of the side porticos, and of 60 round fluted pillars, which together with the 4 large porch pillars, made a total of 74 pillars in the colonnade. An elevation of the north-eastern corner of this peristyle is given in Plate XVIII. This is the portion that I excavated, and which, with the exception of the upper row of stones, is just as perfect and fresh-looking as when it was first executed. The general style is similar to that of Márttand, excepting that the bases of the column are almost plain, and that the capitals are without ornament, whilst on the contrary the pedimental pilasters of the intervening recesses are highly ornamented. The shafts of the pillars are much more graceful, being somewhat higher in proportion to their breadth: but the beauty thus gained is more than counterbalanced by the large plain bases. Behind each pillar there is a pilaster of the same height, with mouldings exactly similar to those of the square pillar represented on the right hand in Plate XVIII.

6.—The trefoiled-heads of the intervening recesses are joined to the

\* Travels, v. 2—p. 244.



ELEVATION OF THE PERISTYLE

OF THE TEMPLE OF AVANTISWAMI,

AT AVANTIPUR, KASHMIR.

*Scale 1/2 inch = 1 foot*





side mouldings of the opening by short horizontal returns, whereas at Márttand they spring at once from the sides of the doorway. The ornaments of the two pairs of pilasters which I excavated differ from each other; and it is possible that different ornaments were used for every pair: but I think it more probable that only these two styles of ornaments were used for the alternate pairs of pilasters throughout the whole extent of the quadrangle. The trefoiled-heads are shorter, although the doorways are five inches higher than those of Márttand; but this difference was imposed by the more obtuse angle of the pediment, which heightened its supporting pilasters, and consequently reduced the space of the tympanum. The only other difference that need be noticed is, that the capitals of the pilasters are highly ornamented, while the bases are quite plain: a contrast which I have already observed in the treatment of the pillars.

7.—In the right-hand recess of Plate XVIII. I discovered the pedestal of a *lingam*, from which I infer that the whole of these recesses must once have been occupied by emblems of Mahadeva.

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*Temple of Avanteswara.*

1.—The raised foundations of this temple, which still exist in a very perfect state, form a square of  $82\frac{1}{2}$  feet. The whole of the superstructure has been overturned and the foundation is now covered by a confused heap of stones, which from its convenient situation on the immediate bank of the river, has no doubt formed a mine of materials for all the principal buildings that have been erected in the capital for several centuries. Thus the foundations and walls of the Juma Masjid, as well as of all the buildings, reservoirs and canals, in the Shálimár garden, are constructed of the squared stones brought from Hindu temples; of which many still retain the Hindu mason's marks, as well as the remains of ornamental sculpture. As a proof of the extent to which this temple has been pillaged, I may mention that not a single pillar of the ninety-one which once formed the colonnade of this noble pile now remains.

2.—This lofty temple was built by Avanti Varmma after his accession to the throne, between the years 854 and 888 A. D., and the edifice must have been worthy of the king. For if its height followed the same proportion of two breadths which is used in all the other temples, it

must have been the loftiest edifice, not only in Kashmír, but in India. The width is  $82\frac{1}{2}$  feet: its height therefore would have been about 165 feet, or perhaps a few feet less, being considerably more than twice that of Márttand.

3.—On each side of the temple there was a flight of steps with a front of  $28\frac{1}{2}$  feet, supported by flank walls  $17\frac{1}{2}$  feet in length. These walls still remain, and I believe that the steps yet exist uninjured, beneath what Moorcroft\* justly calls a “confused mass of ruins.” According to him the edifice must have been “a square temple with four doors approached by broad and spacious porches.” This description corresponds exactly with that which I have already given as the most probable style of superstructure of the other temple, which is the same as that of the temples at Pathan.

4.—Of the surrounding quadrangle nothing but the foundations can now be traced, excepting to the westward, where parts of the gateway walls, and of the sides of the recesses are still standing. The gateway itself was similar in plan to that of Márttand, and much about the same size; but its width did not bear the same proportion to that of the temple. In the Márttand example the width of the gateway was made equal to that of the temple itself, or rather to that of the *arddha-mandapa*, or outer-chamber, whereas in both of the Avantipura examples the width of the gateway bears a very different proportion. In the smaller temple it is made two-thirds of the width, or exactly equal to that of the projecting porches; whilst in the larger one it is only one-third of the width, or just equal to the front breadth of the flight of steps leading up to the entrance of the temple.

5.—In Plate XVII. I have restored the plan of the quadrangle of this temple, from the few stories which still remain in their original positions, guided by the plans of the Márttand and Avantiswámi examples. The foundations of many of the pillars still remain; and as the existing stones prove that there were both pilasters and recesses, the ground-plan of this peristyle must have been almost the same as that of the others. This plan shows a quadrangle 216 feet long and 190 feet broad, containing 86 recesses, from which two must be deducted for the side doors, leaving the favorite number of 84 for the reception of as many LINGA or emblems of Siva. For this number, although dedi-

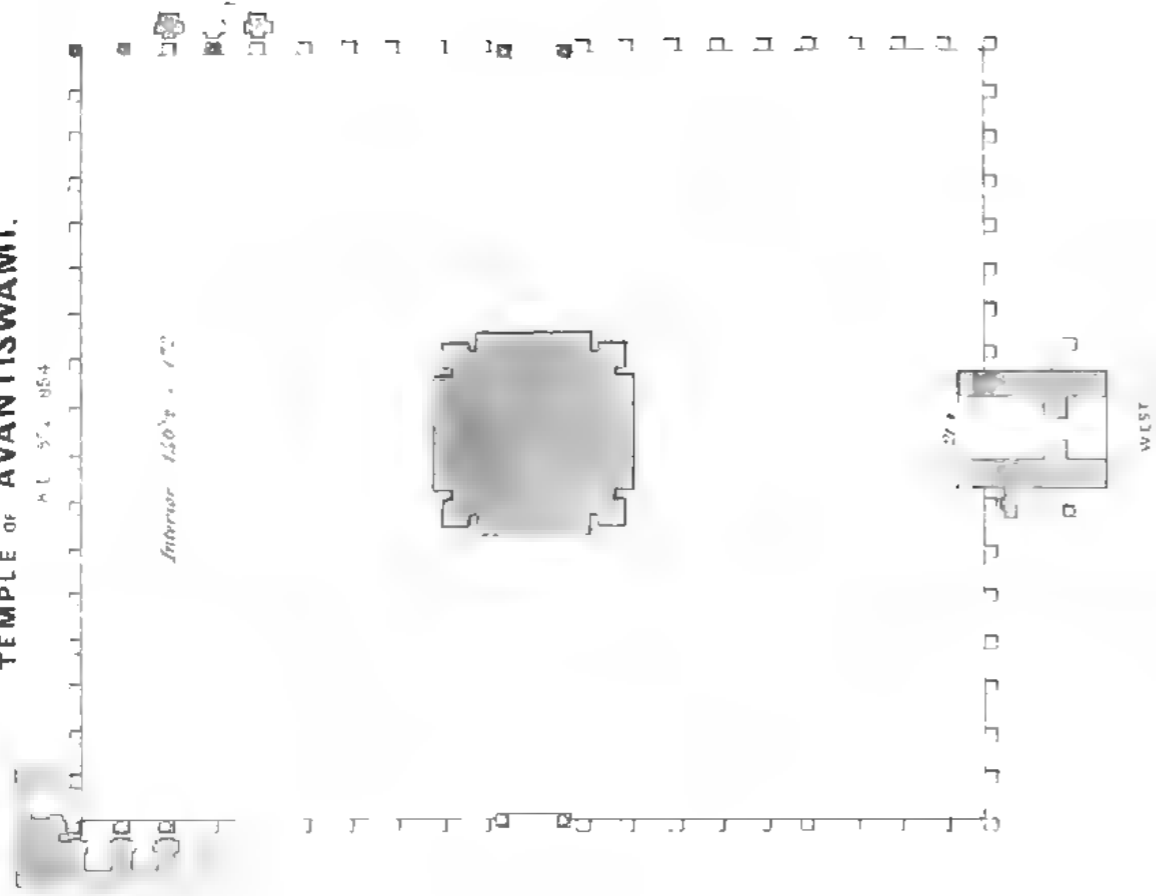
\* Travels, v. 2—p. 243.

AT AVANTIPUR, KASHMIR

TEMPLE OF AVANTISWAMI.

A.D. 57. 854

Interior 150' x 170'

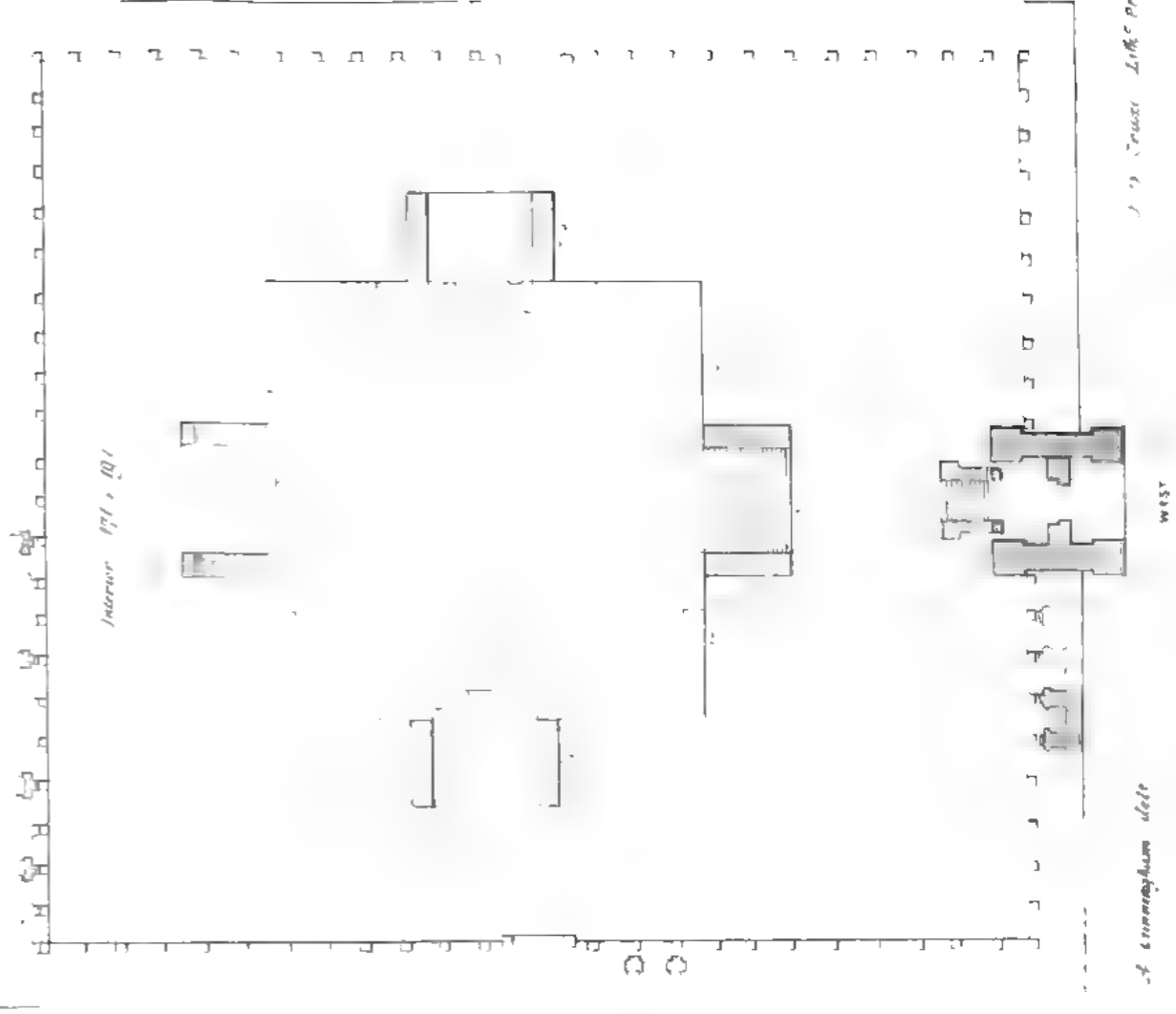


Scale of Feet - 1 Inch = 100

TEMPLE OF AVANTESWARA.

A.D. 654. 883

Interior 171 x 101



A. Cunningham del.

J. J. Traver Litho Press London



cated to the Sun, was also much used by the votaries of Mahádeva, as well as by others, on account of its auspiciousness. Thus there are 84 temples to Mahádeva both at Ujain and at Barmáwar in Chamba; and at Depálpur in the Panjab, there are said to be 84 towers and 84 wells.

6.—I presume that there were elevated pyramidal roofed porches at the angles and in the middle of each of the long sides of the quadrangle, as at Márttand, and at the other Avantipura temple; and that the walls of the peristyle were similarly covered by a roof of triangular section.

7.—Forster calls this place *Bhyteepoor*, a name which has puzzled Vigne exceedingly; although it has evidently originated only in a slip of memory, which could not restore the true name, from the inherent imperfection of the Persian alphabet, in which character Forster was obliged to keep his Journal. I suppose that he must have written *Bhantipur*, in Persian characters, بهنتپور, which, when he came to reduce his remarks into English, he might easily have read as *Bhytipur*. At any rate there is no doubt regarding the identity of this place, both on account of his recorded distances, and of his description of the temple, which he\* calls “a shapeless pile of ruins.”

#### VIII.—Temples at Pathan.

1.—The temples of Pathan are situated on the high road leading to the Baráhmúla Pass, at 16 miles to the W. N. W. of the capital. Their erection is attributed by the Bráhmans to Sankara Varmma, who reigned over Kashmír between the years 883 and 901. The Raja Tarangini, however, simply records the erection of two temples by this Prince, in the town of Sankarapura, which he had himself founded. The identification of this town, with the present Pathan, is asserted by all the Bráhmans, who write the name पथन्, *Pathan*, which means “a road,” and not पत्तन, “a town.” The new city may, perhaps, have been so named, because it was in the midst of the high road, leading from the capital out of the valley to the westward. The foundation of these temples is recorded in the following verse of the Raja Tarangini, B. 5. v. 157 :—

तथा समं पुरवरे सुरराजोपमो नृपः ।  
तस्मिन् शङ्करगौरीशसुगन्धेशो विनिर्ममे ॥

\* Travels, 8vo. vol. 2—p. 9.

“This Prince, equal to the king of gods (Indra), in conjunction with her (his wife Sugandhá) erected in that excellent town (Sankarapura) temples to *Sankara gauresa* and to *Sugandesá*.”

The two temples are rather less than half a mile apart, the smaller one being situated to the S. E. of the larger, as is likewise the case with the two temples at Avantipura. As there is no other clue for our guidance than difference of size and decoration, I have supposed that the larger temple, which is highly decorated, was built by the king in his own name, and that the smaller one, which is plain, was erected in the queen's name, and I have thus distinguished them in Plate XX.

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#### *Temple of Sugandheswara.*

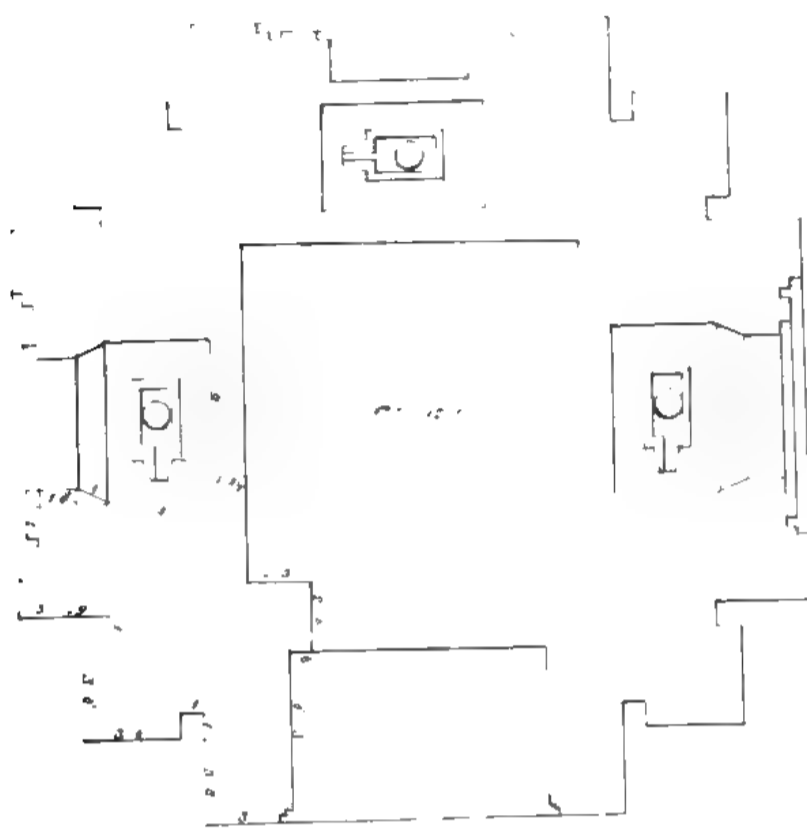
1.—The ground-plan of this temple is similar to that of Avantiswámi. The porticos, however, have a much greater projection, and their recesses are formed into separate chambers, 6 feet by 4 feet, which most probably once contained *linga*: for I found the pedestals of three of those emblems, which had been converted into Mahomedan tombs, within fifty paces of the temple itself. These porches were all surmounted by pediments of high pitch, covering trefoiled arches, which rested upon independent pilasters, as in the Márttand temple. The roof was, no doubt, pyramidal, and the total height of the building, estimated at twice its breadth, must have been 48 feet. The inner chamber is a square of 12 feet 7 inches, and is quite plain.

2.—I am unable to say whether this temple was surrounded by a pillared quadrangle or not; as I could not find a single trace of a column on any side. To the eastward, however, in front of the entrance porch of the temple, and at 68 feet distance, there is part of a large door-way or gate-way, and of a wall of squared stones. To the northward and westward also, at 50 feet from the temple, there are shallow trenches partially filled with stones. These I believe to indicate the lines of the surrounding quadrangle, which must have been completely carried away down to the very bottom of its foundation, as there is nothing now remaining but a trench to mark where it once stood. It is curious that the fate of these Pathan temples should have been exactly the reverse of that of the Avantipura temples. The latter were entirely overthrown, while their surrounding walls have escaped; in the one almost entirely, in the other partially. The former temples, on the



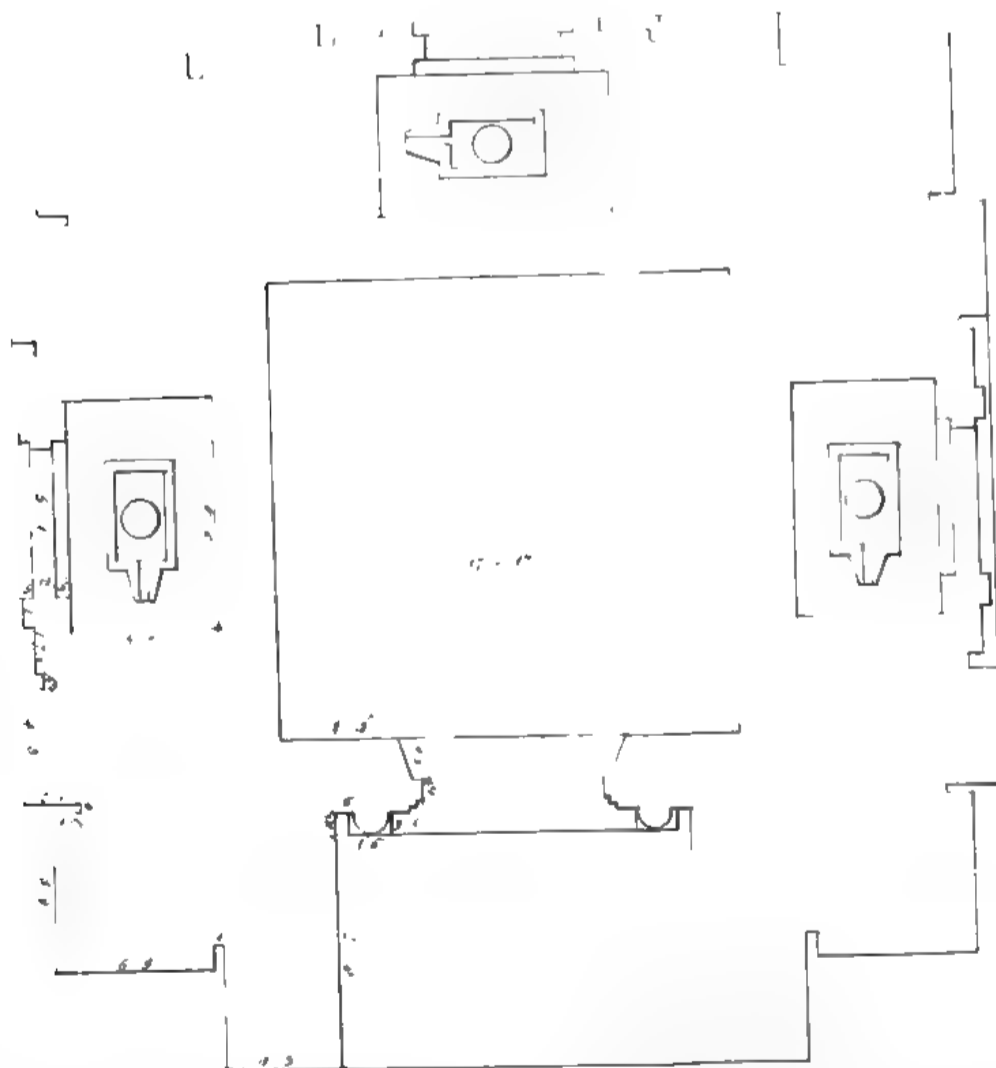
PLANS OF TEMPLES  
AT PATHAN, KASHMIR

TEMPLE OF SUGANDHESWARA  
A D 883-901



EAST

TEMPLE OF SANKARAGAURESWARA.  
A D 883-901.

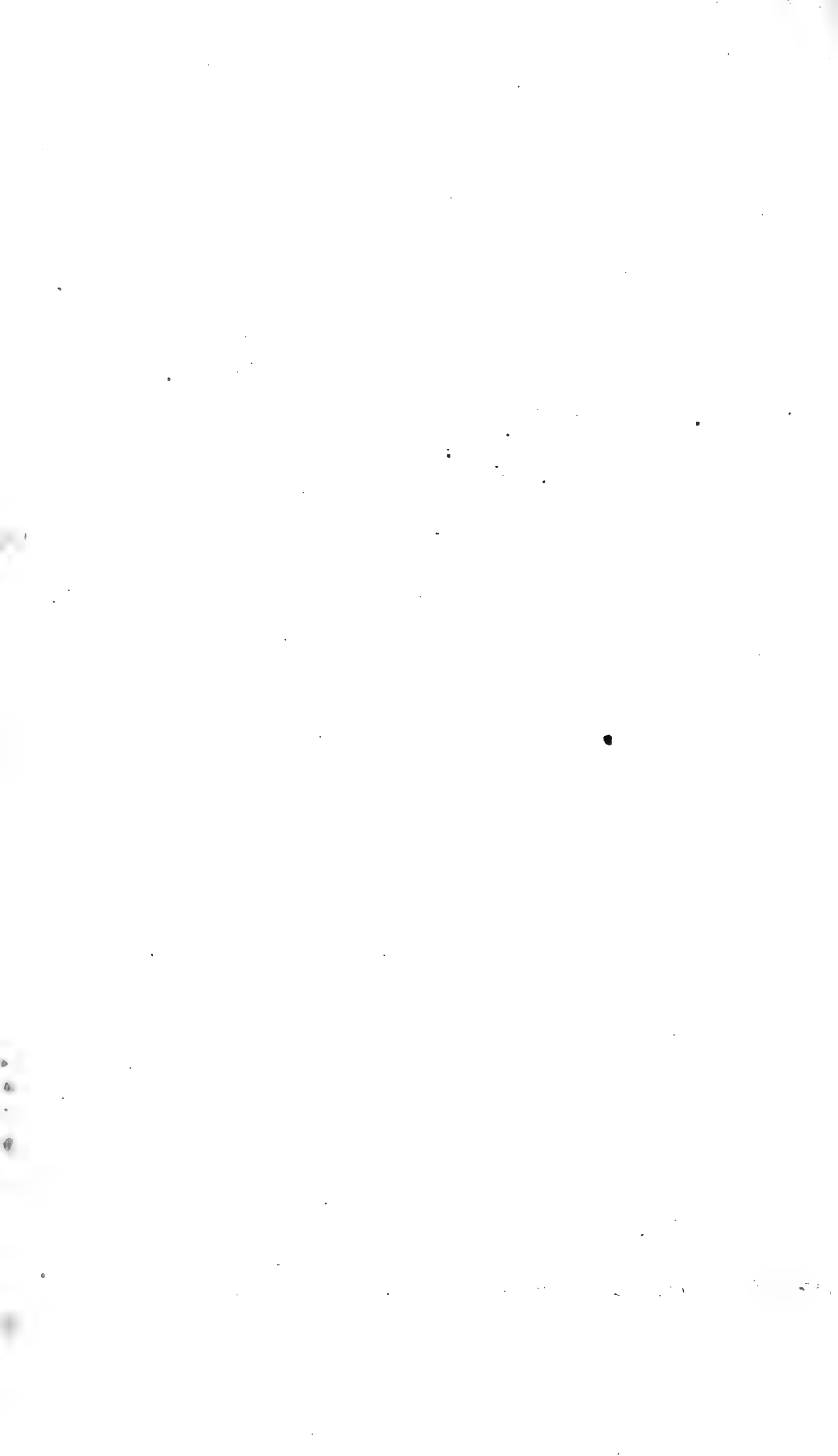


EAST

Scale  $\frac{1}{4}$ " = 1 Foot.



A Cunningham del.





Scale 1/4 inch = 1 Foot  
 Vertical Footing  
 Feet

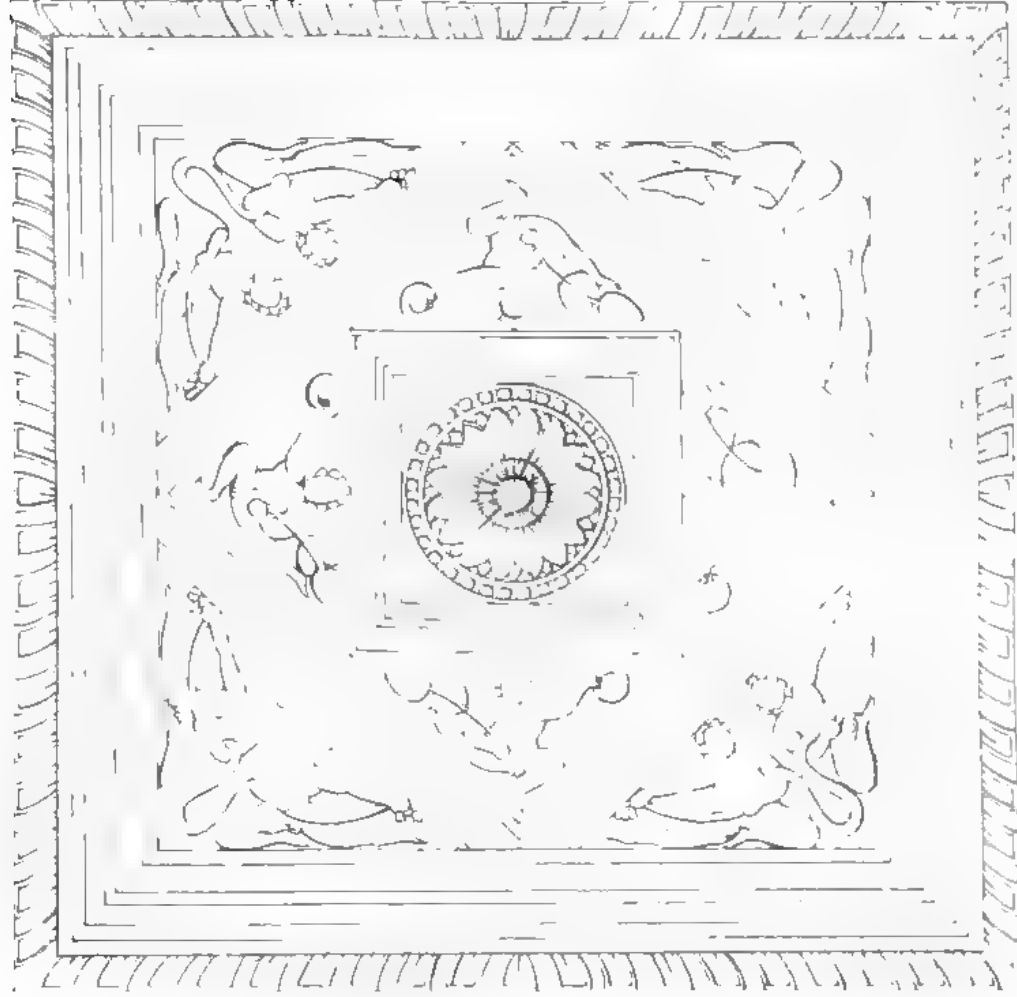
117 - 117



1/16  
NORTH

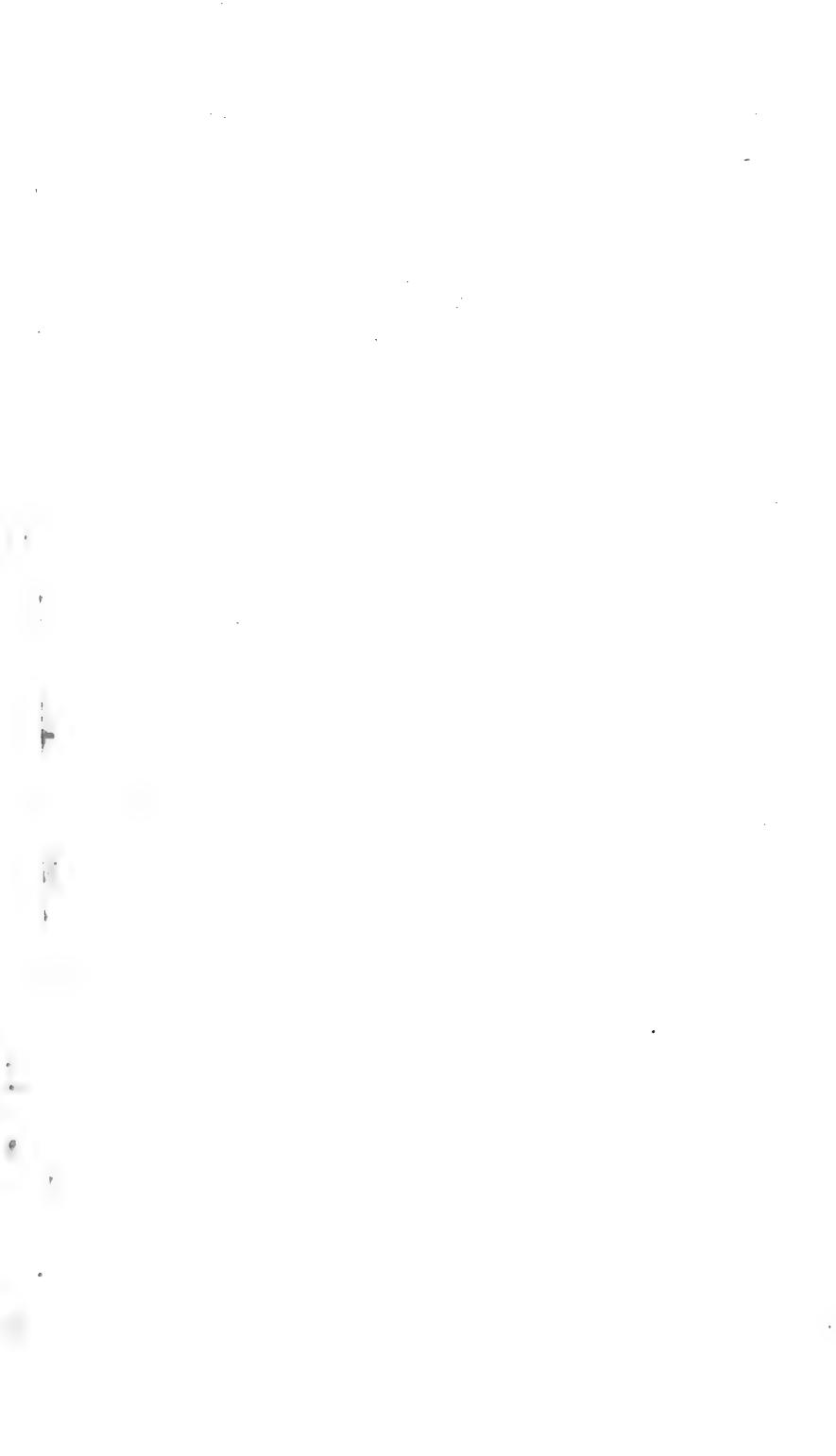
TEMPLE OF MERUVARDHANASWAMI AT PANDRETHAN KASHMIR

A D 913 - 921



Scale 1/4 inch = 1 Foot  
 Vertical Footing  
 Feet

Plan of Roof



contrary, have been saved, while scarcely a trace now remains of their surrounding walls.

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*Temple of Sankara-gaureswara.*

This temple is similar in plan, and in internal arrangement to the former; but the porticos, like those of Avantiswámi, have only one foot of projection beyond the walls of the building. The entrance is to the eastward; and leads to an inner chamber, 17 feet square, which is quite plain, as in the Márttand example, and as in other Kashmírian temples. The side walls of the entrance are, however, decorated by very elegant niches containing statues after the fashion of the Márttand entrance. Each of the side porches opens into a chambered recess,  $8\frac{1}{2}$  feet long by 5 feet broad. These are now empty, but no doubt they once held *linga*. The porticos are of the same style as those of Márttand, with pediments of high pitch covering trefoiled arches.

2.—The walls are still standing, although much injured. It will be sufficient, however, to state, that this temple is very like Márttand, both in its style and in its present state of preservation. In size also it is much like the back view of Márttand, but somewhat smaller. The ground-plan is a square of  $33\frac{1}{2}$  feet, which, if the usual proportion was observed, would give a height of 67 feet for the top of the pyramidal roof above the ground.

3.—I could not discover any traces of a surrounding wall, although I have no doubt that one formerly existed, as my examination of the precincts of the temple was cut short by a heavy and continued fall of snow, which obliged me to leave the place.

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IX.—*Temple at Pándrethán.*

1.—The Pándrethán temple is situated  $1\frac{1}{2}$  mile to the S. E. of the Takht-i-Sulimán. The name is a corruption of *Puránadhsthána*, and means simply “the old capital,” which, we know, was situated on this side of the Takht. For the Chinese Pilgrim, Hwán Thsáng, particularly notices, that the old town stood at 10 *li* (or  $1\frac{2}{3}$  mile) to the S. E. of the new town. Now the present city of Srinagar was built by Pravarasena, who reigned from A. D. 432 to 464: it was, therefore, a new town at the period of Hwán Thsáng’s visit, between the years 629-642 A. D. There are but few ruins now existing on the site of the old town, but

carved stones and architectural fragments are numerous; the lines of old walls can be traced in the grass, and the fields are covered with broken pottery. These remains extend for nearly three miles, from the foot of the Takht-i-Sulimán to Pánthasok, at which place two piers of an old bridge are still existing, one just above the surface of the water, and the other just below it, the position of the latter being marked by the stillness of the water over it. The people assert that these piers are the remains of a stone bridge, which once spanned the Behat at this place. The colossal *linga* and other remains about Pándrethán induced Vigne\* to imagine, that they might have formed “part of a city and vast Hindu temple.” The existence of an ancient city on this spot may, therefore, be considered as fully established on the joint testimony of Vigne and myself: and that this ancient city was the old capital, is established beyond all doubt, both by the record of the Chinese pilgrim, and by its present name of Pándrethán, or “ancient chief town.”

2.—The temple of Pándrethán, from its vicinity to the capital, has attracted the notice of most European travellers, who have spelt the name in as many different ways. Moorcroft calls it Pándenthán; Vigne, Pandrenton; and Hugel, Pandritan. The last is the same as the Kashmírian Tákri, in which it is written पंड्रेथान Pándretán, but as it is spelt पांड्रेथान Pándrethán in modern Nágari, and as the final syllable is a contraction of the Sanskrit, स्थान *sthán*, I have preserved the aspirate.

3.—The erection of this temple is attributed to Meru-Varddhana, the minister of Partha, both by tradition and by the Raja Tarangini in the following verse: B. 5—v. 266.

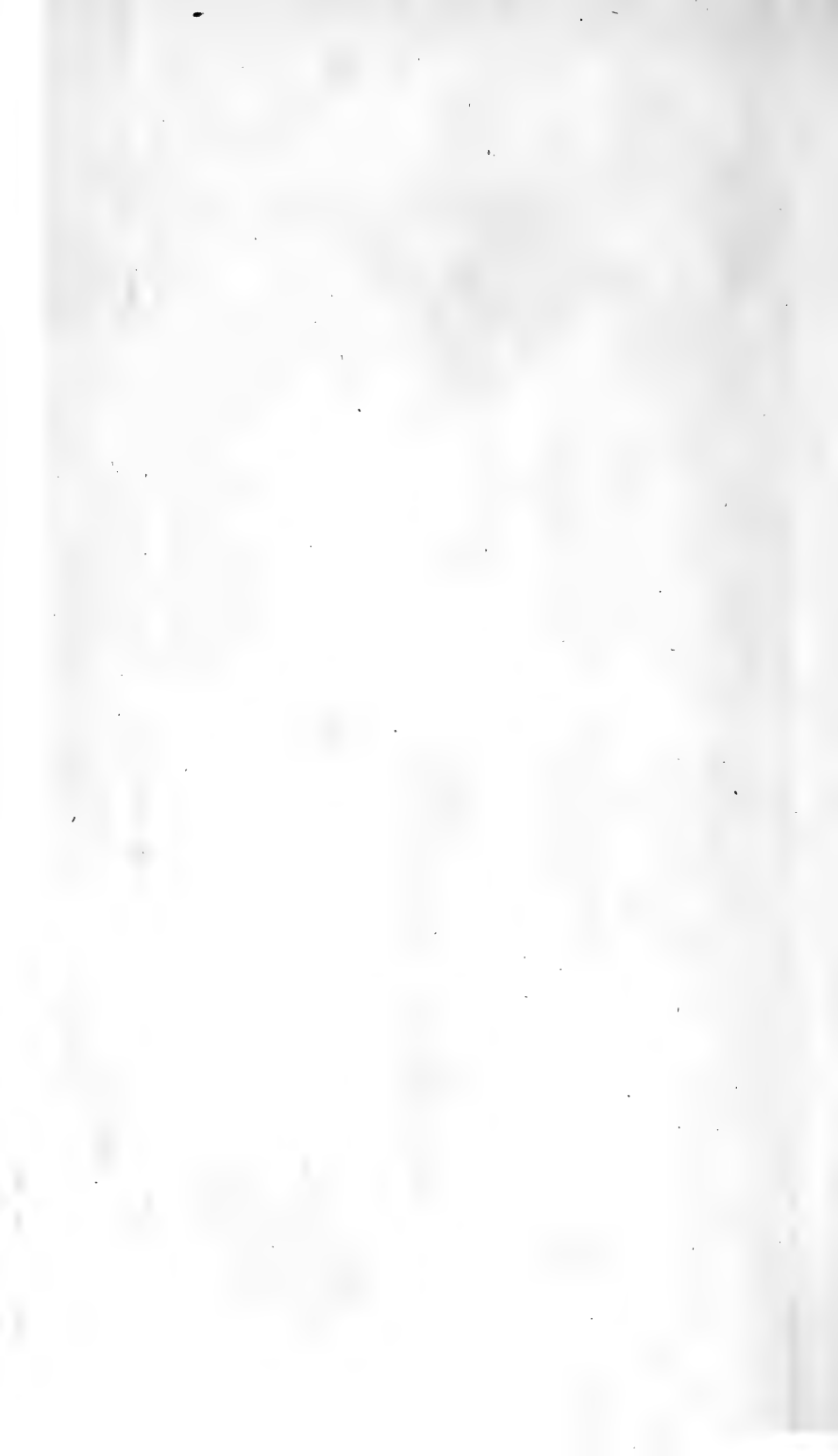
विष्णुः पुराणाधिष्ठाने मेरुवर्धनमन्त्रिणा ।  
श्रीमेरुवर्धनस्वामिनामा येन व्यधोयत ॥

“The minister Meru erected in the ancient capital, [Puránadhístána, or Pándrethán,] a temple called ‘Sri-Meru-Varddhana-swami.’” The building of the temple is recorded between the years 89 and 97 of the Kashmírian era, equivalent to A. D. 913-921; and it is afterwards mentioned, between the years 958 and 972, as having escaped destruction, when Abhimanyu, Nero-like, set fire to his own capital, on which occasion the Raja Tarangini relates in B. 6—v. 191.

वर्धनस्वामिपाञ्चस्यभिच्छुकीपारकावधिः ।  
वेतालसुत्रपातस्थान् स ददाह महागृहान् ॥

\* Kashmír, vol. 2—p. 36.







“This fire consumed the noble edifices planned by Vetála (an aërial spirit, or Ariel) from the temple of *Varddhana-swami* as far as *Bhikshu-kipáraka*, the “asylum of mendicants”—a Buddhist building.

Now, as this is the only temple situated in the old capital, of which I can find any record, there can be very little, if any, doubt, that it is the very same building which now exists. For, as it is surrounded by water, it was of course quite safe amid the fire, which reduced the other limestone buildings to mere masses of quick lime. Perhaps the same cause has also preserved it down to the present day: otherwise it could scarcely have escaped the hands of the Mahomedan spoiler. Its dangerous vicinity to the capital was more than counterbalanced by its inaccessibility. I have, however, a suspicion, that it must have been converted into a Mahomedan tomb; for both the interior and exterior figures and ornaments have once been plastered over; a practice which the Mahomedans often followed, as the cheapest and readiest way of adapting the sculptured Hindu buildings to their own purpose. This was done in the Hindu cloisters around the Kutt Minar at Delhi, and in all the Hindu temples in the fort of Gwalior.

4.—Baron Hugel calls the Pándrethán edifice a “Buddhist temple,” and states that there are some well preserved Buddhist figures in the interior. But he is doubly mistaken; for the temple was dedicated to Vishnu, and the figures in the inside of it have no connexion whatever with Buddhism. Trebeck swam into the interior and could discover no figures of any kind: but as the whole of the ceiling was formerly hidden by a coating of plaster, his statement was at that time perfectly correct. The existence of the figures was first discovered in 1846 by Lord Elphinstone, who informed me of the circumstance: and before I visited the temple, I took the precaution of sending some men to remove the plaster, as well as a small boat for the purpose of gaining access to the inside of the temple, by which means I was able to ascertain the true character of the interior decorations.

5.—Hugel\* further states, that the piece of water is 600 feet in diameter, and that the Natives believe it to be “unfathomable.” But he is again doubly incorrect, for the tank is a square of not more than 125 feet wide; and it could not have been larger in his time, as it is surrounded by trees; by *chénars* on the city side, and by willows on the

\* English transl. p. 124.

other three sides. And so far is it from being considered unfathomable *by the Natives*, that when I directed the Mahárájá's head-boatman to send a small boat to the temple, he declared it would be of no use, as the pond was "dry" (*khushk*)! Its actual depth in November was  $3\frac{1}{2}$  feet, 2 feet only being water, and the remainder foetid mud. Vigne says that it was 4 feet deep; and as Trebeck swam to it, it is certain that it is sometimes even deeper: but at no time can it exceed 5 or 6 feet in depth, as the banks are very low, and are besides cut through for the purpose of drawing off the water for irrigation.

6.—The Baron's estimate of the size of the temple is very nearly correct. He calls it a square of not more than 25 feet, the real size being 22 feet. But the actual size of the square is only 18 feet, as the four porticos project two feet on each side. In the niche over the northern door there still exists a squatted male figure with the Bráhmical cord over the shoulder: but the figures which once adorned the other niches have long since disappeared. These doorways have square tops covered by pediments, which rest upon the jambs of the door, the tympanum being occupied by a trefoiled niche that contains the figure. This again is covered by another pediment, which also has a trefoiled tympanum. The trefoiled arch rests as usual upon small pilasters on each side of the door, but the pediment is supported upon bold square pillars, which are attached to the building by short walls of less breadth. This is an innovation, which most decidedly betokens a later date, a fact already established from history: but it is also a great improvement upon the earlier style; as the boldness of the projection and the retirement of the connecting walls afford a great and pleasing variety of light and shade, which is altogether wanting in the same parts of the more ancient buildings. See Plates XXI. and XXII.

7.—The roof of the temple which is still nearly perfect, was a pyramid resting upon a line of horizontal denticulated moulding, and divided into two portions, by an ornamental band of the same moulding, on a level with the summits of the four porch pediments. See Plate XXII. The blankness of the upper portion is relieved by a trefoil-headed niche on each side, which is remarkable for its extreme smallness and for its want of a pediment. This is also another innovation, but I think not a happy one, as from the lowness of their position there must have been a high unadorned bald-looking surface, left above each

of them. It is, however, probable, that the upper portion of the pyramid was again subdivided by another band of denticulated moulding, which would have completely relieved its bald appearance. And this seems the more likely to have been the case, as the lower portion of the roof is only one third of the height of the pyramid. Each portion would then have possessed its own ornament: the upper one being crowned by the melon-like fruit, common to all the Kashmírian buildings. The total height of the temple, if the usual proportion of two breadths was observed, must have been 36 feet.

8.—The interior is now filled with water; but I presume that the temple was originally only surrounded by it; and that the villagers, taking advantage of its low situation, must have closed the drains, which formerly carried off the surplus water, so as to create a pond for the irrigation of their fields. In November the floor of the temple was fourteen inches below the surface of the water. Now the very existence of a floor proves, in my opinion, that the interior of the temple was formerly dry, and that the water must have been kept below that level by drains. Indeed two of these drains leading towards the river are still in existence. The access to the temple was, probably, arranged in the same manner, as the crossings of the reservoirs in the Shálimár garden; by large blocks of stone, placed at intervals in the water, carrying a roadway of long slabs from the outer edge of the water to the entrance of the temple.

9.—In the interior arrangement, see Plate XXI., it is remarkable that the southern doorway differs from the others; but with what object I am unable to say. The usual, I believe the invariable practice of the Hindu architects, was to place the entrance of a temple either to the eastward or to the westward; so that the enshrined image should daily receive the beams of the sun, either in the morning or in the evening. Such in fact is the arrangement of all the other temples in Kashmír; and I am, therefore, puzzled to say what could have been the object of the present variation. It is true that with four open doorways the interior would have been illumined, both by the rising and by the setting sun: but it appears to me, that the enshrined image must have been placed to the northward, and immediately in front of the doorway on that side; for I found the iron mortices, which received the door pins, still quite perfect. This side must, therefore, have been closed by a door,

which would seem to point to the opposite doorway on the south as the usual entrance. But the reason for such a departure from the common practice still remains unaccounted for.

10.—The ceiling is formed of nine blocks, four of which rest over the angles of the cornice, and reduce the opening to a square, which is just one half of the size of the other. The same process is again repeated with an upper course of four stones, by which the opening is still further narrowed to a square of 4 feet; and lastly, this opening is covered by a single stone decorated with a large expanded lotus, surrounded by a beaded circle. The smaller angles are occupied by naked human figures, something similar to those of the Páyach ceiling, but without wings. These figures besides have only one leg and one arm outstretched, which affords more variety than the other treatment at Páyach. Each of the larger angles is filled with two figures holding out a garland, which falls in a graceful loop between them. The whole rests upon a cornice supported by brackets, which were so much decayed that I found it impossible to trace their decorations or even their exact shape. The spaces between the brackets were also much injured; but they appeared to have been filled with some kind of ornamental drapery hanging in curved folds.

11.—I was unable to discover any remains of a surrounding quadrangle; but from the square form of the piece of water in which the temple is situated, I feel confident that it must once have had a stone enclosed, similar to those of the other temples, although perhaps neither so large nor so highly decorated. The numerous squared stones still lying about prove, in my opinion, that it must once have had an enclosure of some kind. Indeed some portions yet remain of the walls which formerly surrounded the water; but there is no trace whatever either of pillars or of trefoiled recesses.

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#### *Other Temples.*

Before closing my description of the Kashmírian temples, I will quote from Vigne and Hugel some accounts of other buildings, which I was prevented by different circumstances from visiting, although I obtained a fair view of two of them across the Behat through a good telescope.

## X.—Temples at Lidar.

1.—Vigne who is the only person that has seen these ruins, describes them\* as follows: “At Lidar, or Lidarpur, are two old Hindu temples. One resembles the centre building at Márttand, but is much smaller: the other I was informed, was very old indeed; and I have no doubt of the fact, it being built in the centre of a small pond, now, however, overgrown with reeds and rushes. It may have been built by Ledder Khan, one of the earliest Princes of the Pandu line.” In Vigne’s map the name of this place is spelt *Lidu*; and from its position I have no doubt that it is the village of *Ludaho* लुदहो, called also *Dadhumand Gopúl*, in a list of Kashmírian villages, which Mirza Ahad gave me in 1839. I made enquiries regarding this place from several Bráhmans whilst I was in the city; and again at Pándrethán, Pámpur and Wantipur; but the constant reply was, that there were no ruins of any kind at Ludaho. As I was pressed for time, I, therefore, gave up my intention of going to that place, judging that a visit to the ruins, which were not well known to the people, would scarcely repay me for the loss of time, and might probably entail my being caught in the snow. And I was the more ready to forego this visit, as Vigne himself does not include them in the list of temples, which he considered worthy of inspection.

2.—Regarding the period of their erection, therefore, I cannot possibly offer more than a vague approximation: for Vigne’s idea, that one of them must be very old, because it stands in the centre of a small pond, is completely disproved by the fact, that the temple of Pándrethán, which is also surrounded by water, is the most modern of all the authenticated buildings of Kashmír. The dates of their erection must certainly lie between A. D. 400—900, and we might not be far wrong in assigning them to the period of Lalitáditya’s reign, between A. D. 693—729. For his great city of Lalitádityapura, now only a small village, called Latapur, is only 3 miles to the S. E. of Ludaho: and we know that it was the practice of the Kashmírian courtiers to erect temples as well as dwelling houses in the neighbourhood of places founded by their kings.

3.—I have a suspicion, however, that the place is much older than the time of Lalitáditya, for in the *Raja Tarangini*† it is related that Raja

\* Kashmír, vol. 2, p. 35.

† B. 1—v. 8.

Lava bestowed *Levára* of *Ledari* upon a body of Bráhmans. Now this name of *Ledari* must surely be the original of Vigne's *Lidar* and *Lidar-pur*. We may therefore, perhaps consider *Ledari* as a place consecrated to religion, so early as the reign of *Raja Lava*, who was a contemporary of *Darius Hystaspes*. But I do not suppose that either of the temples can be so old: for their style, according to Vigne's description, is similar to that of *Márttand* and of other temples of a much later age, while it has nothing whatever in common with the undoubtedly ancient temple of *Jyeshteswara* on the *Takht-i Suliman*.

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### XI.—Temples at *Kákápur*.

1.—Both *Wilson* and *Troyer* have identified *Kákápur* and *Gaumoha* with the *Khági* and *Khuna-musha* of the *Raja Tarangini*, which are said to have been bestowed upon the Bráhmans by *Raja Khagendra*, who was the grandson of *Lava*, and, therefore, a contemporary of *Artaxerxes Longimanus*. I agree with the former of these identifications: but there is no such place as *Gaumoha*; for the representative of *Khuna-musha* is the modern *Khunamoh* खुनमोह, which is situated at the foot of the hills at 3 miles to the N. N. E. of *Pámpur*.

2.—Vigne\* dismisses the ruins of *Kákápur* in a few words—"At *Kákápur*, a village under the *Karewah*, or elevated plain of *Pámpur*, is an old ruined temple, but scarcely worth visiting after *Márttand*." As the name is spelt *Kákápur* in Vigne's map and is so quoted by *Thornton*, it strikes me that this must have been the name which Vigne noted down whilst in *Kashmír*, and that the new spelling of *Kákápur*, originated afterwards from a desire to derive the name of the place from one of the *Afghan* tribe of *Kákar*.

3.—These ruins are not at present of much interest; but as the larger temple is hidden by rubbish as high as the frieze of the interior, it is possible that an excavation might bring to light as fine an edifice as any now existing, and perhaps a much more perfect one: as the exposed frieze of the southern wall is even now in very fair preservation. A part of the gateway of this temple is still standing to the westward; and as I was afterwards informed, some pillars of its surrounding quadrangle yet exist in a neighbouring *Musalmán* shrine or *astán*. This is the *astánu*

\* *Kashmir*, vol. 2—p. 31.

of Vigne, for the Mahomedans are unable to pronounce any double consonant of which *s* is the first letter. Thus our names of Smith and Sturt become e-Smith and e-Sturt.

4.—Near this upon the bank of a canal there is the basement of a second Hindu temple with a flight of steps leading down towards the water: but I could discover no portions either of its superstructure or of its surrounding walls.

5.—It is admitted above, that the town of *Khági-pura*, or *Khágen-drapura*, now called *Kákápur*, was founded by Raja Khágendra, who lived in the 5th century before Christ. But the temples are, undoubtedly, of a much later date, as we know that the pillared quadrangle could not have been introduced until at least one thousand years after his time. The frieze also appeared to me to bear a very striking resemblance in style to that of Márttand. With these indications, we may not, perhaps, be far wrong in assigning the erection of this temple to about the same period as that of Márttand, or even somewhat later, say about 600, for the pillared quadrangle of Márttand itself, which is the earliest authenticated example, was not erected until A. D. 700

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## XII.—*Temple near Baráhmula.*

1.—“Most of the ruins in the Baráhmula Pass” says Vigne,\* “are well worth visiting. The top of the oldest of these, on the right bank of the river, has been a small but perfect pyramid, is surrounded by water, and has quite preserved its shape.” Hugel† also notices this building in the following terms. “About two miles from Baráhmula, there is a Buddhist temple in ruins in a small tank. I judged it to be most probably [of the same age as‡] that of Pándrethán.”

2.—When I passed along this road the whole country was covered with snow, which must have filled the tank, and have hidden the temple, for I never observed any object that bore the slightest resemblance to a temple, although I was on the look out for it. It is still more curious, that this temple twice escaped the observation of Moorcroft and Trebeck, who twice travelled the road between Baráhmula and Gingal, and in the month of August when there was no snow upon the ground.

\* Kashmir, vol. 1—p. 406.

† English transl. p. 173.

‡ I have supplied the words included between the brackets, as the sense is incomplete without them.

3.—I tried in vain to discover a name for it ; as the ignorant Mahomedans only knew it as the *But-khána* or Idol-house. No name is assigned to it by Hugel ; and Vigne simply calls it *But-dal*, which he translates “Lake of the Idol,” but which really means the “*Tank Idol*.” From Vigne’s description it would appear to be similar in size and style to the temple of Pándrethán ; and this likeness must have struck Hugel, otherwise I know not on what grounds he considered it to be of the same age as that temple. As these authors would seem to agree regarding its striking likeness to the Pándrethán temple, we shall not perhaps err very much by assigning the date of its erection to the ninth or tenth century.

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### XIII.—*Ruins at Jampura.*

1.—These remains are noticed both by Hugel and by Vigne. The former\* says, “Three buildings at Jampura attracted my curiosity. The first in the form of a sepulchral monument, was a circular edifice about 30 feet in height, on which stood a square chamber ; but to what time or faith the monuments belonged I had no means of discovering.” Vigne† says, “Farther on, upon the banks of the river, and close together, are the remains of three other buildings, the first of which appears originally to have been a tomb, the second a temple, and the third a fort.”

2.—As stated by these authors, there are three separate buildings at Jampura, of which only one is described by Hugel, who appears to have considered it of a *sepulchral character*. Vigne also calls it a tomb. I examined it carefully, and I am of opinion, that it is a Mahomedan tomb. The upper portion is a square structure of small stones, with a circular arch-way in the middle of each side. The lower part, which is built of large dressed stones, must have been the foundation of some Hindu edifice : but I rather incline to believe, that the stones were removed from the Hindu temple next described.

3.—The middle building, which Vigne calls a temple ; is undoubtedly the remains of a stone edifice, similar to the temples in Kashmír. It is built of large squared stones, many of which are very massive. On

\* English transl. p. 173.

† Kashmír, vol. 1—p. 178.



the river front the wing walls of the entrance flight of steps still remain, and the greater part of the basement is quite perfect. There is also a considerable portion of the superstructure still standing, about 10 feet in height.

4.—The last building, which Vigne dignifies with the name of a fort, is only a large square room, of which three sides are still standing upon a mound of rubbish. The total height varies from 20 to 25 feet, I presume that it was only a dwelling house, built by the headman of the neighbouring village, out of the ruins of the adjacent Hindu temple.

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#### XIV.—*Temple at Bhaniyár.*

1.—In Kashmírian, Tákri; this name is written कवनीयार, *Bhawá-niyar*, which would seem to prove, that the temple must have been dedicated to the goddess Bhawáni, the wife of Siva. It is situated on the left bank of the Behat, at  $1\frac{3}{4}$  mile beyond the fortlets of Athári, Sankargarh and Noshehra. Hugel\* simply describes it as a “Buddhist temple in good preservation.” Its name, however, completely refutes this opinion of its Buddhistical destination. Vigne† dismisses it quite as briefly, as “an old Hindu ruin by the path side.”—It appeared to me to be the most perfect of all the temples that I had seen; and I should certainly have visited it, had I not been prevented by the continued fall of snow, which had almost closed the road, and had more than half concealed the temple. The gateway and surrounding walls are still standing, but the former, which is of the same style as those in the valley, is without roof. A portion of the temple roof still remains; but the whole work is without ornament, and is altogether much inferior to the great temples of Márttand and Avantipura. Owing to the number and thickness of the trees, which filled the interior, I was unable to discover, even with a good telescope, whether there was a colonnade around the inside of the enclosing wall, or not. The outside of the quadrangle, however, is ornamented by numerous trefoil-headed recesses, similar to those of the Márttand peristyle. Both of these must have escaped the observation of Vigne, as he states,‡ that “there

\* English translation, p. 174.

† Kashmír, vol. 2—p. 176.

‡ Kashmír, vol. 1—p. 394.

is one peculiarity about the older buildings of Kashmír, and that is, that \* \* the wall surrounding the peristyle has, as usual, a colonnade in the interior, but its outside is completely a blank and unornamented."

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XV.—*Temple near Dyámun.*

1.—On the left bank of the Behat, at  $3\frac{1}{2}$  miles to the N. E. of Uri, and at less than half a mile from the village of Dyámun, and on the opposite bank of the river, there is a small Hindu temple in very good preservation. Baron Hugel\* calls it "a Buddhist temple still in good repair, and built in the same style as those of Kashmír. \* \* Its name is Brangutri." Vigne's account† is much more detailed. He says,—“Proceeding thence towards Uri, we pass two more ancient Hindu temples, of the same style of architecture as those of the valley. The colonnade which surrounds one of them, is in a good state of preservation, it is also evident that the top of the building in the centre of the peristyle, and now about ten yards high, was once pyramidal. The remains of a massive flight of steps are still in position before the entrance.” \* \* “All the remaining ruins I have seen, are of limestone; but this which is called Bryn-kutri, differs from them in being built entirely of granite.”

2.—The name which the people gave me was *Brinkar*; but I suspect that the name recorded by Hugel and Vigne is the more correct one; for *Kotari* कोटरी, which means a “naked woman,” is also an appellation of Durgá. It is probable, therefore, that the temple contained a naked image of that goddess. Indeed, the whole name may, possibly, have been *Varna-kotari* वर्णकोटरी, the “painted” or the “golden Durgá.” The enshrined image might have been a *gilt* one.

3.—The period of the erection of this temple, as well as that of Bhawánigarh, cannot be ascertained except within wide limits. For there are no *data* to guide us, save the existence of colonnades, which fixes the time of their construction between the fifth and tenth centuries.

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Having completed the description of all the Kashmírian temples that I have myself seen, or of which I can find any account, I will now

\* English translation, p. 174.

† Kashmír, vol. 2—p. 176.

proceed to an examination and comparison of their different details one with another, and with the rules laid down by the architects of Greece and India. But before noticing the different parts and various details of these buildings, I will first enumerate the Sanskrit names of the principal mouldings which are used in the Kashmírian architecture.

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XVI.—*Kashmírian Mouldings.*

ABACUS, उत्तर, *uttara*, the “uppermost.” This name is used for every superior member, of whatever shape it may be.

ANNULET, पट्टक, *Pattaka*, a “bandlet.” This occurs in all subordinate positions, both above and below the principal mouldings.

APAPHYGE', प्रस्तार, *Prastara*, the “spreader.” This name is given to any overhanging moulding. It occurs in the Márttand and Avantipura capitals, as well as in those of Pámpur and Srinagar. In the latter, however, it is straight.

ASTRAGAL, कुद्रपद्म, *Khsudra-padma*, the “little-lotus,” is used in both of the Márttand pillars, as the lowest member of the capital.

DADO OR FACE, गल, *Gala* or “neck.” It occurs in every base, both of pillar and building.

EPITRACHELIUM, अधिगल, *Adhigala*, or “above-neck” is used as its name implies.

FILLET, पट्ट, *Patta*, “a band.” This moulding is sometimes used independently as in the Páyach basememt, immediately above the quirked ovolo. When it is placed in the middle of the torus, which is its most usual position in these mouldings, it is called अलिङ्गन, *Alingana*, the “embracer,” because it embraces the member to which it is attached.

FILLETED-TORUS, कुमुदपट्टबान्ध, *Kumuda-patta-bándha*, the “lotus-fillet-bound.” This is the upper member of several basements: it is also used in the base of the Márttand and Pámpur pillars.

HYPOTRACHELIUM, उपगल, *Upagala*, or “beneath neck,” is used in the position indicated by its name.

PLINTH, उपाण, *Upána*, the “undermost,” is the lowest member both in bases and in basements.

QUIRKED OVOLO, पद्म, *Padma*, the “Lotus,”—or अण्डाकार, *Andákár*, the “egg-shaped.” The *Padma* is used for any double curve, such as

the quirked ovolo, the Cyma recta, or the Cyma reversa. *Andákár* is, however, the proper name for the quirked-ovolo. When it is decorated with the egg ornament, like the Márttand and Pámpur pillars, it is called अण्डवपद्म *Andava-padma*, the “egged-lotus.”

TRACHELIUM OF Neck; कण्ठ, *Kantha*, or ग्रीवा, *Griwá*, or गल, *Gala*. This occurs in every example of Kashmírian capital, immediately above the lower ovolo. *Gala* is the most common term.

TORUP, कुमुद, *Kumuda*, the “lotus,” is a very favorite moulding, both in pillars and in basements.

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### XVII.—Of Temples.

1.—The Kashmírian temples are of three kinds, the oblong, the square, and the octagonal, and these again are subdivided into the closed and the open. The closed temples have only one entrance, and are called विमान, *Vimána*, which means literally a seat or throne of the gods. The open temples have door ways on all four sides, and are called मण्डप, *Mandapa*, from *Manda*, ornament, because these open temples are mostly decorated all round, while the inner chambers of the *Vimána* are generally quite plain.

2.—Of the oblong *Vimána*, the only example that now remains is the temple of Márttand, of which the length is equal to  $1\frac{3}{4}$  breadth. It is closed on three sides. Of the square *Vimána*, there are, at least, three examples in the cave temple of Bhaumajo, and in the two temples at Pathán. It is probable that there were many more; for I suspect that the smaller one (and perhaps also the larger one) of the Avantipura temples, was of this description. Of the octagonal *Vimána*, only one example now remains in the ancient temple of Jyeshtheswara, on the Takht-i-Sulimán.

3.—Of the *mandapa* there is but one kind of which the best examples are the almost perfect temples of Páyach and Pándrethán. The entrance chamber or *arddha-mandapa* of Márttand is also a perfect specimen of this kind, although attached to a larger building to which it is subordinate.

XVIII.—*Interior Arrangement.*

1.—According to the practice of the Hindus, the oblong temples were divided into three distinct chambers, of which the outermost was called *arddha-mandapa* or “half temple,” the central one was named अनुराल, *antarāla* or “mid-temple,” and the innermost was denominated गर्भगृह, *garbha-griha* or “womb of the edifice.” The size of these chambers increased by an arithmetical progression from the outside. This arrangement is quite different from that of the Greeks, who in a temple of three apartments, placed the *naos*, which was always much the largest room, in the middle between the *pronaos* and the *posticum*. The Kashmírian architects, on the contrary, judging from the plan of Márttand, which is the only example, adhered to the Hindu arrangement of the chambers but rejected their relative sizes. Thus the outer chamber of Márttand is a perfect square; the mid chamber is one fourth of this square; and the inner chamber is three fourths of it. In this arrangement it is remarkable that the outer chamber is exactly equal to the areas of the other two chambers—a size, which agrees with its name of *arddha-mandapa* or half temple. In this respect the Kashmírian architects would appear to have adhered strictly to the original rules, from which the Hindus themselves had departed. Something like this is, however, mentioned by Rám Ráz who,\* quoting the Kásyapa treatise says, the *arddha-mandapa* or portico is “sometimes made broader than the *garbha-griha*, in which case the width of the former is either once and a half or twice that of the latter.”

2.—The two kinds of square temples would seem to have had their respective arrangements of interior which were almost invariably observed. Thus the Mandapas of Páyach and Pándrethán have a square chamber, with an open doorway, on each side; while the Vimánas of Pathan have only one doorway, leading to a central square chamber, and an open porch leading to a small chamber on each of the other three sides. The length and breadth of these chambers are made one half and one third respectively of the breadth of the principal chamber. Both of these arrangements are somewhat similar to those followed in India Proper in temples of the same shape.

3.—In the positions of the entrances there are also some slight variations. Thus the doorways of the temples of Márttand and of Avan-

\* Hindu Architecture, p. 50.

tipura are to the westward; those of the Takht-i-Sulimán, of Pathan and of Páyach, are to the eastward; while that of the Pándrethán temple alone is to the southward. In the Páyach temple the water-spout is on the northern face, which is in accordance with the practice observed in India, where an eastern entrance has a northern water-spout, and a southern entrance an eastern spout.

4.—On the whole, I think, that the general arrangement of the Kashmírian temples has so much in common with those of India, as to warrant the deduction that the rules of the two countries were originally derived from the same source.

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### XIX.—*Dimensions.*

1.—The relative proportions observed in the three dimensions of length, breadth and height, offer one of the best means of testing, whether the practice of the Kashmírian architects was independent and original, or was borrowed from that of their Indian neighbours. Unfortunately we have only one specimen of an oblong temple to furnish the required proportions between length and breadth, as all the Kashmírian temples, with the single exception of Márttand, are either square or octagonal. The length of the Márttand temple is 63 feet, and its breadth 36 feet; its length is, therefore, equal to  $1\frac{3}{4}$  breadth; or if we compare it with the breadth of the portico, which is 27 feet, then the length is equal to  $2\frac{1}{3}$  breadth; which is a very close approximation to the Hindu rule, given by Rám Ráz\* of  $2\frac{1}{2}$  breadth. It is probable, therefore, that the same proportions between the two dimensions of length and breadth, which were observed in India, were also followed in Kashmír.

2.—With regard to the Kashmírian temples, there can be little doubt, that the rule which was almost invariably practised, was to make the height of a temple equal to twice its breadth. The single exception to this rule is the cave temple of Bhaumajo, of which the height is only equal to  $1\frac{1}{2}$  breadth. This sole departure from the usual custom may, possibly, have been imposed upon the architect, owing to want of height in the cavern; but the style of the roof itself seems to favor the opinion, that it must have been so designed, and as the proportion is one of those used by the Hindus, I think that there can be but little doubt that the

\* Hindu Architecture, p. 50.

architects of Kashmír observed at least some of the rules that were followed in India.

3.—Rám Ráz, quoting the Kásyapa says,\* that “*Vimánas* are divided into five sorts, with respect to their magnitude.” These are called,

1st.—*Sántika*, the “quiet looking” or “modest,” height =  $1\frac{2}{3}$  breadth

2nd.—*Panstika*, which Rám Ráz translates “bulky,” .. =  $1\frac{1}{2}$  „

3rd.—*Jayada*, the “triumphant” or “excellent,” . . . =  $1\frac{3}{5}$  „

4th.—*Adbhuta*, the “wonderful,” . . . . . =  $1\frac{3}{4}$  „

5th.—*Sarvakáma*, the “all-pleasing,” . . . . . = 2 „

Of these different kinds that which was most in esteem in Kashmír was undoubtedly the last. The cave temple of Bhaumajo must be ranked as *panstika Vimána* or “bulky temple,” a name which its massive appearance fully merits. But all the other temples of Kashmír were certainly of the last kind, the *sarva-káma* or “all-pleasing.” It is, however, remarkable, that the author of the *Raja Tarangini* when speaking of the temple of Márttand, calls it *adbhuta*, the “wonderful,” the very name which is applied to another kind of temple of very nearly the same relative proportions, as those of Márttand itself. This epithet of the historical poet I consider as merely an accidental coincidence, for in his first mention of Márttand he calls it *sarvatogatam* “the all-pervading,” a name which is somewhat similar to that of *sarva-káma*, in which class the temple of Márttand must undoubtedly be ranked.

## XX.—Basements.

1.—Basements are appropriately called *upapita* उपपीठ, or “under-seats” by the Hindus and also sometimes *adhastha* अधस्त्य, or “under-fixtures;” which names are exactly equivalent to the Greek *ὑπεδρα* and *ὑποστασις*.

2.—The basements of the Kashmírian temples may be divided into two kinds, the massive and the light, according to the character of their mouldings. In Plate VIII. I have exhibited five different specimens of the Kashmírian mouldings, of which three belong to the more massive order, and two to the lighter one.

3.—The former style which is adapted in the temples of Takht-i-Sulimán, Bhaumajo and Páyach, is distinguished by a massive filleted torus as the crowning member, with a straight fillet above and below.

\* Hindu Architecture, p. 49.

Under this is the dado, or plain straight face, which is of about the same height as the torus itself. Beneath this is a quirked ovolo of bold projection surmounted by a straight fillet, and under this is the plinth, of which the dimensions vary in the different examples. Of these the Takht-i-Sulimán specimen is the most massive, and as it is further characterized by the total want of projection in the face, which is flush with the wall of the building, and which I take to be an undoubted sign of antiquity.

4.—Of the lighter kind of basement, there are two examples, of which that of the enclosing wall around the tomb of Zein-ul-ab-ud-din is probably the more ancient one as it is distinguished by the same want of projection in its face which has just been noticed in the Takht example. In this kind of basement the filleted torus is altogether omitted; and its place is supplied by an abacus, which in the earlier specimen is supported by an apophygé, or *prastara*, broken by several annulets; and in the later specimen by a cyma recta surmounting two annulets. The remainder of the earlier basement is similar to those of Bhaumajo and Páyach, but with a much less projecting ovolo. The Márttand example only differs in having its face broken into three annulets, something like those of the Doric capital, which are separated from the upper member by an astragal.

5.—The last basement is that of the wing-buildings of the Márttand temple of which unfortunately I have no detailed measurements. Its height is of course the same as that of the large temple; but it differs entirely in its details, which are however almost the same as those of the pedestal of the largest interior niche. See Plate XVI. The decorations of the face are precisely the same, and on the sides towards the large temple, where they have been covered from the weather, these decorations are still in excellent preservation.

6.—It is impossible to say whether any particular rule was observed in determining the height of a basement, as we have not sufficient data to guide us. In the Bhaumajo and Páyach examples, the height of the base is exactly one fifth of that of the whole temple, whereas in that of Márttand the basement was only one fifteenth of the whole height. If the Bhaumajo proportion had been used for the temple on the Takht-i-Sulimán, its height would only have been 28 feet and  $1\frac{1}{2}$  inch. As however *this dimension is exactly* three fourths of its extreme breadth,



and one third more than its interior diameter, it seems highly probable that such may have really been its full height. The four plain sides were most likely covered by pediments, in which case the base of the pyramid would not have been much broader than the interior width of the temple. My present opinion is that the height of the basement was made entirely dependent upon the height of the roof. Thus the whole temple being two breadths in height, of which the walls were one half, the height of the basement would of course depend upon the pitch that was given to the pyramidal roof. If it was determined to make a lofty roof, the basement was of course lessened in height; and vice versâ, the basement increasing in height as the roof became more flat.

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### XXI.—*Walls.*

1.—The *walls* of a building are called *bhitti*, भित्ति, and *kudya*, कुद्य, in Sanskrit, but there are many other names now in use that are not of Sanskrit origin. In the Kashmírian temples the walls are made entirely of large blocks of grey limestone fastened together by iron clamps, several of which are now exposed in the walls of Pándrethán. As no cement has been used in the construction of any of the walls that I have seen, Vigne is undoubtedly wrong when he states that the stones “are cemented with an excellent mortar.”\* Thornton has noticed this statement and with much judgment has preferred the account of Jacquemont, who says that these walls are “sans ciment,” although he modestly declines deciding in favor of the French traveller. As I have myself seen these temples and have examined them carefully I am able “*tantas componere lites*” by stating positively that no cement whatever has been used in the walls of any of the Kashmírian temples.

2.—The dimensions of these walls vary very considerably, those of the older temples being thicker in proportion to their interior breadth than the later ones. Thus the thickness of the Takht temple walls is four elevenths of the interior diameter: that of the cave temple of Bhaumajo is two sevenths; those of Márttand and of Pándrethán are one fourth, while that of Páyach is only one sixth. This gradual lessening in thickness, supposing each diminution to denote a more recent period, agrees exactly with the successive dates that have been

\* Travels, vol. 1.—p. 386.

assigned for the erection of the different temples. The only exception is that of Páyach but as the four walls of that temple are formed of single stones, nothing is more likely than that the architect should have made them thinner than was the usual custom in his day, chiefly on account of their superior strength, but partly also to lessen their weight in transport. As the other temples at Pathan have small chambers on three sides which are constructed in the thickness of the temple walls, the architect was obliged to increase the thickness of the solid parts of the walls to one half of the interior diameter in order to gain sufficient strength and solidity for the support of the massive pyramidal roof.

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### XXII.—Entablatures.

1.—The Greeks called the whole of the upper part of the superstructure, including the capitals of the columns by the general name of *επιστυλιον*: but the Hindus discriminate between the capital of a pillar and the entablature itself. The former they call *adhistambha* अधिस्तम्भ, which means exactly the same as the Greek epistylum: the latter they call *urddhasthita* or *urddhastha*, उर्द्धस्थ, the “high fixture,” which is equivalent to the Greek *επιστασις*, although not literally the same. Its exact meaning would be rendered by *αιποστασις*, but I am not aware that such a word has ever been used.

2.—The upper parts of the temple have in general been so much injured and are besides so inaccessible that the correct delineation of the entablatures was a work of considerable difficulty. In the cave temple of Bhaumajo, which is the oldest complete building there is no entablature whatever; unless indeed the narrow line of architrave which is interposed between the top of the walls and the base of the roof can be considered as such. In the next example, that of Páyach, this is somewhat enlarged, although still of very small dimensions. It however consists of three separate parts, which for the sake of distinction alone may be called architrave, frieze and cornice. The lower member is formed of two plain straight mouldings or bands, of which the higher one projects slightly over the other. The middle member is twice the height of the lower one and consists of a denticulated ovolo; while the upper member or cornice which is of the same size as the lower one, is a plain straight moulding or band similar to that of the Bhaumajo temple.

3.—The next specimens in point of antiquity are those of Márttand, of which we have no less than three examples, two belonging to the exterior, and one to the interior. These show a considerable improvement over the former specimens, and at the same time bear a decided general resemblance to the entablatures of the classical orders. That of the great temple itself is 4 feet in height or exactly equal to one diameter of its supporting pilasters. Its division into architrave, frieze, and cornice is distinct and unequivocal. The first which is  $1\frac{1}{2}$  foot in height is equally divided into two plain mouldings each sloping inwards. The second which is of the same height is straight and perfectly plain; while the third which is only 1 foot in height consists of an ovolo surmounting two fillets or annulets. So far this entablature agrees in general distribution with that of the classical orders: but it differs from them most materially in its total want of projection, the line of the frieze being flush with that of the supporting pilaster. This may perhaps be reckoned as a defect; but I am inclined to consider it as an improvement with regard to the purpose for which it was destined. For, if the entablature had been projected beyond the line of the perpendicular walls of the building, the vast pyramidal roof would have appeared much too heavy for its supports. See Plate XIV. Such in fact is the case with the late example of the Pándrethán temple, in which the roof and its supporting entablature project considerably beyond the pilasters. See Plate XXII. In the low Grecian pediments this projection is undoubtedly a beauty: but in my judgment any projection, in a pediment of high pitch has an extremely top-heavy appearance. Indeed the European practice with steeples which are the most lofty description of pyramidal roofs, fully bears out my opinion, as their bases are never made broader than the width of their supporting towers.

4.—The second of the Márttand specimens belongs also to the exterior; but to one of the porches of the colonnade and not to the temple itself. It is therefore a more recent example by upwards of 200 years. Its height is  $3\frac{1}{2}$  feet, and it is divided into three distinct and equal parts, which may, as in the former examples, be likewise called architrave, frieze and cornice. The first consists of three plain mouldings, which are in proportion to each other as 1, 2, 3; the uppermost being the smallest and having also the least projection. The frieze is

divided into triangular-headed niches which contain single seated figures ; and at each end there is a small pilaster for the support of the upper member or cornice. This last, which has a projection equal to its height, is divided into several small mouldings, the uppermost being two bold ovolos. See plates VIII. and XV.

5.—The third specimen from Márttand belongs to the interior of the outer chamber, which may perhaps be of somewhat later date than the larger and plainer building. It is represented in Plates VIII. and XVI. In this specimen the frieze has been considerably enlarged, and the lower member is reduced to a mere band, only 9 inches in height and perfectly plain. The frieze which is no less than 4 feet in height is divided by pilasters into several spaces, each of which contains a niche with a trefoiled head resting upon small pilasters, which are themselves supported by panelled pedestals. Each niche is occupied by a seated human figure. The cornice, which is  $1\frac{1}{2}$  foot in height, consists of two members, of which the upper one is an ovolo of 6 inches, decorated with square-topped leaves ; and the lower one is a straight face of 1 foot divided into triangular-headed niches. This is the richest as well as the most elegant of all the Kashmírian entablatures. And yet its leading feature has been altogether mistaken by Vigne, who has represented the figures enshrined in the niches as a row of four-leaved flowers.\* Unfortunately he selected for his sketch that side of the building which was most injured. He seems also to have been contented with giving the general forms and outlines of the masses, and thus to have lost all those numerous peculiarities of detail which characterize the different parts of one style of architecture from another.

6.—The next entablature I found upon a single stone which is now used as a flank wall to the entrance of the tomb of Zein-ul-áb-ud-din's mother. It is probably of about the same age as those of Márttand.

Like them it has its frieze divided by pilasters, and its cornice is the same as that of the Márttand interior. The decorations of the intervals between the pilasters are however quite different, although of the same style. On a small scale they resemble very closely those of the walls of the quadrangle, but without the peristyle. Like them they have the spaces between the pilasters occupied by trefoil-headed recesses ; but they differ in the want of covering pediments. There is one thin-

\* See View, vol. 1—p. 390.

however in this entablature which is particularly worthy of remark ; namely, that the corner recess is a square-headed trefoil, instead of being round like the others. I notice this fact the more prominently as Professor Willis has suggested that such was probably the original form of the trefoil. Its occurrence in a corner position is in perfect keeping with the treatment followed with the corner columns which are likewise made square instead of round.

7.—The last entablature is that of the temple of Pándrethán. See Plate XXII. It is exactly the same as that of Páyach but with the addition of a good-sized plain architrave beneath the fillets of the denticulated moulding. This specimen confirms the truth of what I before observed, that the height of the entablature appears to be increased in each successive building. Thus in the present example the height is equal to one fourth more than the width of the supporting pilasters. This superior height and apparent stability may have been given solely on account of the extra size of this particular roof, which projects considerably beyond the walls of the building.

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### XXIII.—*Roofs.*

1.—All the existing roofs of the Kashmírian temples are of pyramidal shape. In Sanskrit this form is called *sikhara* शिखर, which means a peak of any kind as well as a pyramid. Throughout India generally the same form is also observed ; but the sides of the roof usually swell out considerably into a kind of paraboloidal pyramid, unlike those of Kashmír, of which the sides are invariably straight. The same style of wooden roof is still common in the valley, but it is seldom of so high a pitch. In most of the temple roofs, as at Bhaumajo and at Páyach, the pyramid is broken into two equal portions, which are divided by a broad moulding. The Pándrethán roof however was probably divided into three portions ; and in the little temple which crowns the Srinagar column we have an example of a four-storied roof. This number of breaks on stories in the roof assimilates the Kashmírian style very closely to that of the Chinese ; and this similarity is still farther increased almost to identity in the wooden roofs, which have also four stories. In these the ends of the corner beams are usually finished off with alligators' heads, somewhat raised above the bottom line of the sloping planks of the roof, and

bearing a singularly striking resemblance to the turned up corners of the different stories of Chinese buildings. As the Chinese religion was borrowed from the Indians chiefly through Kashmír, the introduction of the Kashmírian style of temple must naturally have followed upon the establishment of the new belief. This resemblance between the sacred buildings of the two countries may therefore be taken as a strong evidence in favor of the statement that Buddhism was introduced into China by five hundred Kashmírian *Arhans* during the first century of the Christian era. None of the stone roofs now existing have these ornamental corners, nor do I think that they could ever have had them; unless perhaps some of the very earliest buildings, in which the wooden roofs may have been more closely imitated.

2.—The masonry of the roofs is constructed entirely of horizontal courses. The ceilings are first formed by overlapping stones, which gradually diminish the opening to a size sufficiently small to be covered in by a single stone. Over this the interior of the pyramid was most probably hollow. Such at least is the case with the Pándrethán roof, which has a window in each of its four niches looking into the hollow part of the roof. I have little doubt that the same plan was followed in all the other roofs; partly perhaps to lessen the great weight of the pyramidal mass, but chiefly for the sake of economy.

3.—The flattened top of the pyramid in the Páyach example is an elegant pinnacle formed of a melon-like fruit surmounted by a concave-sided cone. In Sanskrit this is called *kalasa* कलस, which means the topmost point of anything. Thus the famous Rana Sanka, the Sisodia chief who opposed Báber, was called the *kalasa*, or pinnacle of the glory of his native country, Mewár.

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#### XXIV.—Interior Decorations.

1.—The interior decorations are of two kinds; namely, those of the walls and those of the ceilings. Of the latter there are but two specimens, which have already been fully described in the accounts of the Páyach and Pándrethán temples. Under this head also should be included the soffits of the trefoiled arches, which, in the only existing example at Márттand, are divided into square panels, each containing an expanded lotus flower.

2.—The decorations of the walls are quite different, and are in strict keeping with the general character of the other parts of the building. They consist chiefly of trefoil-headed niches covered by pediments supported upon pilasters. These are called *karna-kutah*, कर्णकुटः, or “side-niches,” by the Hindus. In Plate XVI. I have given a view of the northern wall of the entrance-chamber of Márttand, which is the most highly-decorated of all the Kashmírian interiors. The large temple at Pathan has a single niche (with double pediment) on each side of the entrance; but the interior chamber is quite plain. In Márttand however there are four distinct masses of ornament on each side of the interior, each differing in its details from the other, but all having the same predominating type of a pediment supported upon pilasters. Over the right hand niche there is a small indistinct object or tablet supported by a couple of naked and winged figures, which are well-conceived and neatly executed: while both above and below the left hand niche there are panels occupied by small trefoil-headed recesses. The base of the large niche to the left of the door is ornamented with various figures in very high relief. The middle figure is a seated man; and on each side of him there is a human-headed bird. Next to these are elephants, and beyond them are lions. In all the niches also the capitals of the pilasters are occupied by these same human-headed birds, which, though not so natural as the favorite ox-skulls of the Grecian metopes, are much more pleasing.

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#### XXV.—*Porticos.*

1.—The different porticos have been fully described in the accounts of the various temples; but there are some points of difference as well as of similarity that require a more particular mention. Of the former the most striking is the difference in height in proportion to that of the temples to which these porticos are attached. In that of Bhaumajo the portico is exactly of the same height as the temple itself. In the Páyach example, as well as in the little temple on the Srinagar column, the porch reaches only to the centre of the pyramidal roof; whilst in the Pándrethán temple it is highly probable that it did not reach higher than one third of the roof.

2.—Another point of difference consists in the treatment of the pediment itself, which, in the Bhaumajo, Páyach and Pándrethán speci-

mens, is unbroken. In that of the little Srinagar column, and most probably also in that of Márttand, the pediment was divided into two distinct parts by horizontal returns of its mouldings, the same as in the pyramidal roofs of Páyach and Pándrethán.

3.—A third point of difference lies in the projection which is more or less bold in the several temples, apparently according to their relative antiquity. Thus the portico of the ancient Bhaumajo is flush with the pilasters of the temple; whilst in the modern examples of Pándrethán and of Pathan, the portico is advanced 2 feet and 3 feet respectively beyond the main pilasters. In the intermediate examples the projection varies from a few inches in the Páyach and Márttand porticos to  $1\frac{1}{2}$  foot in those of Avantipura.

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#### XXVI.—Wings.

1.—In Sanskrit all side buildings are called *paksha* पक्ष, or “wings,” and *pakshúla* पक्षाल, or “side-temples.” The small buildings attached to Márttand are the only examples of this kind now existing in Kashmír. I cannot therefore presume to deduce any rules from a single specimen; but I may be permitted to notice a few of its leading features. For instance, the exterior dimensions of the Márttand wings are made exactly the same as those of the principal interior chamber. Again, the width of the wing is equal to one half of that of the entrance end of the temple, and its length is equal to one half of that of the other. Some of these proportions can scarcely be accidental; but nothing further can be deduced from them than that the dimensions of the wings would appear to have been about one half of those of the temples.

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#### XXVII.—Gateways.

1.—The gateways of the Hindus have different names according to the class of buildings to which they are attached. Thus a royal gate is called *dwára-harmya* द्वारहर्म्य, or the “palace-gate;”—that of a large public or private dwelling is named *dwára-shúla* द्वारशाल, or “hall-door;” whilst that of a town is called *gopura* गोपुर. The last two are also applied to the gateways of temples, which are however more generally known as *dwára-mandapa* द्वारमण्डप, or “temple-gates.” According to the Sanskrit works quoted by Rám Ráz, the Hindu architects divided the different kinds of gateways into five classes, each bearing a certain



proportion in its width to that of the temple to which it was attached. This proportion increases gradually from six sevenths, the breadth of the most simple kind, to ten elevenths the breadth of the most magnificent. The several names are as follows :

- |   |        |       |                 |                   |
|---|--------|-------|-----------------|-------------------|
| 1.— <i>Dwára-sobha</i> , the “beautiful gate” — width | .....  | =     | $\frac{6}{7}$ . |                   |
| 2.— <i>Dwára-shála</i> , the “hall-gate,”             | ditto, | ..... | =               | $\frac{7}{8}$ .   |
| 3.— <i>Dwára-prasáda</i> , the “elegant-gate,”        | ditto, | ..... | =               | $\frac{8}{9}$ .   |
| 4.— <i>Dwára-harmya</i> , the “palace-gate,”          | ditto, | ..... | =               | $\frac{9}{10}$ .  |
| 5.— <i>Gopura</i> , the “town-gate,”                  | ditto, | ..... | =               | $\frac{10}{11}$ . |

If we might judge from the few examples that now remain, none of these Hindu classes would appear to have been known to the Kashmírian architects; or, if known, they were certainly not followed. For the gateway of Márttand is exactly of the same width as that of the temple itself, while those of Avantipura are only equal to two thirds and to one third of that of their respective temples. The first is equal to the width of the temple itself; the second to that of its entrance porch; while the third is only equal to that of its flight of steps. These different gradations would seem to point out that the Kashmírians possessed some rules relative to the widths of their gateways which were founded upon the sizes of the principal masses of the temples, and not upon any proportional parts of the temples themselves.

2.—But these are the larger gateways that were constructed during the most flourishing period of Kashmírian architecture. The gates of older times were mere doorways in the enclosing walls. Such for instance is that of the temple of Jyeshtheswara on the Takht-i-Sulimán hill; and such also is that of the enclosing wall around the tomb of Zein-ul-áb-ud-din. (See Plate VIII.) This last however is a closed doorway; the actual entrance being a gateway of larger dimensions, similar to those of Márttand and Avantipura.

3.—The exterior ends of the gateway walls were divided into panels, each decorated with a miniature temple. These ends were in fact only square attached pillars with bases and capitals complete. The gateways were no doubt originally covered by pyramidal roofs and attached porticos; and they were therefore exteriorly only smaller temples.

4.—It was in their interior arrangement that the gateways differed from the temples, as they were open at both ends. Of the four existing gateways at Márttand, Avantipura, and Zein-ul-áb-ud-din’s tomb, three

of them have a transverse wall exactly in the centre of the building ; while the fourth, that of Avantiswámi, has this cross wall nearer to the outer end than to the inner one. Each of these cross walls had a doorway in the centre, which must once have been closed by a wooden door. The gateways were thus divided into two open porches, of equal size, in the first three temples ; but differing in the last, of which the outer apartment was only half of the size of the inner one.

5.—The interior decorations of the gateways were also similar to those of the temples : as all the side walls of the four existing examples are ornamented with trefoil-headed niches covered by pediments. All of these must once have held statues or sculptures of some kind, excepting only, those of the gateway leading to Zein-ul-áb-ud-din's tomb. But these last were certainly never completed, as each of the niches is filled by a square mass of rough stone, which was no doubt destined by the architect to be carved into some divine form, or some mythological group.

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#### XXVIII.—*Enclosures.*

1.—Rání Diddá, the Messalina of Kashmírian history, is recorded\* to have repaired the ruinous surrounding walls of some temples and to have erected new enclosures around others. Thus every Kashmírian temple would appear to have been surrounded by a wall of some kind, more or less decorated according to the magnificence of the enclosed shrine, and larger or smaller according to the means at command. There are however only three existing enclosures in the valley itself ; namely, those of Márttand, Avantipura, and Zein-ul-áb-ud-din's tomb, all of which have suffered considerably by the hands of the spoiler. But in my accounts of the temples themselves I have given grounds for supposing that those of Pathan and Pándrethán must once have possessed enclosing walls of some kind ; and I have no doubt that a minute research would discover the traces or remains of a surrounding wall to the temple of Páyach. Of the temples in the Baráhmula Pass beyond the valley, two still have their enclosures somewhat perfect. The third I have not seen ; and Vigne unfortunately does not notice this point.

\* Raja Tarangini, B. 6—v. 307.

2.—These enclosing walls were called *prākāra* प्राकार, both in ancient and in modern times, and in India as well as in Kashmír. I have been unable to discover any rules for their dimensions that would appear to have been followed by the Kashmírian architects, owing perhaps to the fewness of the examples which now exist. I have no doubt however that certain rules were observed, and that they were founded upon various multiples of some of the dimensions of the enclosed temples. Thus the Márttand quadrangle is  $220\frac{1}{2}$  feet long by  $142\frac{1}{2}$  feet broad in the interior; the former dimension being exactly equal to  $3\frac{1}{2}$  times the length of the temple, and the latter being  $1\frac{1}{2}$  foot more than 4 times its breadth. With the Avantipura temples a similar practice may be traced. Thus the quadrangle of Avantiswámi is 172 feet long by  $146\frac{1}{2}$  feet broad, which dimensions are respectively 5 times and  $4\frac{1}{4}$  times the width of the temple. Thus also the quadrangle of the Avanteswara temple is 191 feet long by 171 feet broad, or respectively  $2\frac{3}{8}$  and  $2\frac{1}{8}$  times that of the temple itself.

3.—As the fractions of these last proportionals of the Avantipura temples are very small, it seems probable that some other rules must have been observed with them, but of what description it is difficult to conjecture. I have tried multiples of the diagonal lines of the ground-plans, which would seem to answer very well, as the results which they give are in large fractions. In the Avantiswámi temple they are  $3\frac{1}{2}$  and 3 diagonals, and in the Avanteswara temple  $1\frac{1}{2}$  and  $1\frac{2}{3}$  diagonals. I do not however lay much stress upon these results, which after all perhaps owe more to chance than to design.

4.—I say nothing regarding the dimensions of the octangular court which surrounds the temple of Jyeshteswara on the Takht-i-Sulimán hill, because its small size was most probably imposed by its confined situation. The space on each side was however exactly equal to one fifth of the diameter of the temple.

4.—The style of these surrounding walls has undergone even a greater change than that of the temples themselves, although the same predominating forms have been preserved throughout the different gradations, from the most simple to the most magnificent. The earliest of these enclosures is that of the temple of Jyeshteswara, which was most probably built about 220 B. C. In this example I think that I can trace the first germs of the Kashmírian style. The walls which

have triangular or pedimental tops are divided into square panels, each containing a pointed arched recess. In the next example, which is that of the enclosure of Zein-ul-áb-ud-din's tomb, the very same treatment is observed, but with some ornamental additions betokening a later date. Thus the pointed arches do not rest immediately upon the upright sides of the recesses; but are joined to them by short horizontal returns; while the most characteristic feature of the Kashmírian arch, the trefoil is here observed for the first time, in the recess immediately on each side of the entrance. The same trefoiled arch is also used in the doorway of this enclosure. In these early examples the lower arcs of the trefoil are of very small size, being only one fourth of that of the upper one. This wall has also the same triangular or pedimental top, but with the addition of two plain mouldings or annulets on each face. Its thickness is also considerably less than that of the other, although its height is somewhat greater.

5.—Between the ancient simplicity of these enclosures, and the majestic colonnade of Márttand, the difference is very great indeed; but so also is the interval between the dates of their erection, which is upwards of 900 years. During this long period there must have been a constant and yet gradual succession of improvements, which at last resulted in the production of one of the noblest enclosures in the known world. Amongst the earliest improvements were most probably the insertion of plain pilasters in the spaces between the panels, and the enlargement of the lower arcs of the trefoil to the same size as that of the upper one. Both of these are well shown in the Srinagar Frieze of Plate VIII. In this specimen, as well as in those of the Márttand friezes, are first observed the small triangular-headed recesses in conjunction with the trefoil; from which I conclude that the next improvement was the addition of the pediment over the head of the trefoil, and the consequent enlargement of the wall in all its parts. This increased size would naturally have led to the successive enlargement of the recesses until they had attained their present dimensions of distinct chambers. The next step in advance was perhaps the gradual disengagement of the pilasters from the walls until they became independent square pillars. After this the change to round columns was easy and natural; and the insertion of new pilasters in the old places, must have quickly followed upon the disengagement of the others.

6.—Such I presume must have been the gradual improvements and additions that were successively introduced into the Kashmírian style of architecture until the simple enclosure of the old temple of Jyesh-teswara, was expanded into the magnificent peristyle of Márttand.

7.—The pillars of all the colonnades now existing in Kashmír are similar in style and in general appearance, but somewhat different in their relative proportions, and in the mouldings of their bases and capitals. As these columns are, in my opinion, the noblest specimens of the Kashmírian architecture, I will now examine them in minute detail, for the purpose of comparing them with some of the classical orders.

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### XXIX.—*Pillars.*

1.—There are several Sanskrit names for a pillar, but the most usual one is *stambha* स्तम्भ, which is derived from *stha* स्था, “staying,” or “standing,” and is an exact equivalent to the Greek *στύλος*. As this name is still used throughout India for a pillar, I do not think it necessary to notice any of the numerous Hindí names which are of less common occurrence.

2.—The Kashmírian pillars are of two kinds, round and square : and are distinguished from the numerous varieties of Hindu pillars generally by being always divided into the three distinct members of base, shaft and capital. The square pillars are used in all corner positions where superior strength and solidity are required to support the greater weight of those parts of the superstructure. In the only existing examples at Márttand and Avantipura, their faces are panelled.

3.—The round pillars are used throughout the colonnades, and for the support of porches of all kinds. They are always fluted, the number of flutes being 16, but sometimes 20, and even 24. These fluted pillars would seem to have been the favorite ornament of all the Kashmírian buildings, both Hindu and Mahomedan, as they are found, more or less perfect, in every place of note throughout the valley. Sometimes they are discovered lying by the road-side ; occasionally they are seen standing amidst the ruins of the temples which they once surrounded, but more generally they are found attached to the doorways of Mahomedan masjids and tombs.

4.—The relative proportions between the heights and breadths of the Kashmírian pillars are given in the following table :

		Lower Dr. Inches.	Height, inches.	Multiple of Dr.	Inter- coln.	1½ Inter- coln.
Márttand	Gate	25.940	209.250	$8\frac{1}{8}$	138.00	207.000
do.	Porch	24.430	155.500	$6\frac{3}{8}$	102.57	153.855
do.	Peristyle	21.500	113.250	$5\frac{1}{4}$	81.56	122.340
Avantipura	Gate	24.430	233.235	$9\frac{3}{8}$		
do.	Porch	20.750	171.375	$8\frac{1}{4}$	114.25	171.375
do.	Peristyle	17.875	122.750	$6\frac{7}{8}$	85.62	128.430
Pámpur	Pillar	11.250	71.500	$6\frac{3}{8}$		
Bhaumajo	Pilaster	10.375	66.250	$6\frac{3}{8}$	44.250	66.375

The lowest multiple amongst these is that of the peristyle columns of Márttand, which is almost the same as the  $5\frac{1}{4}$  diameters of the Doric columns of the Parthenon. In the Márttand and Avantipura examples the proportions increase rapidly, and not according to any rule that I can discover, although no doubt some rule must have been followed by the architects. I will hereafter show that the intercolumniation is always two thirds of the height, and I think it very probable that the height was dependent upon the interval, which was itself dependent upon the number either of pillars or of recesses, that the architect had determined upon introducing on each side of the quadrangle.

5.—In the above table I have given a column of heights, calculated at  $1\frac{1}{2}$  intercolumniation each, which correspond almost exactly with the measured heights. I have therefore but little doubt that the practical rule followed by the Kashmírian architects was to make the height of the pillar equal to one half more than the width of the interval.

### XXX.—Flutes.

1.—All the peristyle columns of Márttand, Pámpur and Avantipura have 16 flutes: the larger columns of the porches have 20 flutes; and the still larger ones of the gateways have 24 flutes. But the number of flutes did not always depend upon the size of the columns; for there is a fragment of a pillar standing near the tomb of Zein-ul-áb-ud-din's mother, which has 24 flutes and is only 1 foot in diameter. This how-

ever is the sole exception to the general rule, that the number of flutes should increase with the diameter of the column, sixteen being the least number that is ever used. Thus the Pámpur pillar, which is  $11\frac{1}{4}$  inches in diameter, those of the Márttand peristyle, which are  $21\frac{1}{2}$  inches, and those of the Avantipura peristyle, which are  $17\frac{7}{8}$  inches, have all sixteen flutes. Of the 20-sided pillars there is a fragment of one near Zein-ul-áb-ud-din's tomb, which is only  $19\frac{1}{2}$  inches in diameter; while those of Márttand and of Avantipura are respectively  $24\frac{1}{2}$  inches and  $20\frac{3}{4}$  inches. Of the 24-sided pillars the Márttand and Avantipura examples are respectively 26 inches and  $24\frac{1}{2}$  inches.

2.—The flutes of the Kashmírian pillars are extremely shallow, none of them being more than from one quarter to three-eighths of an inch in depth. They must therefore, as nearly as I can determine, have been formed by radii of the same length, as those of their respective pillars. In this, as well as in the number of their flutes, they assimilate more closely to the Doric column than to any other of the classical orders.

### XXXI.—Bases.

1.—The base of a column is called *Adhastambha* अधस्तम्भ, or “beneath-pillar” in Sanskrit, a name which is exactly equivalent to the Greek *ὑποστύλιον*. The following table exhibits the relative heights and breadths of the different Kashmírian bases, side by side with the lower diameters of their respective pillars :—

	Lower Dr.	Height.	Multiple of Dr.	Width.	Multiple of Dr.
Márttand Porch	24.43	29.75	1.21	31.50	1.28
ditto Peristyle	21.50	25.75	1.19	26.75	1.24
Avantipura Peristyle	17.87	28.00	1.57	27.00	1.51
Pámpur Pillar	11.25	18.00	1.60	15.00	1.33
Bhaumajo Pilaster	10.37	14.25	1.37	13.75	1.32

According to the results shown above there would appear to have been no constant rule observed by the Kashmírian architects for determining either the heights or the breadths of the bases. The former range from 1.2 to 1.6 diameter, and the latter from 1.25 to 1.5 diameter. In

Márttand the relative proportions were exactly the same for both of the existing examples : namely,  $1\frac{1}{5}$  diameter for the height, and  $1\frac{1}{4}$  diameter for the width.

2.—There are but five different specimens of the Kashmírian base, of which that of Avantipura is almost plain. (See Plate VI.) Those of Márttand and of Pámpur agree generally in the character of their mouldings, which may be thus described. The upper member is an ovolo with a straight fillet above, and an apophygé below. The next is a filleted torus, with a fillet both above and below, and surmounting the straight face or neck of the pillar. In the large Márttand pillar the torus is plain. Beneath this is a quirked ovolo with a straight fillet above and below, and the last is the plinth. In all of these the upper and lower members are of the same height ; that is the ovolo and apophygé are equal to the plinth.

3.—In figure 8 of Plate VI. there is another variety of base belonging to a broken pillar near the flight of steps leading from the river to the tomb of Zein-ul-áb-ud-din's mother. In this the central member or filleted torus is omitted, and a plain face is inserted between the ovolo and the plinth. There is no clue to its date : but whether it be of an earlier or of a later period than the other examples, it is by no means an improvement upon them.

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### XXXII.—*Shafts.*

1.—The shaft is the portion of the pillar to which the name of *stambha*, or “stay,” more especially belongs. It is an exact equivalent of the Greek *στύλος*. There would appear to have been no fixed and unalterable rule for the height of the shaft ; at least I can discover none. The various examples range from  $3\frac{2}{16}$  to  $4\frac{3}{16}$  diameters in height, the average being 3.88, or as nearly as possible 4 diameters. This indeed is the height of all the finest specimens of the porch pillars of Márttand, of the doorway pilasters of the perfect little temple of Bhaumajo, and of some well preserved columns in Nowa-shehra of Srinagar.

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### XXXIII.—*Capitals.*

1.—In Sanskrit the capital is called *Adhistambha* अधिस्तम्भ, or “above-pillar,” which is precisely the same as the Greek *επιστύλιον*. According to Vitruvius, the Doric capital was half a diameter in height, the



Ionic capital three-fourths of a diameter, and the Corinthian capital, the last improvement of the Greeks, one whole diameter. Now in all the examples that I have seen, excepting only that of Avantipura, the height of the capital is made equal to the upper diameter of the column. If this was not borrowed, the Kashmírian builders would seem to have decided upon the same proportion as the Greek architects for the height of a capital. For the Greek capitals were made in parts of the upper diameter, and not of the lower diameter. Thus the Parthenon Doric capital is exactly one half of the upper diameter in height. Such also are the Doric capitals of the Propylæa, of the temple of Theseus and of the old temple at Corinth. From the annular channel it is true that the height is one half of the lower diameter: but measured from the lowest annulet, the height is exactly one half of the upper diameter. And this was undoubtedly the capital of the pillar; for I believe that the annular channel was intended solely for the reception of a metal ring to prevent the splitting of the columns at top from the insertion of stone or metal fastenings for the purpose of holding the architraves. And yet these channels are slavishly copied now-a-days, and left empty. So also did the Chinese tailor copy the sailor's jacket, *patches and all*.

2.—In the Márttand examples the capital is divided into three nearly equal parts, of which the lowest consists of an *astragal* and an ornamented *echinos*; above which is the neck of the same width as the upper diameter of the column. Over this is a fillet and a high *apophygé* surmounted by two fillets, and a second *echinos*, or *quirked ovolo*. In the square pillars the apophygé is made straight, most probably to assimilate it more closely to the straight-lined character of the columns. In the Avantipura example the same triple division is observable, but in unequal parts; the upper portion being the least, the middle one somewhat larger, and the lowest portion the greatest.

3.—In the Pámpur example the upper member is only one-fifth of the height, while the central and lower members are each two fifths. In this specimen the lower *echinos*, which has thus been enlarged, has a row of lotus leaves surmounting the egg ornaments, which are themselves separated by rows of small beads. The central portion has also been altered; for the epitachelium, or *adhikantha*, is here divided into two portions, the upper one being, as in the other examples; while the lower portion is made to swell out into a filleted moulding. In all these

examples the lower portion of the capital is round, and the upper portion, square.

4.—Vitruvius says that the practical rule followed for obtaining the width of the Doric capital was to make it one sixth more than one diameter. But the Doric capitals were only half a diameter in height, while the Kashmírian capitals are exactly one diameter. If therefore the same rule was followed by the Kashmírian architects, the excess over one diameter should be the double of one sixth, or one third of a diameter; and such in fact is the case, as will be seen by an inspection of the fourth column of the following table. The theoretical rule regarding the width of the Cornithian capital, according to Vitruvius, was to make the length of the diagonal of the abacus equal to twice the height of the capital. This rule however will not apply to the other classical orders, nor to that of Kashmír. But there is another one which gives results so nearly corresponding to those of the practical rule, that there can be no reasonable doubt that it was the theoretical rule followed by the architects of both countries, although I am not aware that it has hitherto been noticed by any author. This is to make the width of the capital equal to the hypotenuse or diagonal of the square of the upper diameter. In the fifth column of the annexed table I have given the different dimensions according to this calculation. On the whole, the results of the practical rule appear to agree better with the actual widths of the capitals than those of the theoretical one, although both of them correspond with the real dimensions within fractions of an inch. In Kashmír as well as in Greece, I should suppose that the architect made his calculations by the theoretical rule, while the mason worked by the practical one. In my opinion the coincidences are much too remarkable to have been accidental.

		Lower Dr.	Upper Dr.	Width of capital.	Practice. D+ $\frac{1}{3}$	Theory Hyp.of dr
Márttand	Porch . .	24.430	22.910	32.500	32.570	32.395
Ditto	Peristyle	21.500	20.600	28.500	28.666	29.133
Avantipura	Peristyle	17.875	16.875	27.000	23.865	23.833
Pámpur	Pillar . .	11.250	10.625	14.250	15.000	15.026
Srinagar	Pillar . .	14.500	14.250	19.500	19.332	20.153

XXXIV.—*Diminution.*

1.—The rule laid down by Vitruvius, for diminishing the thickness of a pillar, is to make the upper diameter one sixth less than the lower one in a column of 15 feet in height, and one eighth less in a column of 50 feet. According to Rám Ráz, the practice of the Hindu architects\* was to divide the lower diameter into as many parts as the number of diameters in the whole height of the column, and to diminish the thickness by one of those parts.

2.—In the following table of comparison I have given the actual diminutions of the Kashmírian pillars side by side with the calculated diminutions according to the Greek and Hindu rules. But as all the Kashmírian pillars are under 15 feet in height, I have taken the proportional parts of  $\frac{1}{8}th$  D, according to the different heights. Thus the Márttand porch pillar being 13 feet high, I have taken  $\frac{13}{8}ths$  of  $\frac{1}{8}th$  D; and the peristyle pillars of Márttand being only  $\frac{2}{5}ths$  of 15 feet in height, I have taken that proportion of  $\frac{1}{8}th$  D. for the diminution, and the same for the others, according to their relative heights.

	Lower Dr.	Upper Dr.	Calculated Dimn.		Actual Dimn.
			Vitruvius.	Rám Ráz.	
Márttand Porch ..	24.430	22.910	3.528	3.840	1.520
Ditto Peristyle	21.500	20.600	2.583	4.096	0.900
Avantipura Ditto,	17.875	16.875	1.986	2.648	1.000
Pámpur Pillar ..	11.250	10.625	0.750	1.760	0.625
Srinagar Ditto,	14.500	14.250	0.483		0.250

Both the Greek and Hindu rules would appear to be based upon the same principle, that the diminution should lessen as the height increased. But neither of these rules apply to the Kashmírian pillars, in which the diminution increased with the height. The practical rule would appear to have been, to lessen the thickness by one quarter of an inch for every cubit of height of *shaft*, and not of pillar. This is certainly the most simple as well as the most natural mode of diminution; for as the shaft is the part that is diminished, the amount of diminution should be made dependent upon its height, and not upon the total height of the pillar.

\* Hindu Architecture, p. 38.

3.—The following table exhibits the diminutions of the Kashmírian pillars, along with the heights of the shafts, and the total heights of the columns. Beside these I have placed the scale of diminutions calculated at one quarter of an inch per cubit of height of shaft. The remarkably close agreement of the numbers in this last column with the actual measured diminution, is, I think, a sufficient proof of the correctness of my deduced rule. The practical rule amongst the Kashmírian architects was most probably to lessen the thickness of the shaft by one third part of a finger, or *angula*, ( $=\frac{1}{4}$  inch) for every cubit, or *hasta*, of its height.

		Total height.	Height of shaft.	Actual dimn.	Calculated diminution.
Srinagar	Pillar. ....	4.1 $\frac{1}{4}$	1.5 $\frac{1}{4}$	0.250	0.239
Pámpur	Ditto. ....	5.11 $\frac{1}{2}$	3.6	0.625	0.586
Avantipura	Peristyle. ..	10.2 $\frac{3}{4}$	6.5 $\frac{1}{4}$	1.000	1.072
Márttand	Ditto.....	9.5 $\frac{1}{4}$	5.7	0.900	0.930
Ditto	Porch. ....	12.11 $\frac{1}{2}$	8.7 $\frac{3}{4}$	1.520	1.441

#### XXXV.—*Intercolumniations.*

1.—The distance between the pillars of the Kashmírian colonnades, measured at the base of the shaft, is never less than 4 diameters. After a careful examination of all the examples, I have been unable to discover any rule, founded upon multiples of the diameter, that is suitable to the Kashmírian order. But I have found what appears to me to have been the practical rule used for determining the distance between the columns, which is, to make the interval equal to two-thirds of the total height of the pillar. The following table shows the results of this rule, side by side with the measured intercolumniations:—

		Height. Inches	$\frac{2}{3}$ Height.	Measured Intercols.
Márttand	Gate .....	209.25	139.50	138.00
Ditto	Porch .....	155.50	103.66	102.57
Ditto	Peristyle .....	113.25	75.50	81.56
Avantipura	Porch .....	174.17	116.11	114.25
Ditto	Peristyle .....	122.75	81.83	85.62
Bhaumajo	Pilaster .....	66.25	44.07	44.25

I suspect however that the height was determined from the intercolumniation, and that the latter was altogether dependent upon the number of pillars, or of recesses, which the architect was obliged to introduce within the limits of each side of the quadrangle.

2.—The Sanskrit name for an intercolumniation is *antarastambha*, अंतरस्तम्भ, or *antarapáda*, अंतरपाद, both of which are exactly equivalent to the Greek *μεσοστυλιον*, or “between-pillars.”

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### XXXVI.—*Pilasters.*

1.—Pilasters, or *kudya-stambha*, कुद्यस्तम्भ, “wall-pillars” as they are aptly called by the Hindus, are used in all the ancient buildings of Kashmír. They have the same three divisions of base, shaft, and capital, which distinguish the pillars of Kashmír from those of India generally. They have also the same proportions and the same mouldings of base and capital, and differ only in the decorations of their shafts. The earliest examples in the cave temple of Bhaumajo, have a plain simple panel upon the shaft. Those of the Páyach and Pándrethán temples are quite plain, while those of the great temple of Márttand, Avantipura and Pathan are divided into several panels, each decorated with a miniature relievo of the Arian temple.

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### XXXVII.—*Isolated pillars.*

#### 1.—*Column at Srinagar.*

1.—On the outside of the Jama Masjid, in the city of Srinagar, there is a small isolated pillar, which has not to my knowledge been noticed by any former traveller. Its top is crowned by a nearly perfect little temple with a roof of four stories, which alone is sufficient to render it one of the most interesting remains of the Kashmírian architecture. The base is nearly all hidden beneath the ground; but it was most probably a plain cubic block like that of the Avantipura pillar. Its shaft has sixteen sides, and its capital is similar to those of Márttand, but somewhat plainer and more massive. The little temple which crowns its summit is invaluable for the illustration of the Kashmírian style of sacred edifice, as it offers the only existing specimen of a four-storied roof—and of porch-pediment divided into two distinct portions, of which the upper half overlaps the under one. The same style of

pediment was undoubtedly used for the porches of Márttand, but only the lower portions of the horizontal mouldings are now remaining.

2.—*Pravareswara Symbol at Pándrethán.*

1.—The gigantic fragments which in plate VII. I have joined together into one lofty pillar, have attracted the notice of most European travellers. The largest piece, marked No. 1, in my Plate, is thus described by Moorcroft\*—“One large stone of a conical shape had the appearance of a *lingam*; but the peasants said it was a mark for the ball used in playing *chaugún*, employed by a race of giants who formerly dwelt there.” Vigne also calls it a *lingam*, which it undoubtedly is, as may be seen by a reference to Plate VII. This fragment is  $16\frac{1}{2}$  feet in height, and 6 feet 10 inches in diameter; the upper part being a spheroidal topped cylinder, and the lower portion a polygon of sixteen sides. There is also another large *lingam* 6 feet in height, but only 6 feet in diameter, and with no more than eight sides. I presume therefore that it was most probably not connected with the larger pillar.

2.—The fragment marked No. 4, in my Plate, is by far the most interesting of these remains. Moorcroft, continuing his former account, thus describes it:—“Another was pointed out as the goal, but proved to be the upper part and capital of a huge polygonal pillar, the shaft of which was seven yards in circumference. Traces of figures on its upper part were distinctly perceptible.” Vigne† calls it the “capital and five feet of the shaft of an enormous limestone pillar.” “The plinth,” he adds, “is much damaged, but enough is left to show that it was composed (at least I thought so) of four gigantic female busts.” The upper part is undoubtedly composed of four busts, or rather half-length figures, but they are most unequivocally males, and not females. The fragment is now lying upon its side on the top of a low flat spur which puts out into the plain, opposite the village of Lajan, between Pándrethán and Panthasok, and at rather less than half a mile from the Pándrethán temple. A view of its situation is given, at the top of Plate VII. where it is seen lying to the left of the restored pillar. This fragment is also a polygon of sixteen sides, with a diameter of 6 feet 10 inches. Vigne† states its thickness at “about 5 feet;” but the more

\* Travels, v. 2.—p. 241.

† Kashmír, v. 2—p. 36.

accurate Moorcroft makes the shaft "seven yards in circumference." My diameter of 6 feet 10 inches gives a *circular* girth of seven yards and somewhat less than six inches. The true diameter may therefore perhaps be only 6 feet 9 inches, which would give a circumference of 7 yards and  $2\frac{1}{2}$  inches; for Moorcroft's measurement was the aggregate of the 16 sides, which would of course be somewhat less than the circumference of a circle of equal diameter. The difference between our measurements is therefore almost too small to be worth notice.

3.—Moorcroft's statement\* that no other remains of sculpture were discoverable in the immediate vicinity of this large fragment, shows that he did not, on that occasion, make use of the same active research as was his wont. For by cutting away the bushes behind the upper part of the stone, I found two different portions of the heads of these gigantic busts, of which unfortunately the more perfect one fell to pieces in turning it over. The other fragment is that which I have inserted as No. 3 of Plate VII. in the restored sketch of the pillar. The mouth is ten inches long. The portion marked No. 2 in my sketch is conjecturally supplied from a large head which I found amongst the ruins of Avantipura. As the treatment of the hair is similar to that observed with the human-headed birds in all the temples of Kashmir, it is probable that my proposed restoration preserves the general style, although perhaps not the actual details of the original.

4.—The upper portion or great *lingam* No. 1, is situated at a few hundred yards from the last, on the side of the sloping bank; and on the plain below is the fragment marked No. 5 in my Plate. This is called *baror*, or the "cat," by the Kashmirians, from some fancied resemblance to that animal. Vigne† calls it a "large block on which are rudely sculptured the knees and legs of a gigantic sitting figure." The knees are certainly not visible now, and I fancy that Vigne must have been mistaken in his supposition about them.

5.—In restoring the different portions of this pillar to what would appear to have been their original positions, I have been guided chiefly by the identity in the dimensions and in the number of the polygonal faces of the two principal fragments, and partly by the near positions which

\* Travels, v. 2—p. 241.

† Kashmir, vol. 2, p. 36.

the different pieces now occupy with regard to each other. Vigne calls the distance from the principal fragment No. 4, to the base piece No. 5, about "half a mile." But he is certainly wrong; for the whole distance between the hill upon which No. 4 fragment is lying, and the Pándrethán temple, is somewhat less than 700 yards, and the base piece No. 5 stands about half way between them.

6.—My belief is that the pillar originally stood in its present position as shown in the view in Plate VII. ; and that it was cut out of the solid rock by the quarrying away of the hill on all sides. The total height must have been fully 36 feet; for I have not added a single piece to the remaining fragments, excepting only the necessary restoration of the upper parts of the heads. The style of long-plaited tresses appears to be similar to that which was usually given by the Greeks to their caryatid figures; a specimen of which from Athens is shown in Plate VII.

7.—Vigne\* has hazarded a conjecture that the large fragment No. 4 is the capital of a great *Garuda* pillar, which was erected at Parihasapura; and that it was removed to its present position perhaps by Sankara Varmma. But as it has already been shown that the largest stones which the Kashmírian architects were in the habit of using in the temples do not weigh more than 17 tons, it is scarcely possible that this vast fragment, which contains 375 cubic feet and weighs upwards of 28 tons, would have been selected for removal from Parihasapura to Pándrethán, a distance of 20 miles. I have already stated my belief that this gigantic *lingam* was cut out of the solid rock in the very spot where it now lies prostrate. Vigne mentions the "flat surface" which has been cut in the rock close to it; but he does not notice the existence of a large rough square plinth upwards of seven feet across, which is also hewn out of the solid rock in the middle of this platform, and on which I believe that the pillar formerly stood.

8.—If I am correct in my restoration of these various fragments into one gigantic *lingam*, the period of its erection is, I think, ascertained beyond all doubt in the following verse of the Raja Tarangini, B. 3—  
v. 99 :—

समाट्चक्रं निर्माद्यः पूर्वं प्रवरेच्चरं ।

पुण्याः पुराणाधिष्ठाने प्रतिष्ठा विविधा व्यधात् ॥

which is thus rendered by Troyer :

\* Kashmír, vol. 2, p. 37.



“Après avoir erigé un symbole dédié à la divinité suprême, joint à un cercle mystique, il consacra plusieurs-sanctuaires dans l’ancienne capitale.”

In this version the words “la divinité suprême” are a translation of *Pravareswara*, which was the name of the Saiva symbol erected by king Pravareswara ; and the words “l’ancienne capitale,” are a translation of *Puranadhishtána*, which is now called Pándrethán. The consecration of a famous *lingam* at Pándrethán is therefore clearly attributed to this Prince, and as it is the only one mentioned throughout the history, there is every probability that the gigantic Priapian fragments now existing are the remains of the Pravareswara symbol. This Prince reigned from A. D. 400 to 415. His pillar is therefore the oldest authenticated column in Kashmír.

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### XXXVIII.—Concluding Remarks.

1.—I have now given a complete description of all the existing temples of Kashmír, with a detailed account of the different parts and various mouldings of which these edifices are composed. I will therefore close this long notice with a few general remarks upon the Kashmírian style of architecture, to which I have ventured to give the name of the **ARIAN ORDER**. Even at first sight, one is immediately struck by the strong resemblance which the Kashmírian colonnades bear to the classical peristyles of Greece. This first impression is undoubtedly due to the distinct division of the pillars into the three members—base, shaft, and capital, as well as to the fluting of the shafts. On further inspection the first impression is confirmed by the recognition that some of the principal mouldings are also peculiar to the Grecian orders, but more especially to the Doric. Thus the *echinos*, which is the leading feature of the Kashmírian capital, is also the chief member of the Doric capital. A still closer examination reveals the fact that the width of the capital is subject exactly to the same rules as that of all the classical orders excepting the Corinthian.

2.—Even the temples themselves, with their porches and pediments, remind one more of Greece than of India ; and it is difficult to believe that a style of architecture which differs so much from all Indian examples, and which has so much in common with those of Greece, could have been indebted to chance alone for this striking resemblance.

Professor Willis admits the probability that the Kashmírian pediments may have been borrowed from those of the Syrian Greeks, and he finds his opinion upon the fact that the trefoiled arch of the Kashmírian temple rises high into the tympanum of the pediment ; a practice which was not introduced into the classical architecture until after the commencement of the Christian era. But the Professor had not I believe, seen any examples of the older Kashmírian buildings, such as the enclosing walls of the temple on the Takht-i-Sulimán and of the tomb of Zein-ul-áb-ud-din, as well as the perfect little cave temple of Bhau-majo. Of these specimens the first dates as early as 220 B. C. at which time the Kábul valley, and even the western Punjáb, was occupied by the Bactrian Greeks under Euthydemus and his son Demetrius. If therefore it is admitted that the Kashmírian architects have been indebted to those of Greece for their pediments, for their fluted columns, or even for any of their minor details, I think that they must certainly have borrowed them from the temples of their immediate neighbours the Bactrian Greeks, and not from the buildings of the distant Syrian Greeks. I think also that had these pediments been imitated from the later Romanized examples, the copyists would scarcely have overlooked the structural arches which occupy their pediments. In fact the forms of the principal Kashmírian mouldings, which are all *quirked ovolos*, or *echini*, could only have been borrowed from the pure Greek style of an earlier period than the Roman innovation of circular segmental mouldings.

3.—Another striking resemblance between the Kashmírian architecture and that of the various Grecian orders is its stereotyped style, which during the long flourishing period of several centuries remained unchanged. In this respect it is so widely different from the ever-varying forms and plastic vagaries of the Hindu architecture that it is impossible to conceive their evolution from a common origin. I feel convinced myself that several of the Kashmírian forms and many of the details, were borrowed from the temples of the Kabulian Greeks, while the arrangement of the interior and the relative proportions of the different parts were of Hindu origin. Such in fact must necessarily have been the case with imitations by Indian workmen, which would naturally have been engrafted upon the indigenous architecture. The general arrangement would therefore still remain Indian, while many of the details, and even some of the larger forms might be of foreign origin.

4.—As a whole I think that the Kashmírian architecture, with its noble fluted pillars, its vast colonnades, its lofty pediments, and its elegant trefoiled arches, is fully entitled to be classed as a distinct style. I have therefore ventured to call it the “ARIAN ORDER,” a name to which it has a double right; firstly, because it was the style of the *Aryas* or *Arians* of Kashmír; and secondly, because its intercolumniations are always of four diameters, an interval which the Greeks called *Araiostyle*.

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*Narrative of a Journey to Cho Lagan (Rákas Tal), Cho Mapan (Manasarówar), and the valley of Pruang in Gnari, Hundés, in September and October 1846. By HENRY STRACHEY, Lieut. 66th Regt. Bengal N. I.*

(Concluded from page 182.)

10th October.—Parties of Hunias, mostly Khampa, frequent Byáns at this time of the year, for the usual traffic, bringing sheep with salt and borax to be exchanged for grain. One of these, now encamped at Gárbia, inform me that they are Khampa, natives of “Chang,” i. e. the province of which Digarcha is the capital; Kham proper, the original seat of their tribe, is a long way off, between U, i. e. the province of which Lhássa is the capital, and Gyánák, i. e. China, and they know little or nothing about that country, as their families have been long since settled in the vicinity of Digarcha, and their trading excursions have always been in this direction, away from Kham.

Immediately east of the mountains which bound that side of Cho-Mápán near the *Sámo-tokchim Tarjum*, in the district of Hor Tol, rises a stream, *Chima-Yungdung*, so named from the profusion of the sand, “*Chima*,” which covers the ground about, probably the same granitic debris that spreads for miles around the base of Mounongli. This river flows eastward past Digarcha and Lhássa, and informants recognize the name of “Bráhmápútra,” as applied to it by the Hindus of Nipál; or pretend to do so, for I am not sure that the Nipalese do identify the river as the Bráhmápútra.

The Gángri range of mountains subsides at *Tankcham-Tarjum*, the next east from *Sámo-tokchim*. Hor Tol is *Jang-tang*, i. e., untilled pasture ground, and belongs to the province of Gnari, subject to the

Garpun of Gartokh : the people of that ilk have the reputation of being great thieves ; their head-man is "Goba Lobjang."

Beyond Hor Tol, eastward, lies the district of Tosher, by some pronounced Doshel, also *Jang-tang* ; it is subject to the Zungpun of Sáku Zúng, or Sáka, which is the centre of the province next east of Gnari ; how far from the Nipál frontier uncertain.

Bhotias brought me the skin of a *Barji*, the brown bear, which Traill has improperly called "Tawny : " the color is not tawny, i. e. tenny, which implies a tendency to yellow, but a fair umber brown : some people have an idea that this beast is white or turns white in winter, which the Bhotias assured me is never the case. Maximum thermometer in sun 92° ; in shade at sunset 46°.

11th October.—Hoar frost at sunrise ; thermometer 32° ; maximum in sun during the day 82° ; at 4 P. M. 50°, boiled at 194° ; elevation of Gárbia 10,272 feet.

The barley here is now under the sickle, but much of it seems still imperfectly ripe, and I doubt whether all of it ever can ripen properly, the due quantum of sunshine being so much curtailed by the high surrounding mountains at all times, and throughout summer by the constant clouds. The gooseberries appear to be in the same predicament ; no great loss, for they are utterly worthless.

I must mention, once for all, a strong south wind prevails here, and which is of universal occurrence in all the Alpine valleys of the Himálaya, penetrating also to the north side of the snowy ranges, where there is an opening through the chain of mountain, as I observed it in the valley of Pruang, and other travellers have noticed the same in Kunáwar.

In Jwár the village of Martoli is notorious among the Bhotias for its "Pon,"\* being from its elevated site towards the bottom of the valley particularly exposed to the current of air from the lower regions. This wind appears to be the end of the great westerly current which prevails over the continent of northern India, and here impinging on the south-western face of the Himálaya, enters all the valleys that debouch in that direction. It here follows the universal custom of rising at mid-day and attaining its greatest intensity in the afternoon. They say that this Bhotia "Pon" reverses its direction, blowing down the valleys at

\* "Wind."

night ; I was always too fast locked in sleep to attest this fact myself, but I had it from the best Bhotia authority, Hirdu Budha, Thokdar of Chaudáns.

It is also observable that immediately over all the principal mountain-torrents, a very strong wind blows in the direction of the current, and in strength proportioned to the volume and rapidity of the stream ; this I take to be a mere mechanical action of the moving water by which it drags along with it the superjacent stream of air in contact with its surface. On my way up here in the beginning of September, when distressed with the great heat of the lower vallies, I often experienced much relief, by sitting on the banks of the streams or on the bridges, in these cooling currents of air.

*Budhi, 12th October.*—Maximum Thermometer in sun during the afternoon  $104^{\circ}$  ; at  $2\frac{1}{2}$  P. M. in shade  $62^{\circ}$ , boiled at  $197^{\circ}$  ; elevation 8600 feet ; the village is 150 feet higher, i. e. 8,750 feet ; Thermometer at sunset  $52^{\circ}$ .

Another party of Khampa Hunias, one of them a decent-looking man, rather intelligent and understanding a few words of Hindustani, gave me the following information.

Four rivers rise from Gangri, according to Tibetan mythology, from the mountain itself or the lakes ; in geographical fact (which informant properly distinguished from the legend) from their vicinity nearer or further, they are,

1st. (The Indus) ; *Sing-Chin (or Jing) Kamba (or Kampa)* on the northward, fabled to spring from the mouth of the Lion, (Sing ?)

2nd. *Lang-Chin Kamba* on the westward (the Satrudra or Sutluj) from the mouth of the Ox (Lang.)

3rd. On the southward *Mapchu Kamba* (the Kárnáli) from the Peacock (Mapchu.)

4th. The Brahmaputra, to the eastward, *Tamjyak Kamba*, from the Horse (Tám ? or Tamjyak ?)

In his exploration of the Sutluj in 1819, Herbert obtained the same names for these four rivers, allowing for differences of corrupt pronunciation by illiterate informants. (Asiatic Researches, 1825, Vol. XV. Art. VI.)

*Chima Yungdung* is the local name of the sandy ground in which the last river rises : it is said to originate in springs. East of its source in

Hor-Tal, this river takes the name of *Eru-Zhungbu*, or as Turner has it, *Erl dwomboo*, by which it is known at Zhigatze and Lhasa.

In Hor-Tal, somewhat this side (i. e. west) of the Tankcham, Tarjum, which is the next east of Samoo Takchin, there is a third lake, the Gungyut. Cho, similar to Lagan and Mapan, but smaller.

The Tarjum, next east of Tanksham, is Tukshum, in the district of Toshel.

Hor-Tal is the most eastern district of the Gartokh Iláka, and Toshel the most western of the next province, (name unknown) under the Zungpun of Saka, (or Saku-Zung.) The boundary between the two provinces is the La of Maryum, i. e. a hill ridge over a village of the latter name. The country to the west of this is called Todh Gnari Lungba, i. e. the province of Upper (or further) Gnari, or simply Gnari. It once formed the easternmost province of the dominions of Ladak, a circumstance which gave a pretence for the claim and invasion of the Sikhs under Zorawar Singh, after their conquest of Ladak proper.

The Gangri mountains subside about Maryum La ; probably the La itself is a terminating spur of the Gangri range ; beyond that, eastward, extends table-land with smaller, more irregular and detached hills, all the way to Lhasa, and as far as informant knows to the northward.

East of Maryum La, the general name of the country to Lhasa inclusive is *Bod*, (Unde, Indian name *Bhote* ?) but it is doubtful to me whether this does not comprise the whole of what we call Tibet, including Ladak and Balti on the north-west, and perhaps Kham on the north-east.

Jung Gáldáng Phropang, (i. e. realm of the Emperor's sway, or something of the sort,) appears to be rather an extraneous political designation, than a native proper name indigenous to the land and its people, and if the term was rightly explained to me it looks like a recent introduction by the Chinese since the growth of their power in that quarter.

The Hunias know China proper by no other name than Gyanak, and the Chinese are, Gyami. Guinak, the capital of Chinese Tartary, is in fact a city of Nibelungen, built by Moorcroft. Peking is Tashi-tikur, i. e. the city of ten thousands.

The above may explain the information got by Herbert from the

Sayana of Namja in Hangarang, that the country beyond Shipki is called by the Kanawaris Jang, by the Tartars Galdang Paprang; beyond it is Kamling (i. e. Kham?) and Gehna (i. e. Gyának?)

The term *Jang-Tang* merely denotes uncultivated pastoral high lands in contradistinction to *Rung-Tang*, which signifies low lands, with villages and agriculture; thus the people of Ladak call the district of Rudukh on their eastern border, Jang-Tang, as being more bleak and unreclaimed than their own sheltered and less elevated vallies: hence also the appellation of *Rungba*, by which the Hunias designate all the Bhotias from the south-side of the Himálaya. The remains of an old boundary wall at Chirchun (which the Jwaris stupidly omitted to show me, when I was there in June last), are called *Jang-tang*, *Rung-tang*; the wall was raised, according to tradition, to mark the frontier between Hundes and Khasdes, or some fraction of it, for parts of those countries, and absurdly enough at this point, the boundary being defined beyond all mistake by the natural barrier of the snowy range, which here separates the northward and southward rivers by a single mountain ridge; a better debateable land might have been found a few miles to the westward at Laptel, where the river, though rising on the north of the double snowy range of Jwar, in a valley easily accessible to Hundes, turns southward again into the Girthi valley south of the Niti passes.

The southern part of Gnari is called Gugi, (or Gokey,) which includes the valley of the Sutlej, perhaps all the way from Kyunglung, and the plain of Gyanima to the Shipki frontier.

On the north side of the Gangri mountains is a valley high, Bong, or Bongbwa, Tal, Jang-tang, inhabited by shepherds, and salt carriers. North (and east?) of that are the salt and Borax fields, and north (east?) of them the Gold mines, which appear to be the Ultima Thule of Gnari.

Pashm (Shawl Wool), is produced abundantly in the eastern provinces of Bod as far as Lhasa, though not equal perhaps in quantity or quality to that of Gnari. The people of U-Chang, (i. e. the provinces about Lhasa and Digharcha) are so ignorant and unskilful, that they use up their Pashm along with the wool, even for the basest purposes, such as making ropes, &c. The superior quality of the Ruddukh Pashm arises not only from the coldness of the climate there, but also

from the skill of the Ruddukh-pa, in combing it out without shearing the fleece; in Gugi and Pruang, where this article forms a small, and that illicit, fraction of their trade, the people are content to shear it along with the hair, from which it is afterwards picked with much trouble. Of late a few Bisehir people have been taking a little Pashm, (twenty or thirty cooly loads yearly) through Pruang by Humla and Jumla to Bairaj, i. e. Baraich, in north-eastern Oude (formerly a flourishing town and mart of importance), whence merchants buy and take it to Lucknow, and it is there disposed of to one or two Cashmiri Shawl weavers, who have lately settled in the city.

Informant thinks that if there were any steady and remunerative demand for the Pashm in Kumaon and Gurwal, it would not fail to find its way across the frontier, notwithstanding the Ladak monopoly; for the Lhassan authorities in Gnari, are not incorruptible (except in matters of foreign intercourse), and have no other agency for effecting the prohibition than the people themselves, who are interested in evading it, most of them having flocks which produce the shawl wool, but no manufacture that can render it worth keeping in their own hands. Moorcroft in 1812, found the Garpan themselves ready to dabble in the contraband traffic, and they are known to do the same to this day.

The Nipalese have little intercourse with Gnari: being ignorant of shawl manufactures, they have no demand for the staple product, Pashm, and for every thing else, they have as good and better markets on their own frontier, and especially in U-Chang, to the eastward. A few of the Gorkhas visit Gangri on pilgrimage, but they seem to be prohibited from mercantile traffic with Gartokh. Of the western districts (as already mentioned), *Dúng* and Marma have a small trade with Pruang through Byáns, and Bazinjia by Dhuli.

The Gorkhas pay tribute to China, their Vakil taking it all, or part of the way to Peking, probably to Lhassa only, every third year; the payment is nominal, being usually equalled or exceeded by the value of presents given in return by the Chinese to Nipal; but it is doubtless still understood as an acknowledgment of the imperial supremacy.

The Humla pass, following the opening made through the snowy range by the valley of the Karnali, is very much easier than any of the other routes, in the British Himálayan frontier at least, though in the middle of winter, the higher parts of this road are of course dif-



ficult and even dangerous. The people of Humla and Jumla are said to be such a lawless set, and so little restrained by the weak Government of the Gorkhas, that traders would have no great security by this route, even if the opening into Pruang were not barred, as now by the Chinese system of Lhassa.

After this the Khampa treated me to one of their complimentary chorusses; the whole party of them, half a dozen men and women, joining hands in a semicircle, sang together, if such an unmusical noise could be called singing, keeping time with a most uncouth swinging and swaying motion,—as good dancing as their song was music. On the British side of the snow, this performance is generally expected to terminate in *bakhshish*, and my Khampa would not stop till I silenced them with my silver.

*Budhi, 14th October.*—Thermometer at sunrise 42°. The air filled with what appeared to be the larvæ of Locusts? or the *Lamæ*, as they might as well be called; they seemed to be the same sort of animals, whose skeletons I saw on the top of the Gori Glacier in Jwar last June. Thermometer at sunset 54°.

*Golam La, 15th October.*—A very stiff march; 6½ miles on the map, occupying 7½ hours. Having started with all my people rather late, i. e. at 7½ A. M. I got my breakfast at Golam La by 4 P. M. The road from La-mare to this is very precipitous, in steep and narrow steps, the greater part of the way, and yet I got over the worst places in a *Dandi*\* (being lamed by tight shoes). The Bhotias were very clumsy at this work, being quite unaccustomed to it, but managed to tumble along somehow by dint of main strength; and as for ease to myself it was merely a transfer of exertion from legs to arms to keep my seat under the violent tilting to which the *Dandi* was subjected.

This road would be utterly unfit for riding on; indeed it would be bad for a led horse.

As well as I can make out, *La* in the Bhotia language signifies a large rock, and these two places, La-mare and Golam-la, derive their names from the great boulders lying upon the encamping grounds. Thermometer at sunset 60°.

*16th October.*—*Golam-la.* Thermometer at sunrise 50°; at 7 A. M. 52°; boiled at 198°; elevation 8000 feet; the confluence of the Nanggarh with the Kali is some 15000 feet below.

\* A hill litter.

I found the march from Golam-la to Gala easier than yesterday's journey; though in steep steps a good part of the way; one main ascent and descent across Nirpaniah, is less troublesome than the succession of rugged ups and downs, between Budhi and Golam-la; this stage too is better shaded than the other, an advantage even at this season, the mid-day sun being still too hot.

We met a smiling rosy-faced *Tinker* on the top of Nirpaniah, who gave me a drink of water, and informed me that his pass is not so easy as Lipu Lekh, and the snow on it more troublesome, because his village has but 5 or 6 *Man* (families) whose small traffic is insufficient to make a good beaten path, Gala; comfortable quarters again in the cottages which afforded us so opportune a retreat in the three days' deluge of 18th to 20th September. Thermometer at 4½ P. M. 62°, boiled at 199°; elevation 7500 feet; the Kali hidden by the steepness of the ravine, is perhaps 1500 feet below.

Thermometer at sunset 66°; the sudden rise of temperature caused, I believe, by clouds which gathered in the evening.

17th October.—Gala.—Thermometer at sunrise 49°; marched to Titil Sosa, so Hirdu Budha names the encamping ground between his two villages. Thermometer at 4½ P. M. 62°; boiled at 198°; elevation 8000 feet; Thermometer at sunset 57°.

18th October.—Titil Sosa.—Thermometer at sunrise 50°: marched to Kela. Dárma Bhotias inform me that they call their river the Dárma Yankti; others say the Gori, which is also the name of the Jwar river. The names Kali and Gori are derived from the peculiar color of the water of those rivers at their sources. The Khasias of Kela call the Dárma river Dhauli, as down on the map; and Patwari Doorga Dutt thinks that this name is supported by the authority of the Puráná, which treat of these localities. Nyne Dhura, the eastern pass of Dárma, is a little stiffer than Lankpya (of western Byáns). The Glacier lies on the north side of it towards Hundes. The one *man* and some 100 laden sheep were lost this year, not on the Glacier, but by an avalanche which overwhelmed them at night in their encampment at Dawa, the *Dakhna* of the pass; this side, Kach, the western pass of Dárma, has Glaciers on both sides: some say it is dangerous and not frequented. Leburn Dhura, from Dárma into N. western Byáns, still frequented, is steepish and snowy; but not so high as Lankpya; the

18,942 feet of the map is undoubtedly a mistake, perhaps for 16,942. The pass into Rálám of eastern Jwar by the Phula Yankti between Sibú and Marcha of Dárma, is difficult or dangerous and rarely traversed. Rálám is a colony from Dárma and the alliance is still maintained between the two (by intermarriage, &c.), the Bhotias of Rálám holding little intercourse with the rest of the Jwáris. Gyuc-Dhura, from Sela of Dárma, to Kunti of Byáns, by the Pechko-Gankti, is difficult but still traversed; this year, one crossing the pass found the bracelets and other remains of a Dárma woman who eloped this way some years ago and perished in the snow along with her abductor. The Sobhula and Balch route into Munshari (traversed by Commissioner Trail) is always easily passable in summer; it can hardly be called an inter-Himálayan pass, being below the south end of the Páñch-Chula snowy range, and probably not much higher than Chipula, 13,500 feet, to which the Balch ridge adjoins on the south. Not a single head of cattle, informants aver, is left in Dárma except one or two of this season's importation from Hundes, and many of the sheep and goats have died of the same murrain: the village lands have been thrown out of cultivation for want of cattle to plough.

Kela is renowned for the excellence of its ghee, to which I can myself bear testimony, having swallowed a quantity of it in Bhauna's tea when we were in Hundes.

Thermometer at  $4\frac{1}{2}$  P. M.  $72^{\circ}$ , boiled at  $204^{\circ}$ ; elevation 4750 feet: the confluence of Dhauli (alias Gori, alias Dárma Yankti), and Kali, about 1000 feet below; Thermometer at sunset  $69^{\circ}$ .

19th October.—Kela.—Thermometer at sunrise  $58^{\circ}$ . Patwari Durga-dutt takes his leave; he is an excellent sort of person, deserving of more Parwasti, than he has hitherto obtained.

March to Relagarh.—Thermometer at  $4\frac{1}{2}$  P. M.  $78^{\circ}$ , boiled at  $205\frac{1}{2}^{\circ}$ ; Kali 300 feet below. Thermometer at sunset  $68^{\circ}$ : elevation of confluence of the Relagarh with Kali river, trigonometrically (?) by Webb, 3794 feet.

20th October.—Relagarh. Thermometer at sunrise  $57^{\circ}$ ; marched to Dharchula. Thermometer at 5 P. M.  $69^{\circ}$ , boiled at  $207^{\circ}$ ; elevation 2750 feet; Kali 150 feet below; Thermometer at sunset  $67^{\circ}$ .

21st October.—Relagarh. Thermometer at sunrise  $56^{\circ}$ ; heavy dew; march to Balwakot, very picturesque scenery all the way, through wild

forest, along the course of the river, and climate now pleasant; Thermometer at 5 P. M.  $67^{\circ}$ , boiled at  $208^{\circ}$ ; elevation 2250 feet; Kali close below; Thermometer at sunset  $56^{\circ}$ .

Here I found the dirty Jogi, whom I had met at Askot on the 10th September; he grinned foolishly when I had told him what I had seen of Kailas and Manasarowar, and then propounded his own ideas about the lake and mountain, which were silly and superstitious.

22d October.—*Balwakot*. Thermometer at sunrise  $53^{\circ}$ ; heavy dew.

Bhauna (with Anand) made his appearance this morning. From his delay I had apprehended that something had gone wrong with him at Takla-khar, with reference to our illicit visit to Hundes; but happily nothing of the sort occurred, his stay in Pruang being protracted for his own pleasure, and some delay in collecting the money due to him (from Deba Chakwa and others) on former transactions. Chakwa himself is in Lhasa now, but has an agent still resident in Takla-khar. Bhauna met the usual cordial reception from his old *Mitr*, and *Aradh*, (trading-correspondent) Angdah the Tidyā Makhpan, which was the more good-natured as the Makhpan forthwith taxed Bhauna with his contraband introduction of the *Feling*, and seemed well assured of the fact, though stoutly denied by the offender. I suppose that his information must have come from some of the Hunias at Ningri, whom I had there allowed to stare at me without let, and these doubtless passed the report on to Tidyā; subsequent notice from the *Dúng* on the north of Toiyon, where we were encamped on the afternoon of the 7th instant, might have shown that we had come from the northward, and passed through the middle of Pruang by night, Bhauna indeed finding the ground safe, sufficiently owned the impeachment by propounding excuses for the act in question, on the score of his necessary subjection to the orders of his English Masters. The Makhpan observed, that as we had not been openly caught in the fact nothing further need be said about it; indeed as we had succeeded in effecting our passage through his district, his own interest required absolute silence on the subject, for if known to the Lhasan Governors their resentment would attribute our success to the Makhpan's negligence or connivance; and in their barbarous code, the admission of the meanest stranger into the country, is high treason. If it were not for this fear of his tyrannical masters, old Angdah said that he would be most happy to give a

welcome reception to any one, black or white, introduced by his friend Bhauna; and this I know is the feeling of many of the respectable natives of Gnari. At the time of our visit Pruang Zungpan was fortunately away from Takla-khar, attending on the Garpun, or Ship-chet, or Garpun, lately arrived from Lhassa, and then encamped at Barka: and this explains the report we had from the shepherds of Chujia Tal on the 2nd instant. I have not been able to ascertain precisely, who these dignitaries from Lhassa were: according to Bhauna, (who is by no means accurate,) there was a Garpun, an officer of higher rank than the Garpun, accompanied by one "Charon." From Jwári Bhotias, (who are better authority,) I afterwards learned that before they had left Gartokh (end of September) "Charon," the same that was Chaprang Zungpun from 1843 to 1845, had arrived from Lhassa, in the capacity of "Ship-chet," a sort of Special Commissioner, deputed to investigate and administer the affairs of the province, on this occasion more particularly to remove from his office for certain previous offences in a former situation, the senior Garpun, Dhinkar-sah, whose successor, Tannakar Gajjun, had not arrived when the Jwáris left Gartokh; perhaps he was now one of the party at Barka.

With some hesitation, after Bhauna hinted at the extreme probability of Angdah being appointed Tokdar of Tidyah on a salary of 50 Rs. per month when the English took possession of Pruang, the Makhpan directed his son Angil to write down some items of information which I had commissioned Bhauna to bring from Pruang: Bhauna being illiterate in the Tibetan language though proficient in the dialect of Gnari colloquially, interlined Angil's notes with a transcript of the Hunia words in Hindee characters, the result of which document I shall give at the end of my journal, much augmented and corrected by other information derived from the most reliable of the Jwári Bhotias.

*Garjia Ghat, 22nd Oct.*—The valley of the Kali between Dharchula and this, which on my way up—11th to 13th September, was pestilentially hot, has now got cool and pleasant, but I doubt its salubrity yet; the little Quinine I had with me was not a tenth part of what was required by the Fever and Ague patients who crowded round me from every inhabited place this side of Kela.

The Rajbari Karinda (agent) caught two of the *Bán-mánus*, the wild men of Chipula, for my inspection. I saw nothing very remarkable

about them, except an expression of alarm and stupidity in their faces, and they are perhaps rather darker and otherwise more like lowland Hindustanis than the average of Kumaon Paharis. I imagine they were *dressed* for the occasion: one of them brought me a *Nazar*, a miserable fowl, in a wooden bowl of their own manufacture. They are civilized enough to make these wooden bowls for sale or barter in the villages of Askot, whence they supply their few wants. They live under temporary Chappers, frequently moving from place to place amidst the jungles of Chipula; their principal subsistence being certain edible roots of wild plants and what game they can catch, and they occasionally get presents of cooked food from the villagers. They have a dialect of their own, but some of them can communicate with their civilized neighbours of the villages in Pahari Hindi: all that my visitors would say in my presence was in answer to a question on that head,—that there were five or six ‘maw’ (families) of them. The Askot people could tell me nothing at all about the history of these *Bán-mánus*: but I imagine they are the people whom Traill calls Rawats or Rajis, a small remnant of the aborigines of the Hill country, or of an ancient tribe driven into the jungles by subsequent invaders from the lowlands.

It is a pity that some effort is not made to reclaim them from their bestial mode of life; they are a quiet, inoffensive set of people, and might probably be found tractable to civilization.

The river (Gori) here has subsided very much since we crossed it, 10th September, by a Jhula of cables. A large rock now dry in the middle of the stream affords a pier for two Sangas, which the Askotites have built in such a cutcha fashion, that a few days since some of them were thrown off (by the swaying of the loose timbers), and had a narrow escape of drowning. One of the iron suspension bridges would be a great convenience here, this ghat being the only direct communication with lower Kumaon for the districts of Dharchula and Kela, (Khasia;) Chandans, Darma, and Byans, (Bhotia.)

Thermometer at sunset  $63^{\circ}$ ; boiled at  $208\frac{1}{2}^{\circ}$ ; elevation of Garjia Ghat, by Webb, 2,094 feet; Barometrically b. t. 1918 feet. The confluence of the Gori with the Káli,  $1\frac{3}{4}$  miles below this, is 2059 feet above the sea level (by Webb’s book). Jhula ghát on the Káli, a running distance of 14 miles below the confluence, is 1875 feet, so that the fall between the two is 184 feet, being at the rate of 13 feet per mile.

23d October.—*Garjia Ghat*; thermometer at sunrise  $52^{\circ}$ ; Dew.

*Askot*.—Camp 50 feet higher than the village. Thermometer at  $4\frac{3}{4}$  P. M.  $76^{\circ}$ , boiled at  $204^{\circ}$ ; elevation, trigonometrically by Webb, 5089 feet. Thermometer at sunset  $63^{\circ}$ —(elevation b. t. 4519 feet).

24th October.—*Askot*. Thermometer at sunrise  $53^{\circ}$ ; Dew.

*Singhali Khan*.—Camp 50 feet below the Khan (Pass). Thermometer at sunset  $60^{\circ}$ , boiled at  $202^{\circ}$ ; elevation of pass, 5,650 feet.

25th October, *Singhali Khan*.—Thermometer at sunrise  $50^{\circ}$ .

*Satghar*.—Major Drummond's hut at 100 feet below the top of the pass; thermometer at sunset  $59^{\circ}$ , boiled at  $201\frac{1}{2}^{\circ}$ ; elevation of pass 6,000 feet.

26th October, *Satgarh*.—Thermometer at sunrise  $50^{\circ}$ .

27th October, *Petoragarh*.—Drummond's house (25 feet higher than the fort, which by Webb is 5,549 feet), 5,574 feet above the sea by barometric measurement; Thermometer at 5 P. M.  $64^{\circ}$ ; boiled at  $202\frac{1}{2}^{\circ}$ , (Elevation b. t. 5,328 feet).

28th October, *Kantaganu Bungalow*. Thermometer at sunset  $64^{\circ}$ , boiled at  $205^{\circ}$ ; elevation 3,900 feet.

29th October—*Dhargarah Bungalow*. Thermometer at sunset  $65^{\circ}$ , boiled at  $204^{\circ}$ ; elevation 4500 feet.

31st October.—*Lohaghat*, (Ramsay's house.) Thermometer at sunset  $63^{\circ}$ , boiled at  $202^{\circ}$ ; elevation b. t. 5,630 feet. Webb makes one of the houses here 5,649 feet, the Hospital, I believe; they are all near the same elevation.

1st November—*Pharka Bungalow*; elevation by Webb 5,914 feet; Thermometer at sunset  $61^{\circ}$ , boiled at  $201\frac{1}{2}^{\circ}$  (b. t. 5,880 feet).

3rd November.—*Deo Dhura*, (vulgo Dee) *Bungalow*, elevation by Webb, barometrically 6,867 feet. Thermometer at sunset  $53^{\circ}$ , boiled at  $199\frac{1}{2}^{\circ}$  (elevation b. t. 6948 feet.)

4th November.—*Dol Bungalow*. Thermometer at sunset  $52^{\circ}$ , boiled at  $201^{\circ}$ ; elevation 6,100 feet.

5th November.—*Almora*.

## APPENDIX.

The present ruler of the Lhasan dominions, Bod-chi-Lama, is Kushu Gewah Ringborchy, of which terms the first and last are titles, and perhaps the *Gewah* also; as imported in the general title here given (by Tidyá Makhpan), he is the ecclesiastical head of the Budhists of Tibet, of the prevailing sect, at least; the *Gelukpa*, the same as called elsewhere Dalai Lama, and Putala Lama, *Putalah* being the name of his monastic residence near Lhasa. The Bod-chi-Lama, is properly vested with the supreme control in temporal, no less than spiritual affairs throughout his own dominions, and in former days I imagine, that it depended very much upon the personal character of the reigning individual, what part of his temporal power was delegated to subordinate ministers; but of late years the predominance of Chinese influence at Lhasa has probably relieved the Lama from all the cares of governing his own dominions; under color of his name, and through the agency of Lhasan ministers, the country is ruled in fact by the Resident Imperial Commissioners.

Formerly the Chinese Deputy at Lhasa was an *Amba*, Military Resident (?), with a regiment of 500 Chinese soldiers. Two or three years ago two Gyámi, came to Lhasa, of such mean exterior that they attracted no notice, till after some time spent in private enquiries and observations, they suddenly produced their commissions and assumed the supreme authority under the style of "*Tungtang*," which they still hold; the *Amba* with his regiment of 500 remaining under their orders.

Kushu Panjan Ringborchy, is the present *Chan-i Lama*, (that is, superior of the province of "*Chang*," of which Digarcha is the principal town, Zhigatz Zung, the fortress, and Teshu Lumbu, the monastic residence,) a degenerate successor, and according to the superstitions of Tibet, a re-incarnation of the great Teshu Lama, Punjun Irtinnee, of Turner, who 70 years ago was in the fullest exercise of the political administration of his province and enjoying great influence beyond it, throughout the countries of Tibet and China. Chinese usurpations must now have reduced the Lama of Chang to the insignificance of a mere monk like his senior brother of Bod.

The principal officers of state in Lhasa, and actually employed in



the executive under the control of the Chinese “Tung-tang, are as follows :

1. The (*Bod-chi*) *Gelpu*, now by name Dorchey-chang ; the Wazir, or Prime Minister.

2. The *Kalan Sechu*, and

3. *Kalan Sheta*, according to Angil ; but the Jwaris say, that there are four Kalan, whose personal names, or sur-names rather, are

*Sheta*,

*Dhuril or Dhuring*,

*Rakshya*, and

*Thomba*. The particular functions of this office are unknown to my informants, but a “Kalan Sheta,” is said to have come to Gartokh 8 or 9 years ago, with plenary powers for settling the affairs of Gnari.

4. Four *Debun*. These appear to be Military Officers, Generals. One of them came with the (so called) army from Lhasa to annihilate the Sikh invaders of Gnari in 1841, which being accomplished (whether by the Debun and his troops, or by frost and starvation), he continued to reside at Gartokh with the principal authority, civil as well as military, till 1845-46, when order and security being restored, the Debun was recalled to Lhasa, and the administration of the province left as formerly, to the two *Garpun*.

5. Four *Rúban* ; also Military Officers of secondary rank, equivalent to Colonels ? Inferior to these are *Gyakpun*, i. e. Centurians, a *Gya*, Centum, 100.

6. Four *Garpun*. Office unknown.

7. The *Ship-chet*, (not given in Angil’s list,) is an Officer well known to the Jwáris ; one of this rank came to Gartokh, (as previously mentioned) in August or September last, with Commission amongst other things to remove from his office the senior *Garpun* : he appears to be a sort of Special Deputy, with extensive powers, superior to the local governors.

Next to these come the *Garpun* and *Zungpun*, the local Governors of provinces and districts.

Gnari is said to be the only province dignified with the superior rank of *Garpun* (?) The title is said to be derived from the name of their head-quarters, Gar. The place of the fair is called “Gartokh,” also

Gar-Yarsa, which signifies the residence for summer, (from *Yar*, heat or summer), the winter quarters being at Gar, "Gunsa," (from Gun, cold or winter), two or three days further down the river north-west from Gartokh. The two Garpun act jointly, and the court so formed for the administration of the public affairs is termed "Lankya." There is some trifling difference in the rank or authority of the two Garpun; the senior is styled *Urku-gung*, in writing abbreviated to *U-gung*; and the junior *Urku-wa*, written *U-wuk*: they are also called *Urgu-Ma* and *Urgu-Ya* respectively, as mentioned by Traill. The Garpun have each a Sherishtadar, *Zungnirh*, and these two sometimes form an inferior Lankya, for the disposal of minor cases. Nirba (mentioned by Moorcroft,) denotes simply an "Agent" or man of business, of any sort; *Dunik*, a writer or Secretary.

The Zungpun derive their title from *Zung*, signifying either Fortress or Government, or both; and most of them still have their head quarters in quasi-forts, most frequently, in Gnari at least, without garrison. They also hold the general government of their several districts. In many places there appear to be two Zungpun acting jointly like the two Garpun of Gnari, as at Saka, centre of the province next east of Gnari, and (according to the man of Lamjung,) at Kirong and Nyanam (?) on the Nipal frontier; and this perhaps is the usual arrangement where they have independent charge, in direct communication with Lhasa. In the province of Gnari there are four Zungpun, entirely subordinate to the Garpun, in single charge of the four frontier stations, viz. on the northward, Rudukh, which includes supervision of the communications with Ladak.

South-westward Chaprang, including control of the Bisehir frontier, the communication with Chongsa, the Alpine valley of the Jahnavi Ganges, of which Nilang is the principal village, and that by the Mana pass with western British Gurhwal.

Central, Southward, Daba, (*Dapa* is a provincialism of the Niti Bho-tias,) the Zungpun of which has charge of all the Niti and Jwar passes on the British frontier of east Gurhwal and western Kumaon; and south-eastward, Pruang; head-quarters in Takhla-khar, with surveillance of the Darmá and Byáns passes into eastern Kumaon, and of the road to Humla of Nipal, at the bottom of the Pruang valley.

These provincial Governors, Garpun and Zungpun, come from Lhas-

sa or the adjacent country, and, for Gnari at least, are never natives of the province under command. Their regular term of office is 3 years, at the expiry of which, being relieved by successors similarly appointed, they return to Lhassa to give an account of themselves, which if satisfactory may result in further appointment. E. G. Deba Phundu, Pruang Zungpun from 1843 to 1845, is now, (according to the man of Lamjung) one of the joint Zungpun of Kirong. Dhinkar-Sah (i. e. Son of Dhinkar) late Garpun of Gnari, came from the Zung of Kirong, and before that was Zungpun of Chaprang. Sometimes merit or interest may extend the tenure of the same office by one individual to double the ordinary period. Deba Chakwa, a wealthy trader, well spoken of by our Bhotias, was Garpun of Gnari for 5 or 6 years from 1840 to 1845.

Some say that the revenues of the provinces are farmed to the Garpun and Zungpun, who may make what they can for themselves above the state contract, being paid no regular salary: it is certain that the people suffer the most arbitrary exactions, approaching sometimes to indiscriminate robbery.

The term *Deba* either above or prefixed to the names of persons or their official titles, answers to the Hindustani affix, "*Sahib*," and is applied particularly to the Officers of the Lhassan Government who are distinguished by the *Top-Knot*, a peculiar mode of tying up the hair (kept long) on the crown of the head with a skewer through the knot, in the fashion of the Chinese; the losing of this top-knot is a form that accompanies deprivation of office. Moorcroft's Deba at Daba was the Gunpun; his Viziers at Gartokh and Daba probably the Zungnirh of the Garpun, and the Nirba or Dunik of the Zungpun, Trail, following Moorcroft in these inaccuracies. Rajas, Viziers and the like in Tibet are, once for all, mere Hindustani fictions, which should not be retailed any further by English writers. The present Garpun of Gnari are—

1. Tannakarh Gajjun (according to Angil's note) Urkugung, recently appointed in place of Dhinkar-Sah, who, as before mentioned, had his top-knot united by the Ship-Chet the other day: the latter, in succession to Jurkwah, had been in office only one year: and his present disgrace, they say is for his having made certain unauthorized remissions of revenue from ryots of Kirong, where he was previously

joint Zungpun, which occasioned disturbances on the subsequent extortions of his successor.

2. Shungdub Lingbo, Urkúwa, appointed in 1845-46 in succession to Chakwa. This Shungdub, says Debu, has been to Calcutta via Nipal or Lo (?): he is well disposed towards us, and says that the repulsive attitude maintained by the Lhassan Government with regard to the British in India is solely the effect of Chinese dictation at their Court.

Present Pruang Jungpun (succeeded Phundu this year) is Shak Chumba; said (by the man of Lamjung) to be a Khampa from some place 20 days north of Lhassa, and (by the Byánsis) to trouble himself very little with public business, leaving it as much as possible to his Nirba.

Daba Zungpun is Chep-Chungba, also appointed in 1845-46. The Zung-Chungpun is the Government Mercantile Agent, a person of rank and consequence, who comes every year from Lhassa to Gartokh, and thence on to Ladak, before the war with the Sikh usurpers in that quarter. The principal article of this state traffic is tea, mostly of the coarsest sort made up in bricks: and this trash is disposed of by the barbarous expedient of forced sale for double or treble its real value. The whole quantity of tea to be inflicted on the province is made over to the Garpun, who distribute it to the several Zungpun, and they again to the heads of villages and Tals, who finally divide it equally among the families, and payment is realized by the reverse process.

The principal Gold Mines of Gnari (situated east or north-east of Rudukh) are farmed to a Sar-pun (*Sar*, Gold) on triennial contract with the Government at Lhassa.

The Gnari Pungkag *Chuksum*, are thirteen chief districts of the province under their own native hereditary chiefs (*Pun*) subject to the Lhassan Governors: they are

1. Dokachya, and
2. Jimkangnonu, both in the Zung of Rudukh.
3. Chumurthi, on the south bank of the Gartokh Indus, to the extreme west of Gnari, on the Pitti frontier. (?) The best of the ponies (some of them very good) imported into Kumaon by the Jwari Bhotias, are bred in this district, and brought for sale to the Gartokh fair, where the Jwaris buy them.

4. Nabru, also on the south bank of the Gartokh Indus, between Chumurthi and Gar. (?)

5. Chajua, exclusively pastoral, in the west end of the valley of the Shajjan Indus, east of Gartokh, or else in the lower (and southern) part of the valley of the Rudukh Indus, north of Gartokh. With regard to which Rudukh river, the Jwaris assert (positively), that it is a distinct branch flowing past Rudukh from north and south, meeting the Gartokh Indus near Tashigang, a day or two below Gargunsa, whence the united river runs north-westward to Le, &c., and not, as existing maps have it, the lower part merely of the Gartokh river before its entrance into Ladak; but this is doubtful, as others assert as positively the opposite.

6. Bongba (or Bongbwa) Tal, further east up the Shajjan valley and north of the Gnari mountains; consisting of two divisions, viz. Bongmeth, that is, lower, and

7. Bong-toth, that is, upper Bong, the two being under separate *Pun*; one of my informants says that one or other of the Bong Tal is south of the Gnari range, on the east of the province, but Bhauna's version of Angil's note makes this *Bang*, distinct from *Bong*, which he also duly mentions as north of Gnari, and the residence of the *Dok-pa*, who are the carriers of the Salt and Borax from regions further north. Bongbwa Tal is a pastoral district, without villages.

8. Hor Tal, a pastoral district without villages, lying east of Cho-Mapan, between the Gnagri mountains and the Nipal Himálaya, said to communicate by an easy pass (or passes) with Jumla, direct, without intervention of Humla, from which circumstance may be gathered this fact, viz. that the main ridge of the Nipal Himálaya continues to make a great deal of southing far east from Momonangli, and much further than I could see any thing of it, in the course of my route to the lakes and Pruang.

9. Toiyon.

10. Kiron.

11. Tidy; these three are circles of villages, as before described, in the valley of Pruang; and their headmen have the title of *Makhpan*, which is of military origin.

12. Kyungbuchya, the environs of Daba.

13. Tashikhausar, of Chaprang; and 14, Rakshyanonu, on the

right bank of the Sutlej (?) west of preceding (?) These three are agricultural divisions of the district of Gugi, i. e., the trans-Himálayan valley of the Sutlej (?)

Here are 14 Pun-kag, though my informant started with 13 only; nor can he, nor I either, explain the discrepancy.

There are many other districts of inferior size and note, either included in the above or independent of them. Angil mentions.

Namdung, Majjan, and Jangyu, all north of Gangri, without further particulars. Kyunglung he states to be under the Zungpun of Daba, and informants say that the remains of an old Fort there are kept by a functionary styled *Kharpun*, i. e. *Killadar*, Fort-holder, a native of Lhasa, but of inferior rank, and no power or importance.

Gyanima (whatever it may be worth) belongs to Kyunglung.

The villages of Pruang are distributed as follows :

Keli, Lakun, Dela-ling and Kauru, belong to Toiyon on the left bank of the Karnali, in the north-eastern quarter of central Pruang: the present Makhpan is Pimba.

Tidya, on the right bank of the river in the southern quarter, comprises the villages of

Maghraur, (the Makhpan's residence.) Nami, Chumi-thang, Chiljung, Tashikang, Kaga, and Beli: the Makhpan is "Angdah," and his son (who wrote some miserable notes for me) Angil.

Kongarh-Dawa is Makhpan of Kiron, in the south-eastern quarter on the left bank of the river, the district including the following villages:—

Kongarh, (the Makhpan's own village, I suppose.)

Totakh, Dangya-chin, Manw, Chelugang, Shujey, Dojah, and Gajjan.

Kardam, the northernmost village of Pruang, with a monastery, and quasi-fort, is under a Zungpun of inferior rank, (or else a *Kharpun*) perhaps a native of the place; he has to furnish the Tarjum at Barka.

The village of Kangjey belongs to Deba Nerchang, a Lama of Taklakhar, who is also proprietor of Churjia Tal.

Taklakhar, which contains a large monastery.

Shaprang, Lwakh, by the Hindustanis called "Loha-Kot."

Chokhrokh and Khajarh, which the Hindustanis call Kachar-Noth, the lowest village at Pruang (south-eastward) with a monastery, &c. a

place of considerable religious resort; these all belong to the Lhoba Lama of Toklakhar and Khajarh, who is perhaps subordinate to the great Lhoba Lama of Dindi (vulgo Gangri.) The latter is superior of all the Gumba about Gangri and Mapan, his own monastic residence being Dindi, in the ravine under the west side of Kailas.

These Lhoba Lamas are, strange to say, (as imported by their title,) natives of Lho (the Indian Bootan, and a fresh relief of them comes all the way from that country every third year; formerly, says Debu, persons of respectability, but of late, unaccountably, grown "snob-bish," as though the church were on the decline in Lho.

The Lhassan Government have no other military force in the province of Gnari than a Militia of the country people, in the extremity of disorder and undiscipline; and this even has become very much neglected since the fear of the Sikh invasion died away; at best it is represented to be a most unwarlike rabble, utterly useless against an organized enemy. Magh or Makh is the generic name for this army: Makhmi soldiers; and hence the title Makhpan, originally military chiefs, now peaceful villagers. Formerly three Regiments (also Makh) of 500 men each, used to muster at Gartokh, styled the Igru, Kungru, and Indu; these are now merged into a single Makh, nominally of 500 men, but rarely mustering the full compliment. The Makh is assembled for two or three summer months during the Gartokh fairs and drilled by a *Gyakhpun*, (centurion:) the men get no pay, subsist, arm, and accouter themselves, and at the end of the exercising season are dismissed to their houses with—a fine of 3 Rupees each for their bad performance!

This is an extreme case of rare occurrence it is to be hoped. Bhau-na, when late in Pruang, found the soldiery better treated. The quasi-garrison of Taklakhar had been recently discharged, as no longer required in these pacific times, and each man, who had served for the last three years, of course subsisting himself all the while, received six rupees, sum total of his pay for the whole period.

Such are the Chinese Cavalry and Infantry, who repulsed Captain Gerard's invasion of Tartary.

In Gnari there are four chief Kanbu or Kambu, i. e. Bishops? or Abbots? of the Gelukpa sect? viz. at

1. Rudukh.

2. Rabgyaling, or Rabling, probably in the district of Nabru, or elsewhere, west of Gartokh ;
3. Tholing (or Ling), and
4. Shebiling, in Taklakhar ?

Each of which rules 25 *Gumba*, (Monasteries,) the Priors of which are Lamas, with establishment of many inferior Monks, *Daba* or *Gelong*. In Gnari the Nuns are styled *Chemu*, and not *Ani*, which latter word signifies *woman* simply, of any sort.

The Salt and Borax Mines of Gnari, or fields rather, "Lha-lhaka, as Lháli-lhaka, (by Herbert I think or Gerard? erroneously given as the names of districts) lie to the north of Bongbwa Tal, across mountains that round the north-east side of the valley of the Shajjan river, paralled to the Gangri range, and in the eastern part of the Zung of Rudukh. The two salts, I understand, are obtained from different spots in the same vicinity, and both worked in the same way by washing the earth taken from the surface of the ground in which they are developed by natural efflorescence. These salt fields are open to all who choose to adventure their labour in them, on payment of a tenth part of the produce to the Government, which has an excise establishment for collecting the dues on the spot. The proceeds form, perhaps, an item in the general contract for the revenues of Gnari between the Garpan and the Lhassan Government.

Soda also (carbonate of Soda) Búl or Pul, is abundant in many places, (I saw much of it, as mentioned, about the shores of the lakes,) but appears to constitute no trade like the others, though in Hundes it is used generally for helping the extract of Tea, the universal beverage drunk in vast quantity ; and by the higher classes, who sometimes wash their hands and faces, as a substitute for soap.

The principal Gold Mines, *Sar Chaka*, are ten days journey beyond the Salt Mines, further north, or north-east, (perhaps on the north-western borders of the Kám country ?) in a district otherwise uninhabited? named Sar-báchyad? These are farmed by a Sarpún, on triennial contract direct from Lhassa, independent of the authorities in Gnari. Deba Chákwa however held this contract for the last 3 years in which he was Garpan Urku-wa at Gartokh. He paid to the Lhassa Treasury 17,000 Rupees per annum ; had 170 miners at work, for whose subsistence he used to send supplies of Sátu, Ghíú, Tea, &c. from Pruang,



the “Sárbáchyad” country being barren, *Jang-tang*. These mines are worked in shafts and galleries under ground ; the gold is found in the pure native state (in silicious sandstone (?) or in quartz rock ?) : it undergoes no other process than washing and sifting before it enters the market, and after that requires little or no refining. The metal is sometimes found in large masses ; the Lama of Gangri is said to have one weighing 5 Nega, i. e. near a seer, and there are problematical stories of other masses of such supernatural size and shape that the Lamas pronounced them spiritually dangerous and insisted on their being consigned to earth again. The raw gold grains, as they come from the mines, constitute the main part of the heavy currency of this country, in which there is a great dearth of coined money ; that also arising, I believe, from foolish superstitions and state interferences ; of late years our Bhotias have circulated some of the Company’s Rupees in Gnari, but so infatuated are the people, that they persist in keeping the exchange of this coin down to four timashis, though its intrinsic value is nearer six of them. The *Sar Shu*, by the Hindustanis called Phetang, is 8 masa, 8 or 9 Rupees worth of this gold, tied up in a minute bundle of paper and rag, which passes for money with the trouble of repeated scrutiny and weighment.

The Government Mail Establishment for conveyance of Dispatches between Gartokh and Lhasa is styled *Tarjúm*, and the same name is applied to the several stations of relay. At each *Tarjúm*, there is a superintendent of some sort, or one or two horsemen, who are furnished, like all the state requisitions in this province, by roster or some equivalent arrangement from the neighbouring villages or *Dúng*. The several stages are from double to treble an ordinary day’s journey for a traveller with cattle, baggage, &c., that 30 or 40 miles, being proportioned to what is considered a day’s work for a single man and horse, (the horses being poneys, but good ones.) Under ordinary circumstances, the post travels by day only, and at such a rate as to make one stage daily, sometimes two perhaps. There are no stated times, probably, for the dispatch of the mails, expresses being sent as occasion may require. The establishment is intended for the Government service only : and if private individuals get the use of it, it must be by interest with the Government Officials. There are 22 *Tarjúm* between Gartokh and Lhasa. These places, being about 10 degrees of longitude asun-

der (from  $80\frac{1}{2}$  to  $90\frac{1}{2}^{\circ}$  east), and the geographical minute in this latitude nearly equal to the English mile, allowing for deviations from the straight line and for southing of the route from the parallel of Gartokh to that of Lhasa, the whole distance must be seven or eight hundred road miles, which would make the Tarjúm stages average some 35 miles each. My map shows near 40 from Nakyu to Misar, and about as much from Misar to Barka; the route from Gartokh to Misar being copied exactly from the map after Moorcroft and Hearsay, Nakyu fixed by information with reference to Gartokh, and Barka by my own survey.

Angil has given me the following list of the Tarjúm from Gartokh as far as he knew them.

1. Nakyu; this is only 5 miles from Gartokh.
2. Misar; furnished by the people of Kyunglung.
3. Barka; in the plain under Gangri, north of Cho Lagan; furnished from Kárdánkhár of Pruang.
4. Tokchin, or Samo-tokchin; and
5. Tandang, or Tankcham; these two in the district of Hortol, and thus far in the province of Gnari.
6. Dukshum, or Tukshum; and
7. Dodum; these two in the district of Doshel or 'Tosher.'
8. Samku.
9. Saka or Saku; the head-quarters of two joint Zungpun.
10. Uksey; the last 5 in the Zung of Saka; and twelve more, unknown, on to Lhasa.

Digarcha is 2 or 3 Tarjum this side (west) of the capital.

There are no fixed Tarjum establishments between Gartokh and the frontier stations of the Zungpun, dispatches being forwarded on those lines, *Taul*, i. e. *gaonsare*, from village to village, or *Dúng* to *Dúng*, or by single messengers.

*Postscript, 25th July, 1847.*

The above journal had left my hands and was past revision long before I saw for the first time the valuable notice of Csoma Kőrös on Tibetan Geography (Article I. No. 4, Asiatic Society's Journal for April, 1832), as also Jos. Cunningham's Article on Kunawar, &c. in the Asiatic Society's Journal (Vol. XIII. p. 172 et seq.) containing much accurate information.

I have no opportunity at present for tracing in detail the agreement or discrepancy between our several statements where we touch upon the same points : but I think I may say generally that my rude oral information is in the whole well corroborated by the literary investigations of the learned Hungarian.

My chief mistake appears to have been in assigning the eastern Tibetans of *Kham* national existence too independent of their common country, *Boä*, and perhaps a geographical extension too far to the north-westward. In the tribe of *Brukpa*, vulgo *Dakpa*, mentioned by *Csoma de Körös*, I recognize the inhabitants of the *Jang Thang*, north and east from *Gartokh*, the country of the Salt and Borax fields, and of the Gold Mines.

I have availed myself of *Csoma Körös's* article to insert the Tibetan name of *Tise* in my map, over the Peak of *Kailas*, as also to correct my *Kam* and *Lo*, to *Kham* and *Lho* ; I had omitted the aspirates of the initial consonants in these names, because they were by no means clear in the pronunciation of my informants.

Other of my Tibetan names would require correction to agree with the orthography of *Csoma Körös*, but it is as well to leave them unaltered, as their present form indicates the popular pronunciation current on the frontier of the British *Himälayan* provinces, *Kumaon* and *Gurhwal*, to which locality both my map and journal have particular reference.



# Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Sept., 1848.

Lat. 22° 33' 28". 33 N. Long. 88° 23' 42". 84 East. Mag. Variation 2° 28' 36" East. Mag. Dip. 27° 45'.

| Days of the Month. | Observations made at sunrise.        |                 |             |       | Maximum Pressure observed at 9h. 50m. |                 |             |       | Observations made at apparent noon. |                                      |                 |               | Observations made at 2h. 40m. p. m. |                    |                                      |                 | Minimum Pressure observed at 4 p. m. |               |                    |                                      | Observations made at sunset. |             |       |                    | Maximum and Minimum Thermometer. |          |          |          | Rain Gauges. |         |                 |             |                 |             |                 |              |      |      |      |      |      |   |
|--------------------|--------------------------------------|-----------------|-------------|-------|---------------------------------------|-----------------|-------------|-------|-------------------------------------|--------------------------------------|-----------------|---------------|-------------------------------------|--------------------|--------------------------------------|-----------------|--------------------------------------|---------------|--------------------|--------------------------------------|------------------------------|-------------|-------|--------------------|----------------------------------|----------|----------|----------|--------------|---------|-----------------|-------------|-----------------|-------------|-----------------|--------------|------|------|------|------|------|---|
|                    | Barometer reduced to 32° Fahrenheit. | Temperature.    |             | Wind. | Barometer reduced to 32° Fahrenheit.  | Temperature.    |             | Wind. | Aspect of the Sky.                  | Barometer reduced to 32° Fahrenheit. | Temperature.    |               | Wind.                               | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature.    |                                      | Wind.         | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature.                 |             | Wind. | Aspect of the Sky. | Maximum.                         | Minimum. | Maximum. | Minimum. | Feet.        | Inches. |                 |             |                 |             |                 |              |      |      |      |      |      |   |
|                    |                                      | Of the Mercury. | Of the Air. |       |                                       | Of the Mercury. | Of the Air. |       |                                     |                                      | Of the Mercury. | Of the Air.   |                                     |                    |                                      | Of the Mercury. | Of the Air.                          |               |                    |                                      | Of the Mercury.              | Of the Air. |       |                    |                                  |          |          |          |              |         | Of the Mercury. | Of the Air. | Of the Mercury. | Of the Air. | Of the Mercury. | Of the Air.  |      |      |      |      |      |   |
| 1                  | 713                                  | 80.3            | 81.2        | 74.5  | S                                     | Cumulo strat.   | 29.656      | 88.3  | 87.8                                | 81.2                                 | S.              | Cumulo strat. | 29.625                              | 92.0               | 90.0                                 | 81.5            | S. W.                                | Cumulo strat. | 29.563             | 91.9                                 | 89.9                         | 81.7        | S.    | Cumulo strat.      | 29.554                           | 90.1     | 88.3     | 81.0     | S. W.        | Cloudy. | 29.571          | 85.9        | 84.3            | 81.2        | S. E.           | Large cumul. | 82.3 | 87.5 | 81.4 | 0.07 | 0.05 | 1 |
| 2                  | 711                                  | 80.1            | 81.5        | 74.5  | J                                     | Cumulo strat.   | 724         | 80.3  | 84.2                                | 81.8                                 | S. F.           | Ditto         | 703                                 | 87.0               | 83.0                                 | 81.0            | F.                                   | Cloudy.       | 701                | 85.1                                 | 85.1                         | 81.9        | S. E. | Cloudy.            | 651                              | 83.1     | 81.0     | 80.8     | S. E.        | Ditto   | 660             | 82.9        | 81.0            | 80.2        | S. E.           | Cloudy.      | 82.3 | 87.5 | 81.4 | 0.18 | 0.05 | 2 |
| 3                  | 711                                  | 80.4            | 80.1        | 74.1  | N. E.                                 | Cloudy.         | 713         | 80.3  | 84.3                                | 81.0                                 | F.              | Cloudy.       | 703                                 | 87.1               | 83.1                                 | 81.0            | F.                                   | Cloudy.       | 682                | 83.1                                 | 82.8                         | 81.2        | S.    | Ditto              | 652                              | 81.8     | 82.1     | 81.2     | S.           | Cloudy. | 660             | 81.9        | 82.1            | 81.2        | S.              | Cloudy.      | 82.3 | 87.5 | 81.4 | 0.08 | 0.12 | 3 |
| 4                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 5                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 6                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 7                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 8                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 9                  | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 10                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 11                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 12                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 13                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 14                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 15                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 16                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 17                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 18                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 19                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 20                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 21                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 22                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 23                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 24                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 25                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 26                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 27                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 28                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 29                 | 701                                  | 79.8            | 80.3        | 78.1  | S. E.                                 | Drizly          | 732         | 82.0  | 81.4                                | 78.1                                 | S. E.           | Ditto         | 711                                 | 81.1               | 81.8                                 | 81.0            | E.                                   | Cumulo strat. | 647                | 85.4                                 | 85.0                         | 78.1        | S.    | Cloudy.            | 637                              | 82.2     | 81.8     | 78.1     | S. E.        | Cloudy. | 648             | 81.0        | 82.1            | 81.2        | S.              | Cloudy.      | 80.1 | 84.3 | 81.4 | 0.74 | 0.82 | 4 |
| 30                 | 701                                  | 79.8            | 80.3        |       |                                       |                 |             |       |                                     |                                      |                 |               |                                     |                    |                                      |                 |                                      |               |                    |                                      |                              |             |       |                    |                                  |          |          |          |              |         |                 |             |                 |             |                 |              |      |      |      |      |      |   |



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*Observations made when following the Grand Trunk Road across the hills of Upper Bengal, Parus Nath, &c. in the Soane valley; and on the Kymaon branch of the Vindhya hills.—BY J. D. HOOKER, M. D. R. N. Hon. Member of the Asiatic Society. (Communicated by the Hon'ble Mr. Justice COLVILE, President of the Asiatic Society.)*

The following observations were made with the view of instituting a comparison between the vegetation of the various areas, differing in soil, elevation and general custom, which I traversed (chiefly in company with Mr. Williams\* of the Geological Survey,) and the climate which accompanied these changes, and to whose operations the distribution of species is to be traced.

The Instruments used were all of the best construction, chiefly by Newman, and were uninjured up to the last observation recorded. Those made with the portable Barometer, may be relied on as very accurate, the instrument having been adjusted for me with extreme care.

The observations for Temperature were often made where *constant* shade was not to be obtained. Every precaution was however taken to avoid radiated heat.

\* I here beg to return my most sincere thanks to Mr. Williams, not only for the opportunity he gave me of observing over a very interesting country: but for the many facilities he afforded and the uniform kind assistance I received, both from himself, Mr. Haddon, and the other gentlemen attached to his camp in which I was a guest. Few travellers have commenced their investigations under such favorable auspices; and to these much of what value the accompanying observations may possess is due.

For the wet-bulb observations, distilled water was invariably employed; and the minimum temperature taken, which is not indicated if the bulb be loaded with water, as is too often the case.

The observations for nocturnal radiation are not so accurate as if a parabolic reflector were used; they are however sufficiently demonstrative of the state of the atmosphere.

Those taken by exposing a naked thermometer on a non-radiating substance, removed from the surface of the earth, as the top of a broad brimmed Shola hat (the bulb quite free) may I think, be depended upon.

Those again indicative of the radiation from grass, whether dewed or dry, are not strictly comparable; not only does the power of radiation vary with the species, but much more with the luxuriance and length of the blades, with the situation, whether on a plane surface or raised, and with the soil upon which it grows. Of the great effect of the surrounding and subjacent soil I had frequent instances; similar tufts of the same species of grass, radiating more powerfully on the dry sandy bed of the Soane, than on the alluvium on its banks; the exposure being equal in both instances.

Experiments for the surface Temperature of the soil itself, are least satisfactory of any:—adjoining localities being no less affected by the nature, than by the state of disintegration of the surface, and amount of vegetation in proximity to the Instrument.

Such observations however are not useless: the mean of a number taken synchronously with those for the Temperature of grass and for free radiation, affording valuable results, especially if compared with the power of absorption by the same soil of the sun's heat during the day.

The power of the sun's rays is so considerable, and protracted through so long a period of the day, that I have not found the temperature of running water, even in large deep streams, so constant as was to be expected.

On a few occasions the temperature of the soil at considerable depths was obtained by sinking holes. My daily progression and the exceeding hardness of the baked alluvial soil, prevented this being fully accomplished, except on a few occasions, and as connected with the Register the observations will be detailed.



A thermometer with the bulb blackened affords the only means the traveller can generally compass, if measuring the power of the sun's rays. It will be seen that by this I have recorded a greater amount of solar heat than was supposed usual in India.

A good Photometer being still a desideratum, I had recourse to the old wedge of colored glass:—that used was so constructed as to be equivalent to a wedge of a uniform neutral tint, the distance between whose extremes, or between perfect transparency and total opacity was equal to 12 inches. A moveable arm carrying a brass plate with a slit and a vernier, enables the observer to read off at the vanishing point of the sun's limb, to  $\frac{1}{500}$ th of an inch. I generally took the mean of four or five observations, but place little dependence upon the results. The causes of error are too obvious for notice here. As far as the effects of the sun's light on vegetation are concerned, I am inclined to think that it is of more importance to register the number of hours or rather of parts of each hour, that the sun shines, and its clearness, during the time. To secure valuable results this should be done repeatedly, and the strength of the rays by the black bulb thermometer registered at each hour.

Finally, with regard to the hours at which the observations were taken, the three principal ones, 9 A. M., 3 P. M. and 9 P. M. were those adopted by the antarctic expedition. A morning observation was added, because the 3 A. M. one is seldom available for the traveller especially if, besides the toils of the march he has other pursuits. The most useful observations at that hour are perhaps those for the temperature of the grass, soil, &c., which vary little for many consecutive hours in the night, and are losing by radiation till the sun's power is felt.

I much regret not being at present able to enter into these computations, which would render the following observations more useful. I have preferred recording them thus early to detaining them for an indefinite period. Their publication will enable many to point out to me better modes of observation; and direct a few how to conduct such enquiries. I would also hope there are some who are, like myself, seeking for comparative observations, and to whom these will be welcome, as are all similar ones, made in other parts of India, to me.

The more important results which these will give, with more or less accuracy are:—

The mean height of the granite table-land from Taldanga to Dunwah pass, and of Parus Nath, its culminant point, above the plains of Behar (below the Dunwah pass) and the sea.

The mean height of the plains of Behar from the Dunwah pass to the Soane, and absolute height of pass.

The fall of the Soane between Kemch (above Bidjegurh) and Dearee.

The altitude of Rotas Palace, i. e. of the Kymaon range above Akbarpore.

The altitude of the Ghaton pass in the Kymaon at Roump, and mean altitudes of the Table-land extending thence to the Bind hills at Mirzapore.

Altitude of the plains at Mirzapore. Fall of the Ganges between Mirzapore and Bhaugulpore (approximately).

Mean temperature, Dew-point, force of vapors. Weight of vapor in a cubic inch of atmosphere, and rate of evaporation as calculated from the wet-bulb thermometer on the plains of Behar, and the aforesaid table-land.

Mean amount of nocturnal radiation from the exposed thermometer, from soil and from grass, at the aforesaid place.

The barometrical elevations have been computed with great care,\* but so materially does the fluctuation of the mercurial column in Behar, upper Bengal, and the other tracts of country visited, differ from those at Calcutta† that they give but approximate heights.

It has been asserted by a most excellent Meteorologist (Jas. Prinsep) and one more practically familiar with the climate of India than any other; that a few observations made at any part of N. India are so comparable with those at Calcutta, that from such the difference of elevation of the latter and any other station may be deduced with considerable accuracy. This no doubt holds true for the more level

\* I cannot sufficiently express my obligation to my friends, J. and C. Muller, Esqs. for the assistance they have afforded me, in these and other computations whose results are detailed in this paper. Many of the observations were reduced by these gentlemen and the elevations determined, and all of them revised from various formulæ, some of them very complicated. What errors therefore are to be attached to the results, may be safely laid to the observer's charge, not to the Instrument, and still less to the computations.

† In Calcutta, in Feb. and March the sunrise observation is generally higher than the 9 p. m. of the previous night—on the hills and plains traversed the opposite was almost always true.

country; but amongst the hills, the changes in the state of the atmosphere are so sudden and their effects so local, that the Barometer there often continues rising during 12 hours or more when the mercurial column is stationary or even falling at Calcutta, and vice versa. There are even instances on record of moderate elevations determined from monthly means, varying upwards of one hundred feet; that of Gurgaon is from the mean of one month's observations, 868 feet; by another month's 817. Nasirabad\* (by Lt. Col. T. Oliver) from one month's, 1430 feet, from another 1539 feet: the mean of two following years' observations again shew a perfect accordance. In cases where there have been continued steady weather and coincidence in the fluctuations of the column, much reliance may be placed on the height so computed from a comparison of the indications of good Instruments, provided the proper corrections† be employed. A little practice will give the observer some idea of what indications are most trustworthy. When the elevation is to be calculated from the means of several maximum or minimum observations, it is necessary to take into account the daily range at the two stations; which varies not only at different positions, but with each month; for instance in February of one year at Calcutta the mean daily tide is 0.147.; and at Kotgurh as low as 0.028.

A considerable amount of difference in elevation is also due to the formula employed; that which I have adopted is the usual one modified by Daniel, who corrects the specific gravity of the atmosphere by the Dew-point.‡ In India the humidity of the air varies so greatly in different stations, that I think this correction should not be overlooked. It is to be remarked however, that (as Mr. Muller first pointed out to me,) in the last edition of Daniell's work, there is a discrepancy in my results as worked by the rule or by the example: the method adopted as shewn by the example, seemed to us the most correct, and except when otherwise stated this is always employed.

A very excellent formula is that used at the Surveyor General's office, for a copy of which I am indebted to Captain Thuillier, an officer to

\* Jour. As. Soc. 1835 (January, No. 37. p. 49.

† In those Barometers of Troughton and Simms, used in India, I do not find a measure of the diameter of the tube to accompany the Instrument, and the correction for capillarity is hence too frequently disregarded. The diameter of the bore is generally 0.25 inch, and the consequent correction 0.040 always to be added.

‡ Daniell's Meteorological Essays, Ed. 2. (1845.) v. 2, p. 46.

whom I am exceedingly obliged for the prompt and kind manner in which he has afforded me effectual assistance in various ways.

The Dew-point has been calculated from the Wet bulb, by Dr. Apjohn's formulæ, or, where the depression of the Barometer is considerable, by those as modified by Captain Boileau.\* The saturation point, by dividing the tension at the dew point by that at the ordinary temperature. Weight of vapor, by Daniell's formula.

For the means of availing myself of Mr. Williams' kind invitation, so soon after my arrival in India, I am mainly indebted to the President of the Asiatic Society, who not only anticipated my wants by himself equipping me for a mode of travelling widely different from what I had been accustomed to, but has forwarded my views by every means in his power, and shown the warmest interest in my pursuits and kindness to myself. *Darjeeling, Aug. 1848.*

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My botanical outfit was all procured for me at the Botanic Garden by the kindness of Dr. McLelland, to whom I return many thanks for the valuable assistance and advice he afforded me, and the ready manner in which he placed every aid the noble establishment he then superintended could command, at my service.

*January 30th.*—Joined Mr. Williams' camp at Taldangah, on the Grand Trunk Road, a dawk station near to the western limit of the coal basin (Damoodah valley).

Leaving early the following morning, I had no opportunity of inspecting the fossil plants of this field in situ. An examination of a noble collection sent to England by Mr. Williams, (previous to my departure,) throws but little light on the age of the formation, as compared with the more northern ones. The genera to which the species belong are, some English, a few very remarkable ones Australian, and many others peculiar to the Indian coal fields. The European genera or species, are more allied in appearance to those of the Oolite formation than of the carboniferous æra, but I take this resemblance to be possibly accidental, and not to demand a reference of the Indian coal beds to the period of the English Oolite. Arguing from analogy, it is difficult to suppose that the cotemporaneous Floras of two coun-

\* Journal of Asiatic Society, N. 147, (1844) p. 135.

tries as widely remote in geographical position as in physical features, should possess any plants in common : and especially so large a proportion of species, that a recognizable number of these should survive that wreck of a *Regnum Vegetabile* of whose existence the coal and its accompanying fossils are rather the Index than the Historians. It is certainly very remarkable that any distinct relationship should exist between the English and Indian coal fields, and that it is betrayed by a genus so peculiar as *Glossopteris*, which is further common to the fossil Flora of Australia ; but this circumstance loses value from the fact of prevailing forms of Ferns being common to species from all parts of the world, and yet indicating no affinity between such plants, which are only to be recognized by their fructification, an obsolete character in almost all fossil specimens. The Oolite coal of England, again, abounds in representatives of existing tropical plants—these are absent in the Indian coal fields ; which on the other hand presents us with novel forms of vegetable life, some of them common only to this and to the Australian fossil Flora, and equally distinct from any known living or fossil vegetables. In short, the Indian coal fossils are more widely dissimilar from any living plants either of the temperate or tropical Flora, than are the fossils of the oldest English carboniferous period. I do not moot the question of the age of these beds in a geological point of view, for that subject is in able hands ; though having now visited the Australian, Indian and English Oolite beds, I may add that the two former present the strongest features in common, both in points of extent, and in position (geologically and otherwise), as also a wide difference in their Floras from those flourishing over them.

The Rev. Mr. Everest, in some excellent remarks on this coal field considers the position of the beds relatively to the general features of the surrounding country, as evidences of the coal having been deposited in hollows between the granite hills which rise out of the plain, like islets.\*

I had no opportunity of verifying this theory, which is perhaps hardly compatible with the proofs (and these are ample) of the relative position of the coal-beds having suffered much change since their deposition.

\* *Gleanings of Science*, 1831, p. 133.

The workmen employed at the pits use water from the hookah in preference to any other, for the manufacture of gunpowder, but I could not ascertain that there were any good grounds for this choice. The charcoal is made from an *Acacia* (*Catechu* ?); that from *Justicia Adhatoda* is more generally used in India; *Calotropis* wood in Arabia. The pith of all these plants is large, whereas in England, closer-grained and more woody trees, especially willows, are preferred.

A few miles beyond Taldangah the junction of the sandstone and gneiss rocks forming the elevated table-land of upper Bengal, is passed over. From beyond Burdwan the country slopes gradually up to Taldangah, but travelling by dawk at night, I could not estimate the amount of rise. From the latter station the ascent is still gradual, without any material interruption at the change in geological formation. Both sides of the road, and both formations are singularly barren, and the primitive rocks perhaps more so than the sandstone, from the copious effloresced salts, and frequency of masses of granite and quartz protruded through the soil. Good-sized timber is nowhere seen: the trees are stunted, chiefly *Butea frondosa*, *Diospyros*, *Terminalia*, and shrubs of *Zizyphus*, and *Acacia*, *Grislea tomentosa* and *Carissa Carandas*.

The altitude of Gyra is about 652 feet above the sea: it is the first station on the primitive table-land, which extends from this to Dunwah pass, and whose culminant point here is Parus Nath; Main path being another plateau, I believe on the same range of hills, but further S. W. Parus Nath, the eastern metropolis of Jain worship, as mount Abo is the western, is seen towering far above all the other eminences, and so isolated as to form from every side a noble feature in the landscape. All other hills are low ridges, running in various directions. Bamboo certainly forms one third of the jungle on these hills, and from its tints, varying from bright green to absolute whiteness, it gives some variety to the coloring. *Acanthaceæ*, in number of species, prevail beyond any other natural order, both as herbs and bushes; but the *Zizyphus* is the next plant in abundance to the Bamboo, and next the *Carissa Carandas*.

The cultivation is here, as elsewhere along these elevated plains, very wretched, for though alluvion is spread over the schists, the rocks are so dislocated as often to be thrown up at right angles, when their de-

composition produces a very barren soil full of salts. The bosses of ungrateful quartz render this sterile country more hungry still. Rice fields are scarce and scattered ; I saw very little corn, grain, or castor oil ; no poppy, cotton or Carthamus. A very little sugar-cane, with dhal, mustard, rape and linseed, include nearly all the crops I observed.\* Palms are very scarce and the cottage seldom boasts the banana or tamarind, orange, cocoa-nut or date. The Mahowa tree however is common, and a few Mangoes are seen.

*February 2nd.*—Marched to Fitcoree, the country being more hilly and still ascending to this station which is 824 feet above the sea. Though the night had been clear and star-light, no dew was deposited, and therefore for the future I took the temperature of the grass, both after sun-set and before sun-rise, as also of a Thermometer with a naked ball exposed to the sky on a non-conducting material. During the whole time I spent on this table-land the temperature of the grass never sunk to that of the Dew-point, though the nights were always fine. The copious dews that I had experienced on the much drier Egyptian desert, between Cairo and Suez, were equally remarkable for their abundance, as their absence is here. The only cause for this that I can assign is an almost imperceptible haze, which may be observed during mornings, producing that peculiar softening of the tints in the landscape which the artist can well appreciate, but whose presence does not interfere with a perfect definition of outlines in distant objects.

The nights too are calm, so that the little moisture suspended in the atmosphere, may be (during these nights) condensed in a thin stratum considerably above the mean level of the soil, at a height determined by that of the surrounding hills. The cooled surfaces of the latter would further favor this arrangement of a stratum of vapor above the heated surface of the earth, with the free radiation from which it would mutually check. Such strata may even be seen, crossing the hills in ribbon-like masses, though not so clearly on the elevated region, as on the plains bounding the lower course of the Soane, where the vapor is more dense, and the hills scattered and the whole atmosphere more humid.

During the 10 days I spent amongst the hills I saw but one cloudy sun-rise, whereas below, whether at Calcutta, or on the banks of the

\* The Tussar silkworm is reared in some parts of the hills, especially the northern.

Soane, the sun always rose behind a dense fog-bank. This was when close to Parus Nath, and the effect of a slight east wind, forming, first a stratus amongst the mountains to the west, which gradually rose, obscuring the whole sky with cirrho-cumulus. On all other mornings the sun-rise was clear and cloudless; though through a visible haze.

At 9½ A. M. the black-bulb Thermometer rose in the sun to 130°. The morning observation before 10 or 11 A. M. always gives a higher result than at noon, though the sun's declination is so considerably less, and in the hottest part of the day it is lower still (3½ P. M. 109°) an effect no doubt due to the vapors raised by the sun, and which equally interfere with the Photometer observations.\* The N. W. winds invariably rise at about 9 A. M. and blow with increasing strength till sunset; they are no doubt due to the rarefaction of the air over these heated plains, and being loaded with dust, the temperature of the atmosphere is raised by the passage of a warm body, which at the same time that it varies the temperature in the shade, depresses the black-bulb Thermometer. The increased temperature of the afternoon is therefore not due wholly to the accumulation or absorption of caloric from the direct sun's rays, but to the passage of a heated current of air derived from the much hotter regions to the westward. It would be interesting to know how far this N. W. diurnal tide extends; and if it crosses the Sunderbunds or upper part of the Gangetic delta; also the rate at which it gathers moisture in its progress over those damp regions. Of its excessive dryness at Benares, Prinsep's observations give ample proof, and I shall compare these with my own observations, both in the valleys of the Soane and Ganges, and on the elevated plains of Behar and Bengal and of Mirzapur.

Observations with the black-bulb Thermometer, though confessedly imperfect, are of considerable interest, and that they have attracted little notice in India is evident from a paper of Capt. Campbell,† who mentions that in Lat. 18° N. 43° is the maximum effect he ever obtained, and that Dr. Baikie has shown 24° to be the maximum on the Neelghery mountains in January. In February and March I have repeatedly observed a difference of upwards of 50°, and on one occasion of 68°. These were in Lat. 25° N. On the Kymaon hills (alt. 1104 ft.)

\* See Analysis of Observations.

† Calcutta Journal of Nat. His. v. 2. p. 185.



I have registered the black-bulb Thermometer at 150°, a temperature and difference so little short of what has ever been observed in higher latitudes that we must look to other causes than distance from the Poles for the generally diminished power of the sun's rays in and near the tropics. The low results cited by Daniel\* were all obtained from Pelagic stations, as are Capt. Campbell's, compared with my own; nor have I on the tropical and sub-tropical coasts of Africa and S. America, or on the ocean at a distance from land, ever obtained results at all to be compared with these. It is much to be regretted that an instrument so simple and easy of observation should be so neglected. The value of its indications are approximate only, but not the less necessary, as may be gathered from the circumstances of the few experiments I have been enabled to make tending to invalidate a theory grounded on a comparison of all the observations hitherto made in low latitudes.†

\* *Meteorological Essays*, Ed. 2. v. 2. p. 110.

† Since writing the above I have met with a paper by the Rev. Mr. Everest "On the Meteorology of Ghazipur:" in which a record is contained of observations taken with a Thermometer laid on black wool and freely exposed to the sun in the months of September and October. (*As. Journ.* 1833, p. 605.) The range of the exposed Thermometer in these observations coincides very nearly with my own. The maximum being attained at 11 A. M. and the greatest difference observed is also at that hour (50°.6).

Dr. McLelland,\* who has made some excellent analyses of the meteorological phenomena of India, attributes the haze of the atmosphere during the N. W. winds of this season, wholly to the suspended earthy particles. That such may be the case to a great degree is clear, for the amount of the haze is evidently proportioned to the force of the wind during the prevalence of the Diurnal breeze. But the haze is always present, even in the calmest weather, when it is only to be accounted for by the hygrometric state of the atmosphere. Extreme dryness, (which here is so marked that there is no deposition of dew,) is in all parts of the world usually accompanied by an obscure horizon.

Capt. Campbell also objects to the conclusiveness of Dr. McLelland's theory, citing those parts of Southern India which are least likely to be visited by dust storms, as possessing an equally hazy atmosphere, and further denies its being influenced by the hygrometric state of the atmosphere. (*Cal. Journ. Nat. His.* v. 2. p. 44). I have observed the same phenomenon in oceanic islands, when the surface rocks were powerfully heated by a tropical sun, and the air extremely dry, and I have further remarked a brilliantly clear atmosphere with a similarly low Dew point in the Antarctic Ocean, where the horizon was ice-bound: hence it is probably not so much the amount of vapor as its tension that determines the transparency of the atmosphere.

When on this subject I may add that even on the ocean the air is sometime so brilliantly clear that Venus is visible at mid-day during a strong sun-light. I have seen that planet in the north tropical Atlantic under similar circumstances to what Dr. Campbell did at Kenedy, (*Cal. Journ. Nat. His.* v. 2, p. 279,) but have not with me the date or corresponding observations.

\* *Cal. Journ. Nat. His.* v. 1, p. 52.

*February 2nd.*—Proceeded on to Tofe-choney (or Top-chaunsee.) General features similar to those of yesterday, but the country more wooded and ascent considerable; alt. of station 900 feet. Tanks here are covered with the usual water plants of India: *Villarsia Cristata*, *Nymphæa*, *Chara* and *Potamogeton*. The increased shade favors the growth of several ferns, as *Lygodium*, *Pteris*, *Adiantum*, *Cheilanthes* and *Selaginella*. The situation near the foot of Parus Nath, a heavily timbered lofty mountain rising abruptly, and terminated in a rugged ridge, is very pretty. A few rock Lichens are found here. Many trees appear, with *Nauclea*, *Bignonia*, *Combretum* and *Bauhinia*, *Gmelina arborea* and *parvifolia*. *Butea frondosa* continues abundant. In this district the greater proportion of Stick-Lac is collected from *Butea*; in Mirzapur, a species of *Sponia* yields it, and the Peepul very commonly in various parts of India. The elaboration of this dye, whether by the same species of insect, or by many from plants so widely different in habit and characters, is a very curious fact.

*February 3rd.*—At 3 A. M. the temperature was 55°, and to the feeling very cold. This being the most convenient station from whence to ascend Parus Nath, we left early in the morning for the village of Maddaobund, on the north base of the mountain, from whence a good path leads to the summit.

Following the Grand Trunk Road for a few miles to the west, after passing the base of the mountain, a narrow path strikes off to the north winding through low valleys and over finely wooded plains, covered with noble trees of *Bassia*, like Oaks in a park, *Fici*, *Gmelina*, two species of *Diospyros*, *Buchanania latifolia*, *Nauclea cordifolia*, *Semicarpus anacardium*, *Bauhinias*, with clumps of large Bamboo. The undershrubs are still of *Vitex*, *Carissa*, *Grislea tomentosa*, *Zyzyphi*, and stunted *Butea*; the grapes wiry and harsh, *Adropogons*, *Anthrastia*, *Saccharum*, &c. Some villages at the west base of the mountain occupy a better soil and are surrounded with richer cultivation; palms and mangoes and the tamarind, the first and last rare features in this part of Bengal, appeared to be common here, with fields of rice and broad acres of Flax and Rape, through the latter of which the blue *Orobanche Indica* was swarming. The short route to Maddaobund, through narrow rocky valleys, was impracticable for the elephants, and we had to make a very considerable detour, only reaching that village

(on the north base of the mountain) at 2 P. M. All the hill people we had observed were a fine-looking athletic race ; they disown the tiger as a neighbour, which every palkee-bearer along the road declares to carry off the torch-bearers, torch and all. Bears they say are scarce and all other wild animals.

The site of Maddaobund, elevated 1217 feet, in a clearance of the forest, is very beautiful. Fine tamarind trees and a superb Banyan shadow its temples, and the ascent is immediately from the village up a pathway worn by the feet of many a pilgrim, from the most remote parts of India.

The village was crowded with worshippers, whose numerous vehicles of all shapes and build, reminded one of an electioneering in an English country-town. Though so well wooded the forests of its base are far from rich in species of plants.

*February 4th.*—At 6½ A. M. having provided chairs slung on four men's shoulders, in which I put my papers and boxes, we commenced the ascent ; at first through woods of the common trees, with large clumps of Bamboos, over slaty rocks of gneiss, much inclined and sloping away from the mountain. The view from a ridge 500 feet high was superb, of the village, and its white domes half buried in the forest below, and of the latter, continued for many miles to the northward. Descending to a valley some Ferns were met with, and a more luxuriant vegetation, especially of *Urticeæ*. Wild Bananas formed a beautiful, and to me novel feature in the woods ; these I took for granted were planted, but I have since heard that the plant is wild in the Rajmahal hills, N. E. of this (and of which these mountains are a continuation) and hence no doubt here also. A white-flowered Rubiaceous plant (*Hamiltonia suaveolens*) was everywhere abundant, and very handsome, with many *Acanthaceæ* and *Leguminosæ*, but few *Cryptogamiceæ*. The mounds raised by the white-ant appear to me not an independent structure, but the debris of clumps of Bamboos, or of the trunks of large trees which these insects have destroyed. As they work up a tree from the ground, they coat the bark with particles of silicious soil, glued together, carrying up this artificial sheath or covered way as they ascend. A clump of Bamboo is thus speedily killed, the culms fall away, leaving the mass of stumps coated with sand, which the action of the weather soon fashions into a cone of earthy matter.

Ascending again, the path strikes up the hill, through a thick forest of *Sal* (*Vateria robusta*) and other trees, spanned with cables of scandent *Bauhinia* stems. At about 3000 feet above the sea, the vegetation becomes more luxuriant, and by a little stream, I collected 5 species of Ferns, some Mosses and *Hepaticæ*, all in a dry state however; *Ficus artocarpifolia*? which sends hanging tufts of leafless twigs from the limbs, was abundantly covered with fruit. Some *Smilacæ*, *Disporum*, *Clematis*, a terrestrial Orchideous plant, and *Arginetia*, next appeared, and still ascending *Roxburghia viridiflora*, an increased number of grasses and *Cyperacæ* are met with; the *Hamiltonia* ceases, and is succeeded by other bushes of *Verbenacæ* and *Compositæ*. The white-ant apparently does not enter this damper region. On ascending to 3500 feet the vegetation again changes, the trees all become gnarled, stunted, and scattered, and as the dampness also increases, more Mosses and Ferns appear. Emerged from the forest at the foot of the great ridge of rocky peaks, stretching E. and W. 3 or 4 miles. Abundance of a species of Barberry and an *Osbeckia* marked the change in the vegetation most decidedly, and were frequent over the whole summit, with coarse grasses, *Cyperacæ*, and various bushes.

At noon reached the saddle of the crest, where was a small temple, one of 5 or 6 which occupy various prominences of the ridge.

The wind, N. W. was cold, the temp. 56°. The view beautiful, but the atmosphere too hazy. To the north ranges of low wooded hills, and the course of the Barracker and Adji rivers. To the south a flatter country, with lower ranges, and the Dummodah river, its all but waterless bed snowy white from the exposed granite blocks it strews along its course. East and west the several sharp ridges of the mountain itself; the western considerably the highest, and each crowned with a white temple. Immediately below, the mountain flanks appear, clothed with impenetrable forest, here and there interrupted by rocky eminences. To the north the Grand Trunk Road shoots across the plains, like a white thread, stretched as straight as an arrow, spanning here and there the beds of the mountain torrents, with the pretty bridges of my friend Lieut. Beadle.

On the south side the vegetation was more luxuriant than on the north, though from the heat of the sun the opposite might be expected. This is owing partly to the curve taken by the ridge being open to the south

and to the south winds being the damp ones. Accordingly, plants which I had left 3000 feet below in the north ascent, here ascended to near the summit, such as *Fici*, Bananas and various weeds. A small short-stemmed Palm (*Phœnix*) was tolerably abundant, (propably *P. Ouselayanæ*, Griff.) and a small tree of *Pterospermum*, on which a species of grass grew epiphytially: but too withered to determine; it formed a curious feature.

The situation of the principal temple is very fine, below the saddle in a hollow facing the south, surrounded by forest and the Banana and Banian. It is small but handsome, contains little inside to remark, but the sculptured feet of Parus Nath and some slabs of marble with Boodh idols; cross-legged figures with crisp hair and the brahminical cord. These, a leper covered with ashes in the vestibule and an officiating priest, were all we saw.

Pilgrims were seen on various parts of the mount in very considerable numbers, passing from one temple to another, and leaving generally a few grains of dry rice at each; the rich and lame were carried in chairs, the poorer walk.

The culminant rocks are very dry, but in the rains may possess many curious things; a fine *Kalanchoe* was common, with the Barberry, a beautiful *Indigofera*, and various other shrubs; a *Bolbophyllum* grew on the rocks, with a small *Begonia*, *Telaginella*, *Davallia* and some other Ferns. There were no birds, and very few Insects, a beautiful small *Pontia* the only butterfly. The striped squirrel was very busy amongst the rocks, which, with some mice and the traces of bears, includes all I can say of the Zoology of the summit.

On the top and shoulders of the hill there is a considerable space for establishing a small Sanatorium, and the climate is no doubt highly advantageous, as is the proximity to Calcutta, and the acceptability of the country. Mainpath however, is probably a far more eligible site, equal or nearly so in altitude, much more extensive and only a night's dawk from the Grand Trunk Road. The height of the saddle I made to be 4,233 feet,\* above the sea, and the following observations may

\* Calculated by Daniell's Formula, for correcting the specific gravity of air by the Dew-Point. By Sir G. Shuckburgh's Formula, the height is 4,261.8 feet. Of the two Peaks visited the easternmost is 4,148.4, the flag-staff 4,348.2. feet.

give some idea of the temperature as compared with that of Calcutta and the plains below the mountain.

*Comparision of Wooded-gully in Parus Nath.*

Alt. 2,126 ft., with Plains at Base alt. about 1000 ft. and Calcutta at 9 A. M.

|                     | <i>Wooded-gully.</i> | <i>Base.</i> | <i>Calcutta.</i> |
|---------------------|----------------------|--------------|------------------|
| Temp. ....          | 51.5 ....            | 70.1 ....    | 67.              |
| D. P.....           | 36.7 ....            | 37.9 ....    | 38.8             |
| Diff. ....          | 14.8 ....            | 32.2 ....    | 28.2             |
| Saturation. ....    | 0.601 ....           | 0.330 ....   | 0.385            |
| Elast. of vapour... | 0.253 ....           | 0.264 ....   | 0.270            |

Interesting as the Botany of Parus Nath proved, its elevation did not produce such a change from the flora of its base as I had expected. This is no doubt due to the extraordinary influence of a dry atmosphere and barren soil. That the atmosphere of the summit is more damp as well as cooler than at the base, is proved as well by the observations as by the vegetation; the results of the former as compared with the means of those taken below are:

*Comparison of Saddle or Crest of Parus Nath with Calcutta, and with the Plains at the base of the mountain, at 3 P. M. Feb. 4th.*

|                 | <i>Parus Nath.</i> | <i>Plains at foot of.</i> | <i>Calcutta.</i> |
|-----------------|--------------------|---------------------------|------------------|
| Temp. ....      | 54°. ....          | 75.5 ....                 | 74.4             |
| D. P.....       | 21°.8 ....         | 36.0 ....                 | 36.5             |
| Diff. ....      | 32°.2 ....         | 39.5 ....                 | 37.9             |
| Sat. ....       | 0.326 ....         | 0.260 ....                | 0.282            |
| Vap. c. f. .... | 1.658 ....         | 2.674 ....                | 2.719            |
| Elast. ....     | 0.150 ....         | 0.248 ....                | 0.252            |
| Wind. ....      | N.W. ....          | N.W. ....                 | N. W.            |
| Sky. ....       | Hazy. ....         | Hazy. ....                | Clear.           |

Of plants eminently typical of a moister atmosphere, I may mention the genera *Bolbophyllum*, *Begonia*, *Ferns*, *Æginetia*, *Disporum*, *Roxburghia*, *Panax*, *Eugenia*, *Myrsine*, *Shorea*, *Millettia*, the Mosses and foliaceous Lichens; which appeared in uncomfortable association with such dry climate genera, as, *Kalanchoe*, *Pterospermum*, and the dwarf *Phoenix*. Add to this list the Barberry, *Clematis*, *Thalictrum*, 27 grapes, *Cardamine*, &c., and the mountain top presents a mixture of the

plants of a damp hot, a dry hot, and of a temperate climate, in fairly balanced proportions. The prime elements of a tropical Flora were however wholly wanting on Parus Nath, where are neither *Peppers*, *Pothos*, *Arum*, *Palms*, (except the starveling *Phoenix*,) tree ferns, *Scitamineæ* at this season, *Guttiferæ*, *Vitis* or *Laurineæ*.

In the evening returned to the village, I left early on the following morning, following Mr. Williams' camp who had gone on to Sheergottee.

In the valleys near the base of the hill were many fine trees, the *Buchanania latifolia* abounds, with large *Terminalias*, *Diospyros*, *Lagerstroemia*, and *Wrightea tinctoria*. A magnificent *Cæsalpinia* (*paniculata*?) hung in festoons over some of the trees, a perfect cata-ract of golden blossoms, relieved by a dark glossy foliage.

At Doomree (alt. 986 ft.) the hills are of gneiss, and hornblende schist, with a great deal of quartz; no palms or good trees of any kind. The curious genus *Balanites*, with *Ægle marmelos* form abundant bushes. The spear-grass is far too common for comforts in Botanizing.

Feb. 6th.—Left Doomree, walking, for Lieut. Beadle's Bungalow. The country around Baghodur is still very barren, but improves considerably in going westward, the ground becoming hilly and the road winding through prettily wooded valleys. *Nauclea cordifolia* is very common and resembles a young Sycamore. Crossing some well-bridged streams the road rises a good deal, and at the highest point measured 1429 ft. above the sea. The *Bombax*, (Semul) now leafless, is not uncommon, and a very striking tree from its buttressed trunk and gaudy scarlet flowers, swarming with birds, which feed from its honeyed blossoms.

At 10 o'clock the sun became uncomfortably hot, the Therm. being only 77°, but the black-bulb Therm. 137°. At noon arrived at Lieut. Beadle's at Belcuppee, from whom I experienced a most hospitable welcome. Staying there two days I enjoyed his society during several excursions to the hot spring, &c. I further profited much by his excellent knowledge of coloring and appreciation of the natural features of the surrounding country to which the beauty of its landscape is due. The most frequent trees are still the oak-like *Mahowa* (*Bassia*), *Nauclea*, Mango, and *Ficus infectoria*. These are all scattered however, and do not form forest, such as in a stunted shape, clothes the hills, and consists of *Diospyros*, *Terminalia*, *Gmelina*, *Nauclea parvifolia*, *Conocarpus*, &c.

The rocks are still hornblende schists and gneiss with a covering of

alluvium full of quartz pebbles. Effloresced salts are frequent in the exposed rocks, and probably inimical to *Lichens*, which though common hardly ever assumed the foliaceous form. Insects and birds are more numerous, with Jays, Crows, Doves, Sparrows and Maina (Pastor), also the *Phœnicophaus tristis*, (Mahoka of the natives,) with a voice like the English Cuckoo as heard late in the season.

Height of Belcuppee above the sea 1139 feet.

In the evening visited the hot-springs, situated close to the road. These are four in number, rise in as many little ruined brick tanks, about  $\frac{1}{2}$  yard across. Another tank, fed by a cold spring, about twice that size, flows between two of the hot, and only two or three paces distance from one of the latter on either hand.

All burst through the gneiss rocks, meet in one stream after a few yards, and are conducted to a pool of cold water, about 80 yards off, by bricked canals.

The temperatures of the hot springs were respectively  $169^{\circ}$ ,  $170^{\circ}$ ,  $173^{\circ}$  and  $190^{\circ}$ ; of the cold,  $84^{\circ}$  at 4 P. M. and  $75^{\circ}$  at 7 A. M. of the following morning. The hottest is the middle of the five. The water of the cold spring is sweet but not good, and emits gaseous bubbles; it is covered with a green floating *Conferva*.

Of the four hot, the most copious is about three feet deep, bubbles livelily its gasses, boils eggs, and though brilliantly clear, has an exceedingly nauseous taste. This and the other warm ones deposit salt in a very concrete state, on the bricks and surrounding rocks.

*Confervæ* abound in the warm stream from the springs, and two species, one ochreous brown, and the other green, occur on the margins of the tanks themselves, and in the hottest water; the brown is the best Salamander, and forms a belt within the green: both appear in broad luxuriant strata, where the water is cooled down to  $168^{\circ}$  and below to  $90^{\circ}$ . Of flowering plants, three showed in an eminent degree a constitution capable of resisting, if not a predilection for the heat; these were *Cyperaceæ* all, a *Cyperus* and *Eleocharis?* having their roots in water of  $100^{\circ}$ , and where they are probably exposed to greater heat, and a *Fuirene?* at  $98^{\circ}$ ; all were very luxuriant.

From the edge of the four hot springs I gathered seven or eight species of flowering plants, and from the cold tank five, which did not grow in the hot.



A water-beetle, *Colymbetes?* and *Notonecta*, abounded in water at 112°, with quantities of dead shells; frogs were very lively with live shells, at 90°, with various water beetles. Having no means of detecting the salts of this water, I bottled some for future analysis. The situation of these springs (called Soorooch-kand) is very pretty, near the mouth of a valley. They are objects of worship of course, and a ruined temple is seen close behind, with three very conspicuous trees, a white thick stemmed and leafless *Sterculia*, whose ramuli bore dense clusters of greenish red, fetid and viscid flowers;—a Peepul and a Banyan.

On the following day I botanized in the neighbourhood with but poor success; an oblique-leaved *Ficus* climbs the other species and generally strangles them. Two other epiphytial *Orchideæ* occurred on the trees besides the one previously alluded to, an *Angræcum* and *Oberonia*. *Cuscutæ* of two species swarm over and conceal the bushes with their yellow filaments, especially choking the *Vitex Negundo?* *Mucuna* is common, and a most disagreeable intruder, the cowitch of its pod flying about with the wind and causing intolerable irritation.

*February 8th.*—Left Lieut. Beadle's early, following Williams' camp. The morning was clear and cold, the temperature only 56°; crossed the nearly empty broad bed of the Burkutta river, a noble stream in the rains, carrying along huge boulders of granite and gneiss.—Still ascending, measured the highest part of the road, 1492 feet, and suddenly came on a small forest of a peculiar looking tree, quite new to me. This proved to be the Indian Olibanum, *Boswellia thurifera*, conspicuous for its pale bark, and patent curving branches, leafy at the apices. Its general appearance is a good deal that of the mountain Ash; and the leaves, now copiously falling, and red in age, were actually reddening the ground. The gum was flowing abundantly from the trunk, very fragrant, clear and transparent. Many of the trees were cut down and had pushed leafy ramuli in great abundance from the stumps. The ground was dry and rocky with little other vegetation, no *Orchideæ* grew on the trees, and but little grass under foot. Kunkar here reappears in the alluvium. Another *Phœnix* occurred here, similar to, but different from the Parus Nath species, probably *Pacaulis*; it is wholly stemless, and I saw male flowers only.

Suddenly descending to the village of Burshoot, lost sight of the

*Boswellia*, and came upon a magnificent tope of Mango, Banyan and Peepul, so far superior to any thing hitherto met with, that we were glad to have hit on so pleasant a halting-place for a bivouac. There are a few lofty *Borassi* here too, great rarities in this soil and elevation; one about 80 feet high towered above some wretched hovels; displaying the curious proportions of the trunk in this tribe of Palm: first a short cone, tapering to one-third the height of the tree, the trunk then swells to two-third height, and again contracts upwards to the crown.

Beyond this, to Burree, the country ascends again, is tolerably wooded, but otherwise sterile and very dry. Burree (1275 feet) is a barren place, which we left at daylight on the morning of February 9th. So little to be observed that I had recourse to examining footsteps, the precision of which in the sandy soil was curious: looking down from the elephant I was amused to see them all in relief, instead of depressed, the slanting rays of the eastern sun producing this mirage: the effect was curious. Crossed another shoulder of a hill on this undulating road, at an elevation of 1524 feet, and descended to the broad stony bed of the Barrucker river, an affluent of the Dummoodah, and hence of the Hooghly. Except in some cotton cultivation, there was little to be seen, and before us no more of the wooded hills that had been our companions for the last 120 miles, and whose absence is a sign of the near approaching termination of the great hilly plateau we had traversed for that distance. Chorparun,\* the next halt, is situated on an extended barren flat, 1311 feet above the sea, and from it the descent from the table-land to the plains below is very sudden.

*February 10th.*—At daylight left Chorparun, and descended the ghat or Dunwah pass, as it is called, to the great valley of the Soane, and to the level of that of the Ganges at Patna. The road, though very steep, is admirably carried zigzag down a broken hill of gneiss, with a descent of nearly 1000 feet in 6 miles, of which 600 is exceedingly rugged and steep. The pass is well wooded, with small trees, among which the *Boswellia* is conspicuous, now pushing its flowers from the leafless apices of the branches. Quartz and Felspar are the prevalent minerals, and barren enough in every respect, except supporting this low rugged wood and abundance of Bamboo; *Bombax*, *Cassia*, *Acacia*, and *Butea* are likewise frequent, as is a *Calotropis*, the purple

\* Hill above Chuparun, 1322 ft.

Mudar, a very handsome road-side plant, which I had not seen before, but which, with the *Argemone Mexicana* was to be a companion for hundreds of miles before me. All the views in the pass are very picturesque, though wanting in good foliage, such as *Ficus* would afford, of which I did not see one tree. Indeed the rarity of the genus (except *F. infectoria*) in the native woods of these plains I have traversed, is very remarkable. The Banyan and Peepul appear, (as the tamarind and mango and Mahowa?) always planted.

Dunwah, at the foot of the pass, is 633 feet above the sea, and nearly 1000 below the mean level of the highland I had left. Every thing bears here a better aspect; the woods at the foot of the hills afforded better botanizing; the Bamboo (*B. stricta*?) is green instead of yellow and white; a little castor oil is cultivated, and the *Phoenix sylvestris* (low and stunted) appears about the cottages.

In the evening left Dunwah for Bahra, the next stage, over very barren soil, covered with low jungle, the original woods being apparently cut for fuel.

*February 11th.*—Left Bahra, alt. 477 feet (from one observation at sunrise only) at daylight, for Sheergotty,\* where Mr. Williams was waiting our arrival. Wherever cultivation appears the crops are tolerably luxuriant, but a great deal of the country is very barren, yielding scarcely half a dozen kinds of plants to any 10 square yards of ground. The most prevalent were *Alax scandens*, two *Zizyphi*, and the ever-present *Acacia Catechu*? and *Carissa carindas*. The climate is however considerably warmer and much moister, for I here observed dew to be formed, which I afterwards found to be usual on the low grounds. That its presence is due to the increased amount of vapor in the atmosphere I shall prove, the amount of radiation, as shown by the cooling of the earth and vegetation, being the same in the elevated plain and lower levels.

The following is an abstract of the Meteorological observations I was enabled to make. From these it is evident that the dryness of the atmosphere is its most remarkable feature, the temperature not being great, and to this, combined with the sterility of the soil over a great part of the surface, must be attributed the want of a vigorous vegetation. Though so favorably exposed to the influence of nocturnal radia-

\* Alt. of road, at 284th mile-stone, 474 ft.

tion the amount of the latter is small. The maximum depression of a Thermometer laid on grass never exceeding 10°, and averaging 7° ; the average depression of the dew point at the same hour amounting to 25° in the morning ; of course no dew is deposited, even in the clearest star-light night, which I attribute in part to the extreme desiccation, and in part to the operation of the light haze alluded to above.

TABLE-LAND OF BIRBHOOM AND BEHAR.

|              | Temperature. |      |      |        | Wet Bulb. |                  |                  |       | Elasticity of Vapor. | Dew Point. |      |                  |                  |       | Weight of Vapor in cubic feet. | Saturation. |      |    | Number of observations. |
|--------------|--------------|------|------|--------|-----------|------------------|------------------|-------|----------------------|------------|------|------------------|------------------|-------|--------------------------------|-------------|------|----|-------------------------|
|              | Mean.        | Max. | Min. | Range. | Mean.     | Max. Depression. | Min. Depression. | Mean. |                      | Max.       | Min. | Max. Depression. | Min. Depression. | Mean. |                                | Max.        | Min. |    |                         |
| Sun-rise ..  | 56.6         | 65.2 | 46.3 | 18.9   | 48.2      | 12.5             | 6.0              | .276  | 39.5                 | 52.0       | 23.3 | 31.7             | 10.4             | 3.088 | .550                           | .690        | .330 | 7  |                         |
| 9 A. M. ..   | 70.1         | 77.0 | 61.2 | 15.8   | 53.7      | 19.3             | 14.3             | .264  | 37.9                 | 52.7       | 24.5 | 39.2             | 24.3             | 2.875 | .330                           | .450        | .260 | 7  |                         |
| 3 P. M. .... | 75.5         | 81.7 | 65.2 | 16.5   | 55.3      | 22.5             | 16.7             | .248  | 36.0                 | 46.8       | 24.3 | 48.4             | 34.9             | 2.674 | .260                           | .320        | .190 | 7  |                         |
| 9 P. M. .... | 61.7         | 66.2 | 55.5 | 10.7   | 49.3      | 20.5             | 9.0              | .248  | 36.1                 | 50.0       | *9.1 | 56.9             | 16.2             | 2.745 | .410                           | .590        | .140 | 10 |                         |

Extreme variations of Temperature..... 35.4  
 „ „ „ Saturation..... 54.0  
 „ diff. between Solar and Nocturnal Radiation... 96.5

\* Taken during a violent N. W. dust storm.

TABLE-LAND OF BEHAR AND BEERBHOOM.

Solar Radiation.

| Time.     | Morning. |             |       |        | Afternoon. |       |             |       |        |
|-----------|----------|-------------|-------|--------|------------|-------|-------------|-------|--------|
|           | Th.      | Black Bulb. | Diff. | Phot.  | Tim.       | Th.   | Black Bulb. | Diff. | Phot.  |
| 9½ A. M.  | 77.0     | 130         | 53.0  | ..     | 3½         | 81.7  | 109         | 27.3  | ..     |
| 10.....   | 69.5     | 124         | 54.5  | 10,320 | 3          | 80.5  | 120         | 39.5  | 10,320 |
| 10.....   | 77.0     | 137         | 60    | ..     | 3          | 81.5  | 127         | 45.5  | 10,330 |
| 9.....    | 63.5     | 94          | 30.5  | 10,230 | 3½         | 72.7  | 105         | 32.3  | 10,230 |
| 9.....    | 61.2     | 106         | 44.8  | ..     | 3          | 72.5  | 110         | 37.5  | 10,390 |
| 9.....    | 67.0     | 114         | 49.0  | 10,350 | ..         | ..    | ..          | ..    | ..     |
| Mean..... | 69.2     | 117.8       | 48.6  | 10,300 | ..         | 7 7.7 | 114.2       | 36.4  | 10,318 |

## TABLE-LAND OF BIRBHOO AND BEHAR.

*Nocturnal Radiation.*

|                  | Sunrise.     |                      |                      | Number of observations. | 9 P. M.      |                      |                      | Number of observations. |
|------------------|--------------|----------------------|----------------------|-------------------------|--------------|----------------------|----------------------|-------------------------|
|                  | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. |                         | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. |                         |
| Exposed Th. .... | 51.1         | 4.                   | 9.0                  | 6                       | 56.4         | 5.3                  | 7.5                  | 7                       |
| On Earth. ....   | 48.3         | 2.5                  | 3.7                  | 3                       | 53.8         | 4.9                  | 5.5                  | 6                       |
| On Grass. ....   | 46.6         | 6.2                  | 9.0                  | 5                       | 54.4         | 7.2                  | 10.0                 | 7                       |

On one occasion, and that at night, the dew point was as low as  $9^{\circ}.1$ , with a temperature of  $66^{\circ}$ , a depression rarely equalled at so low a temperature; this phenomenon was transient and caused by the passage of a current of air loaded with dust, whose cooling particles possibly absorbed the atmospheric humidity. I neglected to collect any of the powder. From a comparison of the night and morning observations of Thermometers laid on grass,—the earth,—and freely exposed, it appears that the grass parts with its heat much more rapidly than the earth, but that still the effect of radiation is slight, lowering its temperature but  $2^{\circ}$  below that of the freely exposed thermometer.

As compared with the climate of Calcutta these flat hills present a remarkable contrast, considering their proximity in position and moderate elevation.

The difference of temperature, deduced from the sunrise morning and afternoon observations, amounts to  $4^{\circ}$ , which, if the mean height of the hills where crossed by the road, be called 1133 feet, will be equal to a fall of one degree for every 288 feet. This is below the usual equivalent for that height: Playfair assuming,  $1^{\circ}$  equal to 270 feet of elevation, and more recent observers  $1^{\circ}$  as equal to 250 feet. A comparison of the solitary temperature taken at the top of Parus Nath with the cotemporaneous one at Calcutta, gives  $1^{\circ}$  of temperature for every 211 feet, which is again much above the assumed standard.

In the dampness of the atmosphere Calcutta contrasts very remarkably with these hills; the dew point on the Hooghly averaging  $51^{\circ}.3$ ,

and on these hills 38°, the corresponding saturation points being 0.559 and 0.380.

The differences between sunrise, forenoon and afternoon dew points at Calcutta and on the hills, are 13°.6 at each observation ; but the atmosphere at Calcutta is proportionably drier in the afternoon than at sunrise, than it is on the hills : the difference between the Calcutta sunrise and afternoon saturation point being 0.449 : and the hill sunrise and afternoon, 0.190. The march of the dew point is thus the same in both instances, but owing to the much higher temperature of Calcutta, and greatly increased tension of the vapor, there the saturation points answering to these dew point temperatures, are very different.

In other words, the atmosphere of Calcutta is loaded with moisture in the early morning of this season, and is comparatively dry in the afternoon ; in the hills again, it is scarcely more humid at sunrise than at 3 P. M. That this dryness of the hills is partly due to elevation appears from the disproportionately moister state of the atmosphere below the Dunwah pass.

A retrospect of the ground passed over is unsatisfactory, as far as botany is concerned, except as showing how potent are the effects of a dry soil and climate, upon a vegetation which has no desert types. At another season, probably many more species would be obtained, for of annuals I scarce got a score of species. In a geographical point of view the range of hills is exceedingly interesting, as being the N. E. continuation of a chain which crosses the broadest part of the Peninsula, from the gulf of Cambay to the junction of the Ganges and Hooghly at Rajmahal. This range runs south of the Soane and Vindhya, which it meets I believe at Omerkuntuk ; the granite of this and the sandstone of the other, being then both overlain with trap. Further west again, the ranges separate, the present still betraying a nucleus of granite, forming the Satpur range, which divides the valley of the Taptee from that of the Nerbudda. The southern is, though the most difficult of definition, the longest of the two parallel ranges, the Vindhya continued as the Kymaon, terminating abruptly at the Fort of Chunar. The general and geological features of the two, especially along their eastern course, are very different. This of gneiss, hornblende-schists and granites, in various highly inclined beds, through which granite hills are pushed, most of them low, but one culminating

remarkably, Parus Nath, around whose base the overlying gneiss rocks dip, radiating from it. The N. E. Vindhya again are of flat beds of sandstone, presenting a dead level, with no eminences or signs of upheaval, overlying a non-fossiliferous inclined bed of limestone. Between the latter and the Parus Nath gneiss, come (in order of superposition) shivered and undulating strata of metamorphic quartz, hornstone, hornstone-porphry, jaspers, &c. These are thrown up, by volcanic action, along the N. and N. W. boundary of the gneiss range and are to be recognized, at the rocks of Colgong, of Sultangunge and of Monghyr, on the Ganges, as also various detached hills near Gya, and along the upper course of the Soane. From these the Soane pebbles are derived, which are equally common on the Curruckpore range, as on the south banks of the Soane:—so much so in the former position, as to have been used in the decoration of the walls of what are now ruined palaces near Bhaugulpore.

A very gradual ascent, over the alluvial plains of the west bank of the Hooghly, then over laterite, succeeded by sandstone of the Indian coal era, leads to the granite table-land properly so called; a little beyond this the latter reaches an average height of 1130 ft. which is continued on upwards of 100 miles, to the Dunwah Pass, in short. Here the descent is sudden, to the plains, which, continuous with those of the Ganges, run up the Soane till its valley is narrowed beyond Rotasghur. Except for the occasional ridges of metamorphic rocks mentioned above, and some intruded hills of greenstone, the lower plain is stoneless, its subjacent rocks being covered with a thicker stratum of the same alluvium, which is thinly spread over the higher parts of the table-land above, though even there collected in beds of enormous thickness in the depressions. The plain here dividing the Kymaon range from that of Parus Nath, is full 80 miles across, with a mere elevation of 400 ft.; beyond which the ascent to the Kymaon is more abrupt than 400 in the descent at Dunwah. This alluvium is, to my as yet unpractised eyes, a most remarkable formation, and with its inclosed kunker, appears as if deposited quietly and synchronously over the Kymaon, the Parus Nath range and the intervening broad valley of the Soane. Broad bold and headstrong as the latter river is, it seems to have played no part in the formation of its own valley, for in its upper bed, where the valley is scarcely two miles wide, and where the Kymaon sandstone

escarpments all but plumb the river, there is still a narrow strip of dead flat alluvium, with kunker, as hard and tough as many rocks, through which the river eats its way, cutting channels with perpendicular sides in both margins, and which shield the rocky hills on either bank. A thin bed of vegetable mould, the result of decomposition, or perhaps aided by occasional overflows of the stream, caps the alluvium; but the latter is distinctly a formation antecedent to the birth of the river. Of all problems referring more immediately to Indian geology, this appears to me the most interesting; whether we regard this vast deposit in a purely geological light or as that depression of hills and elevation of valleys, which has smoothed so much of the surface of the continent from the Himalayah to Cape Comorin, producing uniformity of outline and of concomitant features, over many thousands of square leagues, favoring the ravages of conquering races, and the propagation of creeds, of populations and industrial arts. On passing over the mountainous districts one is astonished at the isolation of the tribes, inhabiting the rugged hills of Curruck from Parus Nath and Rajmahal, but a uniformity prevails amongst the people north of the range, and along the Gangetic plains, from Benares to Monghyr, more marked than between any two neighbouring counties in England.

To return to the Parus Nath range (or table-land of north Bengal) it is the great water bed of this part of India. Rivers flow from it N. W. and N. into the Soane; the Rheru, the Kunner, the Coyle and innumerable smaller streams. A few insignificant nullahs also find their way to the Ganges. The more considerable ones debouche in the Hooghly, as the Dummoodah with its affluents, the Adji and Barrucker, the Cossye and Dalkissori; and still others, the Subunrika, Brahminy and north feeders of the Mahanuddy flow to the Bay of Bengal.

Hence, though difficult to define from its gradual slope to the eastward, its broken outline, (so different from the ghat ranges of sandstone or trap rocks,) and from the impracticable nature of the country forming its southern boundary, it is a range of great interest, from its being the source of so many important rivers, and of all those which drain the country between the Soane, Hooghly and Ganges—from its position directing the course of the Soane and forcing the Ganges which strikes its base at Rajmahal, to seek a sinuous course to the sea. In its climate and botany it differs equally from the Gangetic plains to the



north and from the hot damp and exuberant forests of Orissa to the south. Nor are its geological features less different, or its concomitant and in part resultant characters of agriculture and native population. Still further west than Mainpath, this range is continued, probably ascending, till it meets the Vyndhya at Omer-kuntuk, there the great rivers of the peninsula have their origin, these two ranges meeting and combining to throw of the waters mainly in opposite directions. The Nerbudda and Taptee hence flow west to the gulf of Cambay, the Cane to the Jumna, the Soane to the Ganges, and the northern feeders of the Godavery to the Bay of Bengal. Further west it appears to me that they again separate, but are still to be recognized by geological features, though these are masked by the presence in common to both of enormous overlying masses of trap.\*

*February 12th.*—Left Sheergotty (alt. 463 ft.) crossing some small streams which, like all else seen since leaving Dunwah Pass, flow N. to the Ganges. Long low ranges of hills, isolated, and together forming no apparent system, rise abruptly out of the plain. These are chiefly of volcanic rocks, syenite and greenstone, forcing up, and sometimes injected through broken masses of gneiss, metamorphic quartz, hornstone, &c. All the rocks composing them are of excessive hardness and covered with a scanty vegetation, approaching absolute sterility. Many of them occurring between Sheergotty and the Soane, are better known to the traveller from having been telegraphic stations. Some are much impregnated with iron, and whether for their color, the curious outlines of many, or their position, they form quaint, and in some cases picturesque features in the otherwise tame landscape.

At Muddunpore alt. 442† ft. a thermometer, sunk 3 ft. 4 inches in

\* I laid these views when very crude before my friend and present host B. H. Hodgson, Esq. and received such assistance in fixing them as few could afford. I am anxious, thus early, to record my deep sense of obligation to one who is my master in the Physical Geography of Asia, because, living as we are in constant intercourse, and entertaining views, so consonant on enquiries of this nature, the pupil is apt to forget, how much the results of his own efforts are enhanced in value by the directing hand of his preceptor.

† I need hardly say that I hope for the indulgence of the Indian Geographer during his perusal of this sketch. It is given with the view of eliciting contradiction or confirmation, and perhaps with too much of that confidence which my superficial knowledge of a great part of the country in question inspires. One end will have

the soil maintained a constant temperature of 71.5°, that of the air varying from 77.5 at 3 P. M. to 62. at sunrise.

Road to Nourunga highly cultivated, with the *Phœnix* more abundant, and many of the weeds of the cultivated grounds, the analogues of the corn-field plants of England, and in many cases the same genera, and almost universally belonging to the same natural order, as *Labiatae*, *Scrophularinae*, *Solanææ*, *Leguminosæ*, and *Boraginææ*, *Caryophylleæ*, *Veronica*, *Anagallis* and *Graphalium luteo-album*; both the latter very prevalent European weeds, were abundant, and are amongst the few English plants common to India. The ground in some places was spangled with the blue flowers of the beautiful *Exacum tetragonum?* as English upland meadows are often with its ally *Gentiana campestris*. At 312 mile-stone the elevation of the road from one morning observation is 371 ft.

At Nourunga I sunk two Thermometers in partial shade of Palms. One at 3 ft. 8 in., the other at 4 ft. 8 in., with the following results :

| Time & Temp. of Air. | Shade. | at 3 ft. 8. | at 4 ft. 8. | Temp. at 3 P. M.    |
|----------------------|--------|-------------|-------------|---------------------|
| Feb. 13th, 9 P. M.   | 60     | 71.0        | 71.5.       | of the same day 71° |
| 10 P. M.             | 60     | 72.0        | 72.0.       | Maxm. of bk. bulb   |
| 14th, 5 A. M.        | 57     | 70.         | 71.5.       | Thermometer 119°.   |

At 5 A. M. I took the temperature of the earth at lesser depths.

|               |    |                                                   |
|---------------|----|---------------------------------------------------|
| Surface soil, | 53 | The elevation of Naurunga is 342 feet, and the    |
| 1 Inch.       | 57 | soil bored into, was an excessively tough allu-   |
| 2 „           | 58 | vium which however seemed to part with            |
| 4 „           | 62 | its heat from nocturnal radiation very rapidly.   |
| 7 „           | 64 | The three observations at 3 feet 8. and 4 feet 8. |

been served should it lead other travellers and enquirers to group geographical features. A stranger in India is overwhelmed with local details. In no British possession have I found a community so conversant with the local geography of that whole country, of which each individual can see but little; none where a new comer may accumulate information so rapidly, so accurately, and I may add without flattery, so pleasantly. But still the broad features are neglected, the dependence and direction of the rivers upon the elevation and disposition of the land, the connection of those with geographical phenomena, of more remarkable simplicity in India than in any similarly extensive country, and the possibility of arranging a knowledge of details by a due regard to the bearings of all these. Very many can indicate with precision the position of an untold number of towns and the mouths of as many rivers, but how few will point the finger to Omer-kuntuk if asked for the fountain-head of all the great cis-Himalayan streams, though these span an area of 10 degrees of latitude and 16 in longitude.

are not sufficient to draw any conclusions from, but they appear to indicate the transmission of solar heat accumulated during the day downwards, between 9 P. M. and sunrise of the following morning.

*February 14th.*—Marched from Naurunga to Barroon on the Soane, crossing several streams, one deep. It is curious that all the streams between the Dunwah pass and the Soane itself run parallel to that river and into the Ganges, even the westernmost of them, as the Pompon, some of whose feeders at the great trunk road, run parallel to the Soane, within a mile of that river, but instead of finding their way to it, seek a northward course of nearly 100 miles to the Ganges. This indicates a more rapid fall of the land towards the N. than to the W., and further, a depression between Dunwah and the Soane, which I believe occurs about Naurunga, and from whence there is a rise towards the Soane. Nothing can more clearly indicate the tenacity and durability of the alluvium through which the small streams wind their way. The body of water lodged in this depression would else, during the rains, find a course into the Soane, instead of keeping parallel to it for so many miles. The fall of the Soane itself however gives the northerly dip of the land towards the Ganges more clearly. My observations both at Barroon on the E. and at Dearee on the W. bank (opposite) of the Soane, makes the river here about the same level as that of the Ganges at Benares, which Prinsep estimates at 300 feet above Calcutta. Now the length of the Ganges between Benares and the mouth of the Soane is about 150 miles, with a fall of as many feet. The length of the Soane between Barroon and the Ganges is 70 miles with a fall of upwards of 150 feet,\* producing of course a current most unfavorable to navigation.

Barroon is situated on the alluvial bank of the river (elevated 345 feet) and on as naked and barren a looking country as well may be, the broad expanse of sand which the river exposes in the dry season, resembles a desert, which like many other similar expanses of sand on the Ganges, has its mirages, its simooms, and the other phenomena of an

\* All these elevations are above the sea, must be considered as mere approximations, and are intended to give the general outline of the land. Had I detailed surveys of the countries in question, they would of course have been preferred to my own very rough geodetical operations, and which were not taken with the view of determining levels primarily.

Australian or African desert to a miniature. Its surface in the day is heated above that of the neighbouring country, at night cooled below it. The stars appeared to twinkle more clearly on its banks, and I thought I could during the early morning detect a current of air flowing from its cooled atmosphere to that surrounding the warmer alluvial plains. *Rhamneæ*, *Carissa*, *Olav*, *Acacia*, *Menispermun* and a tall stiff and dry *Malva*, formed the prevailing vegetation, with *Cuscuta*, *Cassyth*a, a few *Asclepiadeæ* and withered grass. Though this is the coldest season, the sand was heated to 110° and upwards where sheltered from the wind, and to 104° on the broad bed of the river.

To compare the rapidity and depth to which the heat is communicated by pure sand, and by the tough alluvium, I took the temperature at some inches depth in both. The mean of a good many observations at different holes, gave the following differences between the temperature of a column of sand in situ 16 inches thick, at 2 P. M. and 5 A. M. the following morning.

| Feb. 14th 2 P. M. | 15th, 5 A. M. | Diff. |                                                                                                                                           |
|-------------------|---------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Air in shade, 81° | 62            | 18°   | Maximum of black-bulb therm. during the day 126°.<br>Min. of radiation at 5 A. M. from a naked bulb therm. 48.2. (exposed over the sand). |
| Surface, 108      | 43            | 64.5  |                                                                                                                                           |
| 1½ inch, .. 100   | 50            | 50    |                                                                                                                                           |
| 3½ „ 85           | 57            | 28    |                                                                                                                                           |
| 6 „ 73            | 67            | 6     |                                                                                                                                           |
| 16* . . . . 72*   | 68            | 4     |                                                                                                                                           |

\* Sand wet at this depth.

That the alluvium both conducts the heat better, and retains it longer, would appear from the following, the only observations I could make owing to the tenacity of the soil.\*

Hard alluvial bank of river.

2 P. M. Surface 104°.

2½ inch, 93°.

5 „ 88°. Sand at this depth, 78°.

5 A. M. Surface 51°.

28 inches, 68°·5.

\* The plan I adopted was suddenly to remove a large clod of alluvium and insert a very small thermometer bulb into a perpendicular side of the hole thus made. I should be glad that any one could suggest to me a better method, feasible for a traveller. The increment or decrement of heat is so rapid for a few inches below the surface as to render its determination with any accuracy very difficult.

Hence the difference between the heat of the surface of the alluvium and of the same at 5 inches is,  $16^{\circ}$  during the day, but of a similarly disposed column of sand,  $30^{\circ}$ .

During the night again a column of 28 inches of alluvium presents a difference of  $17^{\circ}.5$ , one of sand as nearly as I could ascertain of 16 inches,  $24^{\circ}.5$ .

This effect of sandy deserts in causing extremes of heat during the day, and cold at night, is thus readily to be apprehended, and in the case of the larger area covered with sand, the effect of radiation is probably much increased. Thus in the desert between Cairo and Suez a surface heated in the middle of December to  $90^{\circ}$  during the day, presented on the following morning, before sunrise, a dewed surface of  $47^{\circ}.5$ , the increment of heat in digging down to 10 inches was 9 degrees: so powerful is then the effect of nocturnal radiation, that a column of 10 inches was cooled at its base to within 9 degrees of its exposed surface; while a similar one on the Soane had its base temperature  $24^{\circ}$  above that of the surface, &c.

Observing the flowing sap of a vigorous *Calotropis* plant growing in the sand to maintain a temperature of  $72^{\circ}$  in spite of the great heat of the surrounding soil, I dug about its roots and obtained that temperature at 78 inches where the sand was wet, and from whence its roots derived their moisture. As at 15 inches the temperature was still only  $72^{\circ}$  and its roots did not appear to descend so deep, it is evident that the plant was pumping up moisture with such rapidity as to bring the fluid to the surface as cool as below. That this coolness of the sap is due to the ascending currents, is proved by taking the temperature of the leaves, which were at  $80^{\circ}$  (constants).

The low temperature of the leaves exposed to the sun (which heated the sand to  $110^{\circ}$  and earth to  $104^{\circ}$ ) is probably due both to the coolness of the ascending sap and evaporation from the leaf's surface, as the activity of the circulation is regulated by the rapidity of evaporation. On the same night the leaves were cooled to  $54^{\circ}$  by radiation, the sand to  $51^{\circ}$ , and before sunrise on the following morning the *Calotropis* showed  $45^{\circ}.5$  and the sand  $42^{\circ}$ . I neglected to observe the temperature of the sap at this time, but supposing it to be that of the earth at the same depth (15 inches) which was  $68^{\circ}$ , we must admit the leaves to be heated only  $8^{\circ}$  by solar radiation and cooled  $22^{\circ}.5$  by nocturnal.

Two thermometers sunk in the alluvium here gave the following results :—

| The air.       | Soil at 3 ft. 6. | Soil at 2 ft. 4. | In both cases  |
|----------------|------------------|------------------|----------------|
| 9 P. M. 62°    | 70°              | 70°              | perfectly ex-  |
| 11 P. M.       | 72               | 72               | posed hard al- |
| 5½ A. M. 53.5. | 48.5.            | 68.5.            | luvial soil.   |

Here again, as at Nourunga, there is a decided increase of temperature after 9 P. M. I cannot suppose however, that it is due to a heating of the soil to that depth, so rapidly as the 9 and 11 o'clock observations would seem to indicate.

*February 15th.*—Crossed the Soane to Dearee on the opposite bank ; at this season there is but little water and the body of the current runs close to the W. shore ; all else is sand, representing in its major and minor undulations those of the ocean. The progressive motion of the waves was very evident, and produced by the sand from windward flying off one ripple and heaping against the weather bank of the ripple to leeward ; thus though the particles of sand preserve an onward course, the waves are advancing against the wind or retrograding, that in front being added to on its weather side. A few islets of laminated sand occur in the bed of the sand, little oases, green with waving crops of much diseased wheat and barley. Alt. of Dearee 334 ft.

*February 16th.*—From hence our course lay up the Soane, leaving the grand trunk road. Marched from Dearee this morning to Tilothi, through a rich and highly cultivated country, covered with indigo, cotton, sugar-cane, *Carthamus*, castor oil, poppy, and various grains. The *Zizyphi* are larger, *Cuscutas* cover even tall trees with a golden web, and the *Capparis acuminata*, was in full flower along the road side. Tilothi, a beautiful village situated in a magnificent tope, is close to the river, and about 5 miles from the foot of the Kymaon, which here presents a precipitate sandstone escarpment. The plants along its base were precisely the same as those of the Dunwah pass, and on their tops those of the base of Parus Nath : *Buchanania*, *Boswellia*, *Terminalias*, *Acacias*, *Bauhinia* and the white-trunked naked-armed *Sterculia fetidissima*.

A hole was sunk here again, for the thermometers, and as usual, with great labour ; 8 men took as many hours to bore 5 ft. with a very heavy iron *jumper*, so exceedingly tough is the soil ;—the temperatures obtained were—

|                       |                                            |
|-----------------------|--------------------------------------------|
| Air.                  | 4 feet 6 inches under good shade of trees. |
| 9 P. M. 64°5 . . . .  | 77°                                        |
| 11 P. M. . . . .      | 76°                                        |
| 5½ A. M. 58°5 . . . . | 76°                                        |

This is a very great rise (of 4°) above any of those previously obtained, and certainly indicates a much higher mean temperature of the locality. I can only suppose it due to the radiation of heat from the long range of sandstone cliff, exposed to the south, which overlooks the flat whereon we were encamped, and which though 4 or 5 miles off, forms a very important feature. The differences of temperature in the shade taken on this and the other side of the river are 2°8 higher on this side.

*February 17th.*—Proceeded up the Soane to Rotasghur, where a spur of the Vindhya stands abruptly forward.

The range, in proceeding up the Soane valley gradually approaches the river, and beds of limestone are seen protruding below the sandstone and occasionally rising into rounded hills, the paths upon which show as white as do those through the chalk districts of England. The overlying beds of sandstone are nearly horizontal, or with a dip to the N. W.; the subjacent ones of limestone dip at a greater angle. Before coming to the village of Akbarpore, at the base of the spur, the road passes over the foot of a curious detached conical hill of limestone, capped with a flat mass of sandstone, whose edges, from the more rapid decomposition of the subjacent support, overhung the top of the hill. At its base the beds of some are undulating and an anticlinal line is passed over; beyond this the escarpment of the Vindhya sweeps backwards from the river, and returns as the spur of Rotas, which thus forms one horn to a grand amphitheatre of rocks, enclosing a wooded valley. The forest creeps up the sloping base of the precipices, whose crests are shaggy also with a rough jungly wood. This view of the conical hill with its sandstone cap, the grand sweep of the scarped rocks, returning to form the fortress-crowned spur of Rotas, and the foreground of wooded valley, is exceedingly fine.

During my stay at Akbarpore we had the advantage of the society of C. E. Davies, Esq. who was our guide and instructor during some rambles in the neighbourhood, and to whose experience, founded on the best habits of observation, I am indebted for excellent informa-

tion. On our excursion to the top of the hills, we passed one of those beautiful built wells, about 60 ft. deep, and with a fine flight of steps to the bottom. Now neglected and overgrown with flowering weeds and creepers, it afforded me many of the plants I had only previously obtained in a withered state; it was curious to observe there some of the species of the hill tops, whose seeds doubtless are scattered abundantly over the surrounding plains, and only here find a congenial climate, where the coolness and moisture of their natural level are imitated. A fine fig tree growing out of the stone work spread its leafy green branches over the well mouth, which was about 12 ft. square; its roots assumed a singular form, enveloping two sides of the well walls, with a beautiful network, which at *high-water mark*, (rainy season) abruptly divides into thousands of little brushes, dipping into the water which they fringe, thence descending to the earth below. It was a pretty cool place to descend to, from a temperature of 80° above, to 74° at the bottom, where the water was 60°; and most refreshing to look, either up the shaft to the green fig shadowing the deep profound, or along the sloping steps through a vista of flowering herbs and climbing plants, to the blue heaven of a burning sky.

The ascent to Rotas is over the dry hills of limestone, covered with a scrubby brush-wood, to a crest where are the first rude and now ruined defences of the pass. The limestone is succeeded by the sandstone cliff cut into steps, which leads from ledge to ledge of the strata, and gap to gap, well guarded with walls and archways of solid masonry. Through this you pass on the flat summit of the Kymaon hills, covered with grass and low loose forest, amongst which paths run in all directions. The ascent is about 1200 ft. a long pull in the blazing sun, even of February. The turf is chiefly of spear-grass and *Nardus*, which yields the favorite oil, much used in domestic medicine all over India. The trees are of the kinds mentioned before, especially the *Olibanum*, *Wrightea*, *Diospyros* and *Terminalia*; the Sal (*Vatica robusta*) is rare, from being universally cut down. The curious *Hymenodyctium thyrsoiflorum* grows as a scattered tree. A pretty octagonal summer-house with a roof supported by pillars, occupies one of the highest points of the plateau; it is called 1485 ft. above the Soane, and commands a superb view of the features mentioned before.

From this to the palace is a walk of 3 miles, through the woods.



The buildings are very extensive, and though now ruinous, bear evidence of great beauty in the architecture : light galleries supported by slender columns, long cool arcades, screened squares and terraced walks, are the principal features. The rooms open out into flat roofs, commanding views of the long endless table-land on one side, and a sheer precipice of 1000 feet on the other, with the Soane, the amphitheatre of hills, and village of Akharpore, below.

This and Bidjegur, higher up the Soane, were some of the most recently reduced forts, and this was further the last of those wrested from Baber in 1542. Some of the rooms are still habitable, but the greater part are ruinous and covered with climbers of both wild flowers, and the naturalized garden plants of the adjoining shrubbery. The *Nyctanthes* and *Guetarda*, with *Vitex negundo*, *Hibiscus abelmoschus*, *Abutilon indicum*, *Physalis*, *Justicia adhatoda* and other *Acanthaceæ*, and above all the little yellow-flowered *Linaria ramossima*, crawling like the English *L. cymbalaria* over every ruined wall : all this is just as we see the walls of our old English castles harbouring to the last the plants their old masters fostered in the garden hard by.

On the limestone walls several species of crustaceous *Lichens* abounded.

In the old dark stables I observed the soil to be covered with a copious most evanescent efflorescence, apparently of Nitrate Lime, like soap-suds scattered about.

I made Rotas Palace 1576 feet above the sea, or 1177 feet above the village, so that this table-land is here only 50 feet higher than that I had crossed on the Grand Trunk Road, before descending at the Dunwah pass. Its mean temperature Mr. Davies informs me, is probably about 10° below that of the valley below, but, though so cool, not exempt from agues after the rains. The extremes of temperature are less marked up here than below, where the valley becomes excessively heated, and where the hot wind sometimes lasts for a week, blowing in furious gusts.

The climate of the whole neighbourhood has changed materially ; and the fall of rain, which has much diminished, consequently on felling the forests ; even within 6 years the hail-storms are far less frequent and violent. The air on the hills is highly electrical, owing no doubt to the dryness of the atmosphere, and to this the frequent formation of hail-storms may be due.

The Zoology of these regions is tolerably copious, but little is known of the natural history of a great part of the plateau; a native tribe, prone to human sacrifices, is talked of. Tigers are far from unfrequent, and bears numerous, they have besides the leopard, panther, viverine cat, and civet. Of the dog tribe the pariah, jackal, fox, and wild dog called Koa. Deer are very numerous, of 6 or 7 species. A small alligator inhabits the hill streams, a very different animal from either of the Soane species.\*

During our descent we examined several instances of ripple mark in the sandstone; they resembled the fluting of the *Sigillaria* stems, in the coal-measures, and occurring as they did here, in sandstone a little above great beds of limestone, had been taken for such, and as indications of coal.

On the following day we visited Rajghat, a steep ghat or pass up the cliff to Rotas Palace, a little higher up the river. We took the elephants to the mouth of the glen, picking up Mr. Davies in our way, who had taken his *usual* before break-fast walk, of from Akbarpore to the top of Rotas! and down by the Rajghat pass. Dismounting we followed a stream abounding in small fish and aquatic insects, (*Dytisa* and *Gyrini*), through a close jungle, to the foot of the cliffs, where there are indications of coal. The woods were full of monkeys, and amongst other plants I observed *Murraya exotica*, but scarce. Though the jungle was so dense the woods were very dry, no Palm, *Aroidæ*, Peppers, *Orchidæ* or Ferns. Here, at the foot of the cliffs, which towered imposingly above as seen through the tree tops, are several small seams of coaly matter in the sandstone, with abundance of pyrites, sulphur and copious efflorescences of salts of iron: but no real coal. The springs from the cliffs above, are charged with lime, of which enormous tuff beds are deposited on the sandstone, full of impressions of leaves and stems of the surrounding vegetation. In some part of their course the streams take up quantities of the efflorescence, which are scattered over the sandstones in a singular manner.

At Akbarpore (alt. 399 ft.) I had sunk two thermometers, one at the depth of 4 feet 6 inches, the other 5 feet 6 inches, which both indicated 76° during the whole time of my stay, the air varying at the surface

\* For the better part of this information and much other of value, whose insertion would cause this paper to exceed its proper limits, I am indebted to Mr. Davies.

from 56° to 79°.5. Dew has been formed every night on the plains since leaving the hill at Dunwah, the grass being here cooled 12° below the temperature of the air.

*February 19th.*—Marched up the Soane to Tura, passing some low hills of limestone, between the cliffs of the Kymaon and the river. Collected *Ulmus integrifolia*, a small *Clerodendron*, and pretty bell-flowered Asclepiadeous plant crawling over the hedges. Botanized on the banks of the river, which is lined with small trees of *Ficus*, *Terminalia*, *Phyllanthus*, *Trophis*, and various shrubs, one, a very sweet-scented *Vitex*, with clusters of white flowers, also *V. agnus-castus?* (or *Negundo*.) On the shaded banks, abundance of a *Myosotes* like *Cynoglossum*, *Veronica*, *Potentilla*, *Ranunculus sceleratus*, *Ramex*, several herbaceous *Compositæ* and *Labiatae*; *Tamarix* formed a small bush in rocky hillocks in the bed of the river, and in pools several aquatic plants, *Zanichellia*, *Naias*, *Chara*, and a pretty little *Vallisneria*, and *Potamogeton*. *Riccia* was very abundant. The Brahminy goose was common here, and we usually saw in the mornings immense flocks of wild geese overhead, flying. North elevation of Tura 443 ft.

Here I tried again the effect of solar and nocturnal radiation on the sand, at different depths in the sand, not being able to do so on the alluvium. Temperature of air 87°.

|          | Noon.             | Daylight of following morning. |
|----------|-------------------|--------------------------------|
| Surface* | 110°.....         | 52°                            |
| 1 inch   | 102°.....         | 55°                            |
| 2 ditto  | 93°5.....         | 58°                            |
| 4 ditto  | 84°.....          | 67°                            |
| 8 ditto  | 77° Sand wet..... | 73° wet                        |
| 16 ditto | 76° ditto.....    | 74°                            |

As from above Tura the Soane valley narrows very rapidly, I shall give here an abstract of the Meteorological observations taken since leaving the Dunwah Pass.

The difference in mean temperature, (partly owing to the sun's approach) amounts to 2°5 of increase on the Soane valley, above that of the hills. The range of the thermometer from day to day was considerably greater in the upper station (though fewer observations were

\* Thermometer employed not registered above this temperature.

there recorded) amounting to 17.2 in the former and only 12°8 in the lower station. The range from the maximum to the minimum of each day amounts to the same in both, above 20°. The extreme variations in temperature too coincide within 1°4.

In the hygrometric state of the atmosphere, this of the plains differs most decidedly from that of the hills. Here, as I remarked, dew is constantly formed, which is owing to the amount of moisture in the air, for nocturnal radiation is more powerful on the hills, though it never caused a thermometer to descend to the dew point there. The sunrise and 9 P. M. observation on the lower level give a mean depression of the D. P. below the air of 12°.3, and those at the upper level of 21°.2, with no dew in the former case and a copious deposit in the latter. The corresponding state of the atmosphere as to saturation is 0.480 on the hills and 0.626 below. The only causes I can assign for this seem hardly sufficient: they are the more uniform depth and presence of the alluvium and the frequency of rivers; and what perhaps is even more powerful the shelter afforded by the Kymaon hills from the dry N. W. winds; though it is difficult to conceive that hills of only 1000 feet elevation can influence much a valley 80 miles broad (between the Kymaon and Dunwah.)

The vegetation of the Soane valley is exposed to less extremes of temperature, than that of the hills. The difference between solar and nocturnal radiation amounting here only to 80°.5, and in the former case to 96°.5. There is no material difference in the power of the sun's rays at the upper and lower level, as expressed by the black bulb thermometer, the average rise of a thermometer so exposed over one in the shade, amounting to 48° in either case, and the maximum occurring about 11 A. M. The decrease of the power of the sun's rays in the afternoon is much the most rapid in the valley, coinciding with a greater reduction of the elasticity of vapor and of humidity in the atmosphere.

The photometric experiments show a greater degree of sun's light on the hills than below, but there is not in either state a decided relation between the indications of this instrument and the black bulb thermometer. From observations taken elsewhere I am inclined to attribute the excess of solar light on the hills to their elevation; for at a far greater elevation I have met with much stronger solar light, in a very

damp atmosphere, than I ever experienced in the drier plains of India. In a damp climate the greatest intensity may be expected in the forenoon, where the vapor forms a thin and uniform stratum near the earth's surface; in the afternoon the lower strata of atmosphere are drier but the vapor is condensed into clouds aloft which more effectually obstruct the sun's rays. On the Birbhoom and Behar hills, where the amount of vapor is so small that the afternoon is but little drier than the forenoon, there is little difference between the solar light at each time. In the Soane valley again, where a great deal of humidity is removed from the earth's surface and suspended aloft, the obstruction of the sun's light is very marked.

I have given a few observations on the temperatures of the leaves of two plants during the night, *Argemone Mexicana* and *Calotropis procera*, to which I shall allude when more shall have been taken.

DUNWAH TO SOANE RIVER, AND UP SOANE TO TURA,  
FEBY. 10TH-19TH.

|            | Temperature. |      |      |        | Wet. Bulb. |                  |                  | Elasticity of Vapor. | Dew Point. |      |      |                  |                  | Weight of Vapor in cubic feet. | S. Saturation. |      |      | Number of observations. |
|------------|--------------|------|------|--------|------------|------------------|------------------|----------------------|------------|------|------|------------------|------------------|--------------------------------|----------------|------|------|-------------------------|
|            | Mean.        | Max. | Min. | Range. | Mean.      | Max. Depression. | Min. Depression. |                      | Mean.      | Max. | Min. | Max. Depression. | Min. Depression. |                                | Mean.          | Max. | Min. |                         |
| Sunrise,   | 57.6         | 62.0 | 53.5 | 8.5    | 51.7       | 8.5              | 3.8              | 0.352                | 46.1       | 53.6 | 40.6 | 16.9             | 7.0              | 3.930                          | .680           | .787 | .566 | 10                      |
| 9 A. M.... | 74.0         | 81.0 | 63.5 | 17.5   | 59.5       | 18.5             | 4.0              | 0.332                | 48.5       | 56.7 | 38.0 | 33.5             | 6.8              | 4.066                          | .460           | .818 | .338 | 8                       |
| 3 P. M.... | 77.6         | 87.5 | 71.0 | 16.5   | 59.9       | 26.0             | 6.8              | 0.357                | 46.4       | 60.0 | 36.0 | 44.2             | 11.0             | 3.658                          | .352           | .703 | .237 | 9                       |
| 9 P. M.... | 64.5         | 68.7 | 60.0 | 8.7    | 55.5       | 12.5             | 2.5              | 0.370                | 47.5       | 55.6 | 41.0 | 24.1             | 4.4              | 4.014                          | .572           | .860 | .452 | 10                      |

°

Extreme variation of Temperature..... = 34.0  
 „ „ „ Saturation ..... = .623  
 „ diff. between Solar and Nocturnal Radiation = 80.5

DUNWAH TO TURA.  
Nocturnal Radiation.

|              | Sun-rise.    |                      |                      |                         | 9 P. M.      |                      |                      |                         |
|--------------|--------------|----------------------|----------------------|-------------------------|--------------|----------------------|----------------------|-------------------------|
|              | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. | Number of observations. | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. | Number of observations. |
| Exposed Th.  | 53.2         | 4.5                  | 8.5                  | 9                       | 59.9         | 4.6                  | 11.5                 | 10                      |
| On Earth, .. | 54.0         | 3.7                  | 9.0                  | 9                       | 60.7         | 3.8                  | 10.5                 | 10                      |
| On Grass, .. | 51.5         | 6.2                  | 7.5                  | 8                       | 56.4         | 8.1                  | 13.5                 | 10                      |

DUNWAH TO TURA.  
Solar Radiation.

| Morning. |       |             |       |        | Afternoon. |       |             |       |        |
|----------|-------|-------------|-------|--------|------------|-------|-------------|-------|--------|
| Time.    | Temp. | Black bulb. | Diff. | Phot.  | Time.      | Temp. | Black bulb. | Diff. | Phot.  |
| 9 P. M.  | 70.0  | 125         | 55.0  | 10.300 | 4 P. M.    | 76.5  | 90          | 13.5  | ..     |
| 11.....  | 81.0  | 119         | 38.0  | 10.230 | 3 ....     | 80.0  | 105         | 25.0  | 10.210 |
| 10½ .... | 71.5  | 126         | 54.5  | 10.300 | 3 ....     | 76.0  | 102         | 26.0  | 10.170 |
| 10.....  | 72.0  | 117         | 45.0  | 10.220 | 3 ....     | 87.5  | 126         | 38.5  | ..     |
| 10.....  | 80.0  | 122         | 42.0  | ..     | ..         | ..    | ..          | ..    | ..     |
| 10½ .... | 78.0  | 128         | 50.0  | ..     | ..         | ..    | ..          | ..    | ..     |
| Mean ..  | 75.4  | 122.8       | 47.4  | 10.262 | ..         | 80.0  | 105.7       | 25.7  | 10.190 |

DUNWAH TO TURA.  
Nocturnal radiation from plants.

| Sun-rise.    |              |       |           |       | 9 P. M. |              |       |           |       |
|--------------|--------------|-------|-----------|-------|---------|--------------|-------|-----------|-------|
| Air Temp. .. | Calo-tropis. | Diff. | Argemone. | Diff. | Temp.   | Calo-tropis. | Diff. | Argemone. | Diff. |
| 59.5         | ..           | ..    | 57.0      | 2.5   | 67.5    | ..           | ..    | 53.0      | 14.0  |
| 55.0         | 49.5         | 5.5   | 47.       | 8.0   | 67.     | ..           | ..    | 56.0      | 11.0  |
|              |              |       |           |       | 64.3    | 58.5         | 5.8   | 57.0      | 7.3   |

February 20th.—From Tura we have again to cross our little army over the Soane, the Kymaon cliff approaching too near the river on this (W.) side, to allow of our passing along their base.

The river bed is very sandy, and about  $1\frac{1}{2}$  mile across (apparently). I found the male *Vallisneria* flowers after a great search; it is impossible to distinguish them from the gnat's eggs, with which the pools swarm.

The stream was very narrow, but deep and rapid, obstructed with beds of coarse agate, jasper and chalcedony pebbles. A clumsy boat, here took us across to the village of Dumersolah (or Soanpore) a wretched collection of hovels. The crops thin and poor, and no palms or good trees. Squirrels however abounded, and were busy storing; descending from the trees they scoured across a road to a field of tares, mounted the hedge, took an observation, foraged and returned up the tree with their booty, quickly descended and repeated the operation of reconnoitering and plundering.

The bed of the river here is considerably above that at Dearee, where the mean of the observations with those of Barroon made it about 300 ft. The mean of these taken here and on the opposite side, at Tura, gives about 420 feet, indicating a fall of 120 feet in only 40 miles. Near this the sandy banks of the Soane are full of martins' nests, each one containing a pair of eggs. The deserted ones are literally crammed full of long-legged spiders, (*Phalangium*) which may be raked out with a stick and come pouring down the cliff like corn from a sack; the quantities are quite inconceivable. I did not observe the martin feed on them.

The entomology here resembled that of Europe, more than I had expected in a tropical country, where predacious beetles, at least *Cara-bilideæ* and *Staphylinideæ* are generally considered rare.

The latter tribes here swarmed under the clods, of many species too, but all small, and so singularly active that I could not give the time to collect well. In the banks again, the round egg-like earthy chrysalis of the *Sphinx Atropos?* and the many-celled nidus of the leaf-cutter bee were most common.

A large *Euphorbia* (*E. ligulata?*) is common all along the Soane and used every where (since leaving Dunwah) for fencing. I have not seen the *E. Indica*; and the *E. tereticaulis* very rarely since leaving Calcutta. The *Cactus* is nowhere here.

From this place onwards up the Soane, there is no road of any kind, and we must be our own road engineers. The sameness of the vegetation, and lateness of the season made me regret this; having expected both luxuriance and novelty in these seldom visited and never botanized wilds. Before us the valley narrows considerably, the forest becomes denser, the country in the S. side broken with rounded hills, and on the N. the noble cliffs of the Kymaon dip down to the river. The villages are smaller, more scattered and poverty-stricken, with the Mahowa and Mango as the usual trees: the Bangar, Peepul, and Tamarrind being rare. The natives look more of a jungle race, are tall, athletic, erect, much less indolent and more spirited than the flat and listless natives of the plains.

*February 21st.*—Started at day-light: but so slowly and with such difficulty, through field and wood, and across deep gorges from the hills, that we only advanced five miles in the day, the elephant's head too was aching too badly to push, and the cattle will not advance when the draught is not equal. What is worse, it is impossible to get them to pull together up the inclined planes we cut, except by placing a man at the head of each of the 6, 8, or 10 in a team, and playing at *screw-tail*; when the obstinate animal sometimes capsizes the vehicle. The small garrys and hackeries got on better, though it was most nervous to see them rushing down the steeps, especially those with our fragile instruments, &c.

Kosderah, where we halted, is a pretty place, elevated 473 feet, with a broad stream from the hills flowing past it. These hills are of limestone, and rounded, resting upon others of hornstone and jasper.

The camp was pitched by three small trees of Paper mulberry (I take it) which I had not seen before, and are scarce here.

Following up the little stream, gathered two species of *Potamogeton* and the *Vallisneria*, the latter forming an elegant green carpet in very rapid water, the corkscrew stems always on the stretch. Two *Æschynomynes* abounded, with a *Jussiaea*, *Cyperus*, and several grasses. At the rapids the stream is crossed by large beds of hornstone and porphyry rocks, excessively hard, and pitched up at right angles, or with a bold dip to the N. The number of strata was very great, and of only a few inches or even lines thick; they presented all varieties of jasper, flint-rock, hornstone and quartz of various colours, with occasionally seams



of porphyry and Breccia. Hills of these rocks, and similarly heaved up, skirt the granite range of Parus Nath from the Ganges to as high up the Soane as we went, and perfectly similar rocks occurred again on the Ganges, at the N. of the same range in the islet rocks of Monghyr, Colgong and Sultanpore; they appear to form a deep bed, overlying the gneiss and granite above mentioned, and to be thrown up by the great range.

The numberless little rocks of the rapids were elegantly fringed with a fern I had not hitherto seen, probably *Polypodium proliferum*, and which is the only species the Soane valley presents at this season.

Returning over the hills, found the *Boswellia*, *Gmelina parviflora*, with the common trees of the heights, also *Hardwickia linata*, a most elegant leguminous tree, tall, erect, with an elongated coma and the ultimate ramuli pendulous, covered with bipartite leaves.

All the hills were covered with a shallow bed of alluvium, enclosing abundance of agate pebbles and kunker, the former derived from the quartz strata above noticed.

At night the fires on the Kymaon hills blazed splendidly, the flames in some places leaping from hill to hill. In front of us a gigantic letter W. is written in fire.

*February 23rd.*—Start at daylight, moving the camp up the river with great difficulty to Panchadurmah (elev. 492 feet). High N. W. (the prevailing) wind generally commences at or before sunrise, and moderates at sun-down: this in the narrowed valley blows with very great force, and is so loaded with dust that the hills close by are often obscured: on their subsiding the atmosphere clears remarkably suddenly.

*February 24th.*—Following up the Soane to Pepurah, (elev. 517 ft.) the country wooded, very wild and picturesque; the Mahoowa tree and *Cedrela*, *Nauclea*, *Hardwickia* very abundant with *Terminalias*, *Pentapteris*, *Pongamia*, *Ehretia laevis*, a small tree, covered with white blossoms, and the new foliage deep green, shining and viscid. A fine *Strychnos* forms a dense foliated tree, 30—60 feet high, some pale yellow, as if dying, others deep green, both in apparent health. *Feronia Elephantum* and *Ægle marmelos* very abundant, with various *Leguminous* and *Rubiaceous* trees; *Sterculia* and the dwarf *Phoenix*, which I have never found in fruit or indeed in flower except at Dunwah. Peacocks abound in the woods, and monkeys.

One of my garrys is broken hopelessly and advancing on the spokes instead of the tyre of the wheels. By the banks of a deep gulley here the rocks are well exposed, of shales resting on the limestone, which is nearly horizontal; and this again, unconformably on the quartz and hornstone rocks, which are confused and tilted up at all angles. In one place I observed the strata of the latter to run horizontally for a few feet, and suddenly to be turned up at right angles; with an arc less than a foot in span.

A spur of the Kymaon, like that of Rotas, here projects to the bed of the river, flaming at night with beacon-like fires of the natives, lighted to scare the tigers and bears from the spot where they cut wood and bamboo. The night was bright and clear, with much lighting, the latter attracted to the spur, and darting down as it were to mingle its flame with that of the forest; so many flashes appeared to strike on the flames, that it is probably the rarified air in their neighbourhood attracted it.

*February 25th.*—Awakened between 3 and 4 by a violent dust storm which threatened to carry away the tents. Our position at the mouth of the gulley, formed by the opposite hills, no doubt accounts for it. The gusts were so furious that it was impossible to observe the barometer, which I returned to its case on ascertaining that any indications of a rise or fall, in the column must have been quite trifling.

The night had been oppressively hot, with many insects flying about; amongst which I noticed a *Forficula*, a genus so rarely known to take to the wing in Britain.

At 8½ A. M. it suddenly fell calm, and we proceeded to Chahnchee (elev. 482 feet), the native carts breaking down in the passage over the projecting beds of flinty rocks, or as they hurried down the inclined planes we cut through the precipitous banks of the streams. Near Chahnchee passed an alligator, just killed by two men, a foul beast, about 9 feet long, of the Mager kind. More absorbing than its natural history was the circumstance of its having swallowed a child, that was playing in the water as its mother was washing her utensils in the river. The brute was hardly dead, much distended by the prey, and the mother standing beside it. A very touching group was this: the parent with her hands clasped in agony, unable to withdraw her eyes from the cursed reptile, which still clung to life with that tenacity for

which its tribe are so conspicuous ; beside these the two athletes leaned on the bloody bamboo staffs, with which they had all but despatched the animal.

The *Butea frondosa* is abundantly in flowers here, and a gorgeous sight. In mass the inflorescence resembles sheets of flame, and individually the flowers are eminently beautiful, the bright orange red petals contrasting brilliantly against the jet-black velvety calyx.

By the river found two species of *Gnaphalium*, *Paronychia*, *Tamarix*, a dwarf *Acacia* like *Phyllanthus*, *Wahlenbergia*, *Campanulæ*, *Lepidium*, *Sagitalia*? *Vallisneria* and Docks (*Rumex Wallichii*) in abundance. Cumin and many other herbaceous plants ; tortoises are frequent on the rocks, but pop into the water as approached.

The nest of the *Megachile* (leaf-cutter bee) was in thousands in the cliffs, with *Ephemeras*, *Caddis worms*, spiders and many predaceous beetles. Lamellicorn beetles are very rare, even *Aphodius*, and of *Cetonia* I did not see one.

The poor woman who lost her child earns a scanty maintenance by making catechu ; she inhabits a little cottage, and has no property but two cattle to bring wood from the hills, and a very few household chattles, and how few of these they only know best who have seen the meagre furniture of Dangha hovels. Her husband cuts the trees in the forest and drags them to the hut, but he is now sick and her only boy, her future stay it was whose end I have just related. Her daily food is rice, with beans from the beautiful blue flowered *Dolichos*, trailing round the cottage, and she is in debt to the contractor, who has advanced two rupees to be paid off in three months by the preparation of 240 lbs. of catechu. The present was her second husband, an old man, by whom she never had any children, in which respect alone, did she think herself very unfortunate, for her poverty she did not feel. Rent to the rajah, to the police, and rates to the brahminic priest are here all paid from an acre of land yielding so wretched a crop of barley, that it more resembles a fallow field than a harvest. All day long the natives are boiling down the catechu wood cut into chips, and pouring the decoction into a large wooden trough, where it is inspissated.

This zillah is famous for the quantity of catechu its dry forests yield. The plant is a little thorny tree, erect, and bearing a rounded coma of well remembered prickly branches. Its wood is yellow, with

a dark brick-red heart, most profitable in January and useless in June, (for yielding the extract.)

*February 27th.*—Left for Hirrah, (elev. 536 feet) through a similar country to that passed yesterday. Rocks all highly inclined, often vertical, of ribbon-jasper quartz and hornstone; monkeys, parroquets and hornbills, pigeons, owls and flocks of peacocks. Found a leguminous tree very like the *Butea* in every respect, but with small white flowers (probably *B. parviflora*) so abundant as to appear as if snowed upon. A *Gardenia?* with large yellow fruit eaten by the natives. *Phyllanthus emblica*, *Kydia calycina* and the dwarf *Phœnix*.

*February 28th.*—Marched to Kotah (elev. 542 feet), the path leading over hills with the bed of flinty rock projecting every where, to the utter ruin of our vehicles and the elephant's feet, and then over undulating hills of limestone; on the latter found a tree of *Cochlospermum*, its curious thick branches spread out something awkwardly, and each is tipped with a cluster of glorious golden yellow flowers, as large as the palm of the hand, and very beautiful. I think Lindley is certainly right in referring it to *Cistea*; it is a tropical *Gum-Cistus* in features, produce, color and texture of petals, and their caducous frail nature. It is a superb plant. The bark abounds in a transparent gum, which the white ants seem fond of, for they have killed many trees here.

At Kota, a small village at the junction of the Soane (elev. 543 feet), beside a river of that name, we encamped, and experienced another furious dust storm from the N. W.

Scorpions appear very common here, of a small kind,  $1\frac{1}{2}$  inch long. Several were captured and one stung one of our party on the finger; the smart was burning for an hour or two, and then ceased.

*February 29th.*—Being now nearly opposite the cliffs at Bidgegurh, where coal is reported to exist we again crossed the Soane, and for the last time. The ford is some three miles up the river, to which we marched through deep sand. On the banks saw a species of *Celtis* or *Sponia* covered with lac. This tree is said to produce it here in greatest abundance, as the *Butea* does at Burdwan and the Peepul in many parts of the country. I do not know which yields the best, nor whether the insects are different. The merchants do not distinguish the kinds. The bed of the river is about  $\frac{3}{4}$  mile broad, and the rapid stream 50 or 60 yards, and breast-deep; the sand firm and silicious, with no mica;

nodules of coal are said to be washed down here from the coal bed of Burdee, a good deal higher up, but we saw none.

The cliffs come close to the river on the opposite side, their bases wooded and teeming with birds. The soil is richer and individual trees, especially of *Bombax*, *Pentapteris* and *Mahowa*, very fine; one tree of the *Hardwickia*, about 120 feet high, was as handsome a monarch of the forest as I ever saw, and it is not often that one sees trees in the tropics, which for a combination of beauty in outline, harmony of color, and arrangement of branches and foliage, would form so striking an addition to an English park.

There is a large break in the Kymaon hills here, through which our route lay to Bidgegurh and the Ganges at Mirzapore, the cliffs leaving the river and trending to the N. in a continuous escarpment flanked with low ranges of rounded hills and terminating in an abrupt spur (Mungeza Peak) whose summit was covered with a ragged forest. Kunch, the village at which we halted is elevated 556 feet above the sea; four alligators basked in the river, like logs of wood at a distance, all of the short-nosed or Mager kind, dreaded by man and beast; I saw none of the sharp-snouted or Gharial, so common on the Ganges, where their long bills, with a garniture of teeth and prominent eyes peeping out the water, remind one of geological lectures and visions of *Ichthyosauri*.

Botanized over the ridges near the river, but found little novelty. The *Mahowa*, *Ehretia*, *Hardwickia*, *Gmelina*, and especially *Diospyros* and *Terminalia* are the prevailing timber; the *Cochlospermum* on the very hottest and driest ridges, imitating the *Cistus* in habit; (and like the *C. Ladanum*,) it is streaming with gum as was the *Mahoowa* and *Olibanum*. *Catechu* and *Rhamneæ* are ever present and ever troublesome to the pedestrian. *Phœnix acaulis* frequent, and in some places the woods appeared on fire from the bushes of *Butea frondosa* in full flower.

*March 1st.*—Left the Soane and struck inland over a rough hilly country, covered with forest, good 1000 feet below the tops of the Kymaon table-land, which, as I stated above, here recedes from the river and surrounds an undulating plain, some ten miles either way, facing the south. With nothing but narrow paths much contrivance and labour were required to get the carts on. In one place I descend-

ed to the empty bed of a mountain torrent, which had cut a perpendicular valley through at least 30 feet of alluvium. Thence we plunged into a dense forest, chiefly of the above mentioned trees, with *Zizyphi* and several species of *Acacia*; a *Pterospermum* different from the more common or Parus Nath species, together with that plant, occur in the woods, with dwarf *Bauhinias*, but neither *Ferns*, *Lichens*, mosses, *Orchideæ*, or other tribes of a damp climate. Our course was directed towards *Mungeza Peak*, a remarkable projecting spur or nose of the Kymaon, between which and a conical hill the path led. Whether on the elephants or on foot, the thorny *Zizyphi*, *Acacias*, &c. were most troublesome, and all our previous *scratchings* were nothing to this. The low hills are round-backed masses of sandstone, with beds of shale interposed, but no coal. Peacocks and jungle fowl are very frequent, the squabbling of the former and hooting of the monkeys constantly grating on the ear; other birds were very common. From the defile we emerged on to an open plain, halting at the village of Sulkun, elevated 671 feet.

In the afternoon examined the conical hill, which, like that near Rotas, is of stratified beds of limestone, capped with sandstone. A stream runs round its base, cutting through the alluvium to the subjacent rock, which is exposed and contains oblate spheres of limestone. These spheres are from the size of a fist to a child's head, or even much larger, are excessively hard and neither laminated nor formed of concentric layers. What they are I cannot tell, but have seen similar spheres from the Silurian rocks of Wales. At the top of the hill the sandstone cap was perpendicular on all sides, and its dry top covered with small trees, especially of *Cochlospermum*. A few larger trees were of *Fici*, which clung to the edge of the rocks, and by forcing their roots into the intestines detached enormous masses, affording good dens for bears and other wild animals. From the top the view of rock, river, forest and plain, was very fine, the edge ranging over a broad flat girt by the scarped hills of the Kymaon. The latter were continued along the Soane banks, further west, in a rugged range of hills.

From Sulkun the isolated table-topped hill of Bidjegur is seen, with its one large tree and the Palace at top, but the distance is considerable.

We were delayed three days at Sulkun, from inability to get the carts, &c. on, and my time being precious, I here took leave of Mr. Williams and his hospitable companions and started for Mirzapore. Mr.

Felle, a gentleman attached to the Revenue department, whom I had the pleasure of meeting at Sulkun, kindly escorting me to his residence at Shugunj, and forwarding both myself and collections with camels and elephants.

Both the climate and natural history of this flat on which Sulkun stands, are similar to those of the banks of the Soane; the crops are wretched, as are the people (Koles), an athletic-looking race however, often armed with spear and shield. At this season the dryness of the atmosphere is excessive.

Before leaving the Soane valley to ascend the Kymaon portion of the Vindhya hills I shall give an abstract of the Meteorological observations taken since leaving Tura.

VALLEY OF SOANE RIVER, TURA TO SULKUN, FEBY. 20TH—  
MARCH 3D.

|              | Temperature. |      |      |        | Wet Bulb. |                  |                  |                      | Dew Point. |      |      |                  |                  | Vapor in cubic foot. | Saturation. |      |      | Number of observations. |
|--------------|--------------|------|------|--------|-----------|------------------|------------------|----------------------|------------|------|------|------------------|------------------|----------------------|-------------|------|------|-------------------------|
|              | Mean.        | Max. | Min. | Range. | Mean.     | Max. Depression. | Min. Depression. | Elasticity of Vapor. | Mean.      | Max. | Min. | Max. Depression. | Min. Depression. |                      | Mean.       | Max. | Min. |                         |
| Sun-rise ..  | 56.8         | 70.0 | 50.0 | 20.0   | 52.5      | 10.0             | 1.5              | .380                 | 48.3       | 53.1 | 41.1 | 17.3             | 5.4              | 4.240                | .754        | .831 | .570 | 12                      |
| 9 A. M. ..   | 82.0         | 89.0 | 69.0 | 20.0   | 61.2      | 24.3             | 12.0             | .385                 | 48.7       | 60.2 | 40.3 | 45.2             | 22.0             | 4.097                | .342        | .488 | .226 | 11                      |
| 3 P. M. .... | 88.6         | 94.7 | 81.5 | 13.2   | 62.4      | 30.2             | 14.5             | .289                 | 40.8       | 50.9 | 32.3 | 57.2             | 25.1             | 2.975                | .211        | .598 | .154 | 11                      |
| 9 P. M. .... | 68.0         | 74.0 | 61.0 | 13.0   | 56.8      | 15.0             | 6.0              | .369                 | 47.4       | 51.8 | 42.6 | 27.1             | 10.2             | 3.933                | .511        | .703 | .415 | 11                      |

Extreme variation of Temperature..... = 44.7

„ „ „ Saturation..... = .677

„ diff. between Solar and Nocturnal Radiation... 100

TURA TO SULKUN.

Nocturnal Radiation.

|                  | Sun-rise.    |                      |                      | Number of observations. | 9 P. M.      |                      |                      | Number of observations. |
|------------------|--------------|----------------------|----------------------|-------------------------|--------------|----------------------|----------------------|-------------------------|
|                  | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. |                         | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. |                         |
| Exposed Th. .... | 51.7         | 4.1                  | 8.0                  | 9                       | 61.2         | 6.8                  | 10.5                 | 10                      |
| On Earth. ....   | 52.4         | 3.4                  | 7.0                  | 9                       | 64.3         | 4.6                  | 8.5                  | 9                       |
| On Grass. ....   | 48.8         | 7.0                  | 11.5                 | 9                       | 55.8         | 11.8                 | 17.0                 | 9                       |

## TURA TO SULKUN.

## Solar Radiation.

| Morning.  |       |             |       |        | Afternoon. |       |             |       |       |
|-----------|-------|-------------|-------|--------|------------|-------|-------------|-------|-------|
| Time.     | Temp. | Black Bulb. | Diff. | Phot.  | Time.      | Temp. | Black Bulb. | Diff. | Phot. |
| 11½ A. M. | 85.5  | 129         | 44.5  | ..     | 3 P. M.    | 85.5  | 116         | 30.5  | ..    |
| 10½ ..... | 89.0  | 132         | 43.0  | ..     | ..         | 92.5  | 128         | 35.5  | ..    |
| Noon..... | 90.0  | 132         | 42.0  | 10,140 | ..         | 92.0  | 120         | 28.0  | ..    |
| „         | 85.0  | 130         | 45.0  | ..     | ..         | 89.5  | 128         | 38.5  | ..    |
| „         | 86.0  | 138         | 52.0  | ..     | ..         | 93.5  | 144         | 50.5  | ..    |
| „         | 90.0  | 138         | 48.0  | ..     | ..         | ..    | ..          | ..    | ..    |
| Mean..... | 87.5  | 133.2       | 45.7  | 10,140 | ..         | 90.6  | 127.2       | 36.6  | ..    |

## TURA TO SULKUN.

## Nocturnal Radiation from Barley.

| Sun-rise.  |         |       |              |       |            |       | 9 P. M.    |         |       |              |       |            |       |
|------------|---------|-------|--------------|-------|------------|-------|------------|---------|-------|--------------|-------|------------|-------|
| Temp. Air. | Barley. | Diff. | Calo-tropis. | Diff. | Arge-mone. | Diff. | Temp. Air. | Barley. | Diff. | Calo-tropis. | Diff. | Arge-mone. | Diff. |
| 61.        | 56      | 5.0   | 56.5         | 4.5   | 57.0       | 4.0   | 68.5       | ..      | ..    | ..           | ..    | 56.0       | 12.5  |
| 57.        | 46      | 11.0  | 48.0         | 9.0   | 50.0       | 7.0   | 70.0       | ..      | ..    | 65.0         | 5.0   | 67.0       | 3.0   |
| 57.        | 52      | 5.0   | ..           | ..    | 50.0       | 7.0   | 69.0       | ..      | ..    | 57.0         | 12.0  | 57.0       | 12.0  |
| 58.5       | 52      | 6.5   | ..           | ..    | ..         | ..    | 74.        | ..      | ..    | 59.0         | 15.0  | ..         | ..    |
| 57.        | 52      | 5.0   | ..           | ..    | ..         | ..    | 62.5       | 51.5    | 11.0  | ..           | ..    | ..         | ..    |
| 50.        | 45      | 5.0   | 45.5         | 4.5   | ..         | ..    | 67.5       | 67.5    | 10.0  | 62.5         | 5.0   | ..         | ..    |
| 50.5       | 43      | 7.5   | ..           | ..    | ..         | ..    | 61.0       | 50.0    | 11.0  | ..           | ..    | ..         | ..    |
| 56.0       | ..      | ..    | ..           | ..    | 49.0       | 7.0   |            |         |       |              |       |            |       |
| 55.8       | 49.8    | 6.0   | 50.0         | 6.0   | 51.5       | 6.2   | 68.        | 53.     | 10.7  | 60.9         | 9.2   | 60.0       | 9.1   |

The upper course of the Soane being in some places confined, and in others exposed to furious gusts from the gullies of the Kymaon hills, below Kotah, bounded by a continuous precipice of 1000 feet, and above it expanding into a broader and flatter valley, presents many fluctuations in temperature.

Exposed to the influence of radiation from so extended a surface, the mean temperature is much above that of the lower parts of the same valley (below Tura) the excess amounting to 5°.4. The nights and



mornings are cooler, by 1.2 degrees, the days hotter by 10°. There is also 10° increase of range during the 13 days spent there; and the mean range from day to day is nearly as great as it was on the hills of upper Bengal.

There being much exposed rock and the valley swept by violent dust storms, the atmosphere is drier, the mean saturation point being here 454°, and in the lower part of the Soane's course 516°. On the other hand the variation in the amount of moisture suspended in the atmosphere is more variable than even on the hills above alluded to; the accumulation of moisture in the calm nights and closer parts of the valley being great; it is rapidly swept away by the periodic dry wind of the day.

A remarkable uniformity still prevails in the depression of thermometers exposed to nocturnal radiation, whether laid on the earth, grass, or exposed to the influence of the sky alone; both the mean and maximum indication coincide very nearly with those of the lower Soane valley and of the hills. The temperature of tufts of green barley laid on the ground is one degree higher than that of short grass as it grows; *Argemone* and *Calotropis* leaves maintain a still warmer temperature; from the previous experiments the *Agemone* appeared to be considerably the cooler, which I was inclined to attribute to the smoother and more shining surface of its leaf, but from these there would seem to be no sensible difference between the radiating powers of the two plants.

Here, as on the hills, there is less difference between the forenoon and afternoon indication of the black-bulb thermometer, than in the more open valley, which is to be accounted for by my having been obliged to choose too late an hour for the forenoon observation.

The rapid drying of the lower strata of the atmosphere during the day, as indicated by the great decrease in the tension of the vapor and the saturation point, from 9 A. M. to 3 P. M. is the effect of the great violence of the N. W. winds.

*March 3rd.*—Rode to Roup, at the top of the pass in the hills called "Ek powa" (or one foot) ghat. The village of Markounda, at the foot of the ghat, is situated by a stream running over flat beds of limestone, fissured as to resemble a tessellated pavement; the fissures were filled apparently with volcanic matter, but the evening was too fast closing in to allow of my examining it. This, the only ascent to

the top of the hills for many miles around, is evidently the result of a fault, which has effected so broken an outline, that our path has been carried over the shattered crags. It is steep, rocky and covered with brushwood. On either side the precipices are sheer for many feet. At the summit we entered on a dead flat plain or, table-land with no hills, except along the brim of the broad valley we had left; where are some curious broad pyramids, formed of slabs of sandstone arranged in steppes.

*March 4th.*—Proceeded from Roup, which is about 400 feet above the plain, and 700 above the Soane, to Shahgunj, where I enjoyed Mr. Felle's hospitality for a few days.

The country here, though elevated is, from the nature of the soil and formation, much more fertile than what I had left. Water is abundant, both in tanks and wells, and rice fields, broad and productive, cover the grounds, tamarinds and mango topes now loaded with blossoms, occur at every village.

It is very singular that the elevation of this table-land (1103 feet at Shahgunj) should coincide with that of the granite range of upper Bengal, where crossed by the grand toll road, though they have no other feature but the presence of alluvium in common. Scarce a hillock varies the surface here, and the agricultural produce of the two is widely different. Here the flat ledges of sandstone retain the moisture, and give rise to none of those impetuous torrents which sweep it off the inclined beds of gneiss, or splintered quartz. Nor is there here any of the effloresced salts so forbidding to vegetation where they occur.

Wherever the alluvium is deep on these hills, neither *Catechu*, *Olibanum*, *Butea*, *Terminalia*, *Diospyros*, dwarf *Palm*, or any of this group of plants are to be met with, which abound wherever the rock is superficial, and irrespectively of its mineral or chemical characters, whether granite, gneiss, hornblende schists, hornstone, limestone or sandstone. On the other hand, the Banyan, Peepul, Mango, Tamarind, and even the Banana and Sugar-cane are found on the alluvium, though from the elevation and exposure these cannot attain the dimensions they do on the banks of the Ganges.

*Acacia Arabica* is abundant though not seen below, and very rare to the eastward of this meridian, for I saw but little of it in Birbhoom or Behar. It is a plant partial to a dry climate and rather prefers a good soil. In its distribution it in some degree follows the range of the

camel, which is its constant companion over thousands of leagues. In the valley of the Ganges I am told that neither the animal nor plant flourish east of the Soane, where I experienced a marked change in the humidity of the atmosphere on my passage down the Ganges. It was a circumstance I was interested in, having first met the camel at Teneriffe and the Cape Verd Islands, the westernmost limit of its distribution; imported thither, however, as it now is into Australia, where, though there is no *Acacia Arabica*, 400 other species of that genus are known.

Mr. Felle's bungalow (whose garden smiled with roses in this wilderness) is surrounded by a moat, fed by a spring; it was full of aquatic plants, *Nymphæa*, *Damsonium*, *Villarica cristata*, *Aponogeton*, three species of *Potamogeton*, two of *Naias*, *Chara* and *Zannichellia* (the two latter indifferently, and often together, used in the refinement of sugar). In a large tank hard by, wholly fed by rain water, I observed only the *Villarica Indica*, no *Aponogeton*, *Nymphæa* or *Damasonium*, nor did these occur in any of the other tanks I examined, which were otherwise well peopled with plants. This may not be owing to the quality of the water so much as to its varying quantity in the tank.

All around here, as at Roup, is a dead flat, except towards the crest of the ghauts, which overhang the valley of the Soane, and there the sandstone rock rises by steppes into low hills. During a ride to a natural tank amongst these rocky elevations, I passed from the alluvium to the sandstone steppes, and at once met with all the prevailing plants of the granite, gneiss, limestone and hornstone rocks previously examined, and which I have enumerated too often to require recapitulation, a convincing proof that the mechanical properties and not the chemical constitution of the rocks regulate the distribution of these plants.

Rujub-bund, (the name of the tank) is a small tarn, or more properly the expanded bed of a stream, for art has aided nature in its formation: it is edged by rocks and cliffs fringed with the usual trees of the neighbourhood; it is a wild and pretty spot, not unlike some birch-bordered pool in the mountains of Wales or Scotland, sequestered and picturesque.

Here again the *Aponogeton* and *Villarica cristata* grew, with several *Potamogetons*, *Chara*, *Zannichellia* and a floating *Utricularia*.

At 7 P. M. a tempest which had been gathering from the S. W. broke over Shahgunge, the lightning was very vivid, and the violence of the wind great. No rain fell, nor did the barometer indicate its approach. The day had been very close and sultry.

A columnar *Euphorbia*, (*E. ligulata?*) is commonly used here as a fencing, its pith is septate, a curious character, generally supposed to be peculiar to the pith of the Walnut tree. This is a matter of some interest, a fossil plant of the coal formation having been referred to the family of the Walnuts solely from its presenting this character.

One of the prettiest optical phenomena I have witnessed is frequent in the clear skies of these elevated regions: that of the false sunrise and sunset, often consisting of beams converging from the opposite horizon and meeting at the zenith the direct sun's rays. I have seen it equally vivid against a pure blue sky and against dark lowering clouds. The zodiacal light also shines with peculiar brightness, almost outshining the milkyway at times.

From the few days' observations taken on the Kymaon hills the temperature of their flat tops may be regarded as  $5^{\circ}$  higher than that of the valley, which is 500 feet below their mean level. I can account for this anomaly only on the supposition that the thick bed of alluvium, freely exposed to the sun and not clothed with jungle, absorbs the sun's rays and parts with its heat slowly. This is indicated by the increase of temperature being due to the night and morning observations, which are  $3^{\circ}.1$  and  $8^{\circ}.5$  higher here than below, whilst the two of 9 A. M. and 3 P. M. are half a degree lower. What little alluvium there is on the Soane banks along its upper course is covered with jungle, thus excluding the solar rays, whilst the disproportionate amount of sterile rock rapidly parts with its heat and reduces the nocturnal temperatures. The vastly superior vegetation, both arboreous and herbaceous, of the Kymaon hills, is conclusive in favor of their superior soil and climate.

TABLE-LAND OF KYMAON HILLS, MARCH, 3D-8TH, 1848.

|               | Temperature. |      |      |        | Wet Bulb. |                  |                  |                      | Dew Point. |      |      |                  |                  | Vapor in cubic foot. | Saturation. |      |      | Number of observations. |
|---------------|--------------|------|------|--------|-----------|------------------|------------------|----------------------|------------|------|------|------------------|------------------|----------------------|-------------|------|------|-------------------------|
|               | Mean.        | Max. | Min. | Range. | Mean.     | Max. Depression. | Min. Depression. | Elasticity of Vapor. | Mean.      | Max. | Min. | Max. Depression. | Min. Depression. |                      | Mean.       | Max. | Min. |                         |
| Sun-rise. . . | 65.3         | 69.0 | 57.5 | 11.5   | 57.7      | 8.0              | 6.0              | .428                 | 52.0       | 55.5 | 45.9 | 14.1             | 11.6             | 4.710                | .647        | .741 | .648 | 4                       |
| 9 A. M. . . . | 81.6         | 83.5 | 79.5 | 4.0    | 65.3      | 19.0             | 14.0             | .468                 | 54.5       | 57.9 | 49.0 | 12.9             | 33.0             | 5.000                | .421        | .479 | .344 | 3                       |
| 3 P. M. . . . | 88.1         | 90.0 | 84.5 | 5.5    | 63.3      | 26.5             | 21.5             | .324                 | 43.7       | 47.8 | 37.9 | 46.6             | 42.2             | 3.417                | .240        | .295 | .214 | 3                       |
| 9 P. M. . . . | 71.1         | 76.0 | 68.0 | 8.0    | 60.3      | 13.0             | 8.3              | .433                 | 52.3       | 56.7 | 46.8 | 21.9             | 13.8             | 4.707                | .542        | .643 | .491 | 4                       |

Extreme variation of Temperature..... = 32.5

„ „ „ Saturation ..... = .527

„ diff. between Nocturnal and Solar Radiation = 110.5

TABLE-LAND OF KYMAON.

## Nocturnal Radiation.

|              | Sun-rise.    |                      |                      |                         | 9 P. M.      |                      |                      |                         |
|--------------|--------------|----------------------|----------------------|-------------------------|--------------|----------------------|----------------------|-------------------------|
|              | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. | Number of observations. | Temperature. | Mean Diff. from Air. | Max. Diff. from Air. | Number of observations. |
| Exposed Th.  | 59.5         | 3.5                  | 3.5                  | 2                       | 71.5         | 3.3                  | 7.0                  | 3                       |
| On Earth, .. | 56.0         | 1.5                  | 1.5                  | 1                       | 62.5         | 5.5                  | 5.5                  | 1                       |
| On Grass, .. | 54.7         | 8.2                  | 8.5                  | 2                       | 61.0         | 8.2                  | 11.0                 | 2                       |

The variations of temperature too are all much less in amount, as are those of the state of the atmosphere as to moisture, though the climate is rather damper.

On the subject of terrestrial radiation the paucity of the observation precludes my dwelling. Between 9 P. M. and sunrise the following morning I found the earth to have lost but 6°.5. of heat, whereas a mean of 9 observations at the same hours in the valley below indicates a loss of 12°.

There is as little similarity between the climate of the Kymaons and upper Bengal hills, as between their geology or outline, though so near

in geographical position retaining the same mean level. The differences are analogous to them between the Kymaon and upper Soane valley, and are due to the very different surface soil and means of supporting vegetation.

Though the mean temperature deduced from the few days I spent on this part of the Kymaon is so much above that of the upper Soane valley, which it bounds, I do not suppose that the whole range partakes of this increase. When the alluvium does not cover the rock, as at Rotas and many other places, especially along the southern and eastern ridges of the ghauts, the nights are considerably cooler than on the banks of the Soane; and at Rotas itself, which rises almost perpendicularly from the river, and is exposed to no such radiation of heat from a heated soil as Shahgunge is, I found, the temperature considerably below that of Akbarpore on the Soane, which however is much sheltered by an amphitheatre of rocks.

*March 7th.*—Left Shahgunge for Mirzapore, following the road to Goorawal, over a dead alluvial flat without a feature to remark. Turning north from that village, the country undulates, exposing the rocky nucleus and presenting the usual concomitant vegetation. Occasionally park-like views occurred, which when diversified by the rocky valleys, resemble much the noble scenery of the forest of Dean on the borders of Wales. The *Mahoowa* especially representing the Oak, with its spreading and often gnarled branches many of the exposed slabs of sandstone are beautifully waved on the surface with the *ripple-mark* impression; of which impression a specimen was picked up at Rotas.

*March 8th.*—Having encamped at Amoe last night, I proceeded on to Mirzapore, descending a steep ghaut of the Bind hills by an excellent road, to the level plains of the Ganges.

During the few days spent at Mirzapore with my kind friend, C. Hamilton, Esq. I was surprised to find the temperature of the day cooler by nearly  $4^{\circ}$  than that of the hills above, or of the upper part of the Soane valley, the nights on the other hand were decidedly warmer. The dew point again was even lower in proportion,  $7^{\circ}.6$  and the climate consequently drier. The following is an abstract of the observations taken at Mr. Hamilton's house on the banks of the Ganges.

MIRZAPUR TERRESTRIAL RADIATION AT  
SUN-RISE.

| Air in Shade. | Exposed Th. | Diff. | Exposed on earth. | Diff. | Exposed on grass. | Diff. |
|---------------|-------------|-------|-------------------|-------|-------------------|-------|
| 60.0          | 55.0        | 5.0   | ..                | ..    | 52.0              | 8.0   |
| 62.5          | 54.5        | 8.0   | 56.0              | 6.5   | 52.5              | 10.0  |
| 63.0          | 55.5        | 7.5   | 50.5              | 12.5  | 50.5              | 12.5  |
| 58.0          | 53.0        | 5.0   | 54.               | 4.0   | 50.0              | 8.0   |
| Mean, 60.8    | 54.5        | 6.3   | 53.5              | 7.6   | 51.2              | 9.6   |

MIRZAPUR, MARCH 9TH-13TH, 1848.

|              | Temperature. |      |      |        | Wet Bulb. |            |            | Elasticity of Vapor. | Dew Point. |      |      |            |            | Vapor in cubic foot of atmoſp. | Saturation. |      |      | Number of observations. |
|--------------|--------------|------|------|--------|-----------|------------|------------|----------------------|------------|------|------|------------|------------|--------------------------------|-------------|------|------|-------------------------|
|              | Mean.        | Max. | Min. | Range. | Mean.     | Max. Diff. | Min. Diff. |                      | Mean.      | Max. | Min. | Max. Diff. | Min. Diff. |                                | Mean.       | Max. | Min. |                         |
| Sun-rise, .. | 61.1         | 63   | 58   | 5      | 48.8      | 51.5       | 47.        | .236                 | 34.3       | 39.7 | 29.7 | 32.8       | 23.8       | 2.574                          | .405        | .450 | .327 | 3                       |
| 9 A. M. .... | 76.1         | 83   | 71   | 12     | 58.5      | 56.5       | 51.7       | .302                 | 41.9       | ..   | ..   | 52.3       | 15.7       | 3.271                          | .324        | .603 | .176 | 3                       |
| 3 P. M. .... | 86.          | ..   | ..   | ..     | 61.7      | 24.3       | ..         | .295                 | 41.3       | ..   | ..   | 44.7       | ..         | 3.089                          | .264        | ..   | ..   | 1                       |
| 9 P. M. .... | 76.          | ..   | ..   | ..     | 63.5      | 12.5       | ..         | .480                 | 55.2       | ..   | ..   | 20.8       | ..         | 5.127                          | .511        | ..   | ..   | 1                       |

During my passage down the Ganges the rise of the dew point was very steady, the highest means being at the lowest point on the river, Bhaugulpore, which as compared with Mirzapore, showed an increase of 8° in temperature and of 30°.6. in the rise of the dew point. The saturation point at Mirzapore was .331, and at the corresponding hours at Bhaugulpore .742. (Saturation being represented as unity.) The observations were taken at the house of my friend Dr. Grant.

It is remarkable that nocturnal radiation as registered at sunrise is much more powerful at Mirzapore than on the more exposed Kymaon plateaus; the depression of the thermometer freely exposed being 3° greater; that laid on bare earth 6°, and that on the grass 1°.4 greater on the banks of the Ganges.

*A Resultant System for the Construction of Iron Tension Bridges.*—By  
Major HENRY GOODWYN, Bengal Engineers.

DESCRIPTION OF THE FRONTISPIECE.

The view of the wreck of the Brighton Chain Pier as here exhibited, is a fac-simile copy of Pl. 90, of the "Theory, Practice, and Architecture of Bridges," published by Mr. Weale in 1843, in which the following brief, yet speaking account is given. The span of each curve is only 255 feet with a deflection of  $\frac{1}{4}$ th. The damage to the structure occurred in October 1833, when two curves and their platforms were destroyed. The second from the land side had twenty suspending rods carried completely away and many others seriously injured; the third division had 58 suspending rods destroyed. The chains were greatly deranged, and three-fourths of the platform and railing completely destroyed; the two divisions presenting an awful ruin. A rapid undulation was produced in the platform during the storm, and it sank nearly 6 feet on one side, presenting an inclined plane transversely.

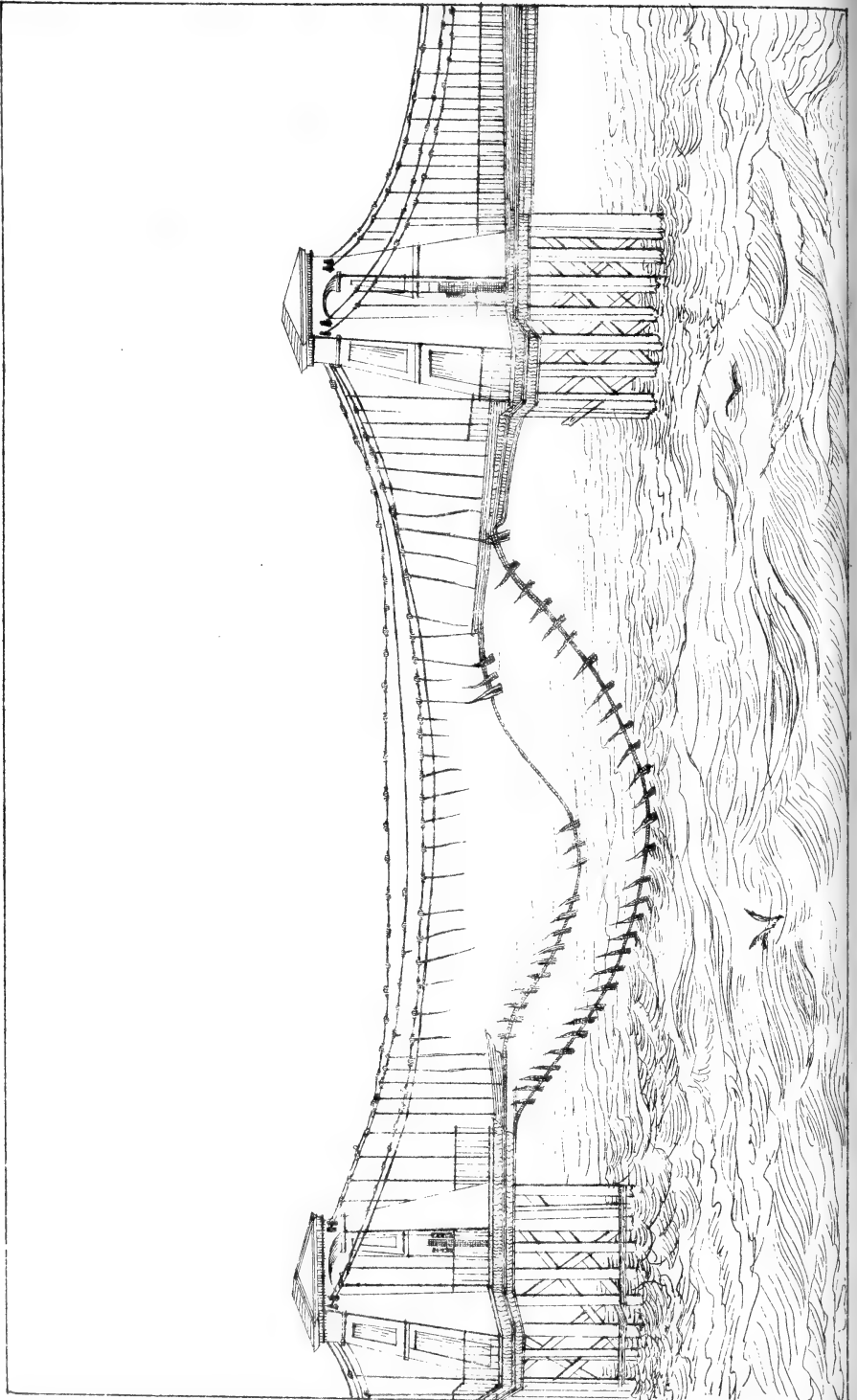
It is remarkable, that notwithstanding the violent injury which the storm produced, the Longitudinal Iron bearing bar, with a Sectional area of only 4 square inches, was not broken, though it suffered severe torsion. A bar of the above Section supported the girders of the roadway to which the planks were fastened, and which bars were upheld by the stirrups at the lower ends of the suspending rods.

These remarks are made with reference to paragraphs 3, 4, 5, and 6 of the following Memoir, and the frontispiece itself introduced as an evidence of there being some great defect in the principle of construction which admits of a structure, which has been pronounced one of Sir Samuel Brown's best works, being thus seriously deranged by merely its own weight thus acted on.

The following practical conclusions are chiefly drawn from the demonstrated results of a "Memoir on the quantity of Iron necessary in a Tension Chain Bridge," by the Rev. J. H. Pratt, and published in the CLXXXVI. No. for January 1848, of the Journal of the Asiatic Society of Calcutta, and although a modified Taper Chain system had been drawn out and partially put into practice by me before the appearance of Mr. Pratt's theory, its principles agree so entirely with my







own experience, and its demonstration is so clear, that I have been induced from the wish to promote the advancement of such structures, to place the following exposition of my system on record, feeling sure that unbiassed minds will, on perusal, be divested of the timidity with which the extreme, or Dredge's Taper Chain system has been received, as its errors have been admitted and corrected; whilst, if there be any virtue in the present uniform chain system, the proposed "Resultant" will be found to possess them in an eminent degree, and yet freed from its acknowledged defects.

The fact demonstrated in the above named "Memoir" is simply this, that in all Iron Suspension Bridges of equal span, and breadth of platform, the quantity of Iron in the main parts must be *the same*, and that quantity which "is necessary to enable each part to sustain the greatest tension to which it may be subjected when the roadway is loaded to the greatest extent, is *altogether independent* of the principle of construction or form of the Bridge," provided of course that the principle be sound.

2. This is a very important conclusion, but whilst I freely admit the soundness of the doctrine, I am not fully satisfied as to the correctness of the writer's practical deductions therefrom, viz. that the old system of suspension, consisting of a uniform chain and vertical drop-bars, is the most proper for adoption under all circumstances. For such an opinion the author of the above "Memoir" gives his reasons, which, as might have been expected, are weighty enough, but "*good reasons must per force give way to better,*" and notwithstanding what has been advanced above, I think the scale may yet be turned in favor of the opposite opinion, viz. that the old, or uniform chain system is by no means necessarily, and under all circumstances the most desirable for adoption.

3. If the strength or stability of a structure to resist a constant dead weight, were alone the points for consideration, the advantages adduced in favor of the uniform chain system might be conclusive; but wherever failures of Suspension Bridges have occurred, they have in almost every case been caused *not* by a steady, uniform dead strain, exceeding the power of the materials to resist, but by the effect of a much smaller load or weight in a state of motion. *Not*, for instance, during a trial by means of a *proof load* uniformly distributed, but by

the *motion* of a far smaller weight, as of a company of soldiers marching in step, as occurred to the "Broughton" Bridge, near Manchester, nay, the great "Manai" Bridge which was calculated to be equal to a load of 1245 tons in excess of its own weight, and the "Brighton" Chain Pier, (vide Frontispiece and description thereof), to an extra load of 100 tons, have both been nearly destroyed by merely their own weight when put in motion by a violent wind. The large suspension Bridge at "Montrose," which when first put up was proved by a dead weight of 970 tons, being the greatest it would have to bear, was destroyed in a similar manner.

4. The disastrous effects which have already occurred, and may still be apprehended from such causes, to bridges on the uniform chain system, are so universally admitted, that they need not here be further dwelt on; it will suffice to notice that no bridge of large span in any exposed locality, is ever put up without some special arrangement to counteract the vibratory and undulatory tendencies of the structure. This protection is sometimes attempted by means of guy-chains, sometimes by a system of side and under trussing, (as in the Hammersmith Bridge,) at others by counter chains, (as in the Brighton Pier), the latter being intended to enable the platform to resist the lifting power of the wind from below.

5. From the result of the opinions on the disastrous effects of gales on the Menai Bridge in the years 1826, 1836, and 1839, and especially when during the latter, 148, or one-third nearly, of the suspending rods were torn asunder, no other conclusion can be drawn, than that the tubular rods introduced between the chains, the trussing of the roadway, the small brace chains, &c. did not preserve the bridge from the effects of the combined motions of the vibration, and undulation, of the chains,\* which were the primary cause of the injuries sustained, and the reason is evident, viz. that these accessories contended against the effect, without attacking the *cause*. It will be therefore evident, that, something more than strength to resist a known strain in a certain direction, is required, and however true the main position demonstrated by the Rev. Mr. Pratt may be, it still remains an open question whether, in order effectually to meet the varied strains and trials to which Suspen-

\* Vide Report by Mr. Provis, resident Engineer. Trans: Civil Engineers, Vol. 3. page 357.

sion Bridges are peculiarly liable, some other arrangement of the *same quantity of Metal*, as is now given to bridges on the uniform chain system, may not with advantage be employed.

6. Here it will not be irrelevant to observe that all the expedients had recourse to, for the purpose of counteracting the vibration and undulation of the uniform chain bridges, not only, of course, increase the expense, and weight of the structure, but absolutely negative the principal advantage expected from, and claimed for, that system, (*viz.* the simplicity and directness of the strains,) in the ratio of their attaining the object for which they were added, *i. e.* the stiffness of the whole.

7. Before proceeding to show, and I trust to prove, what will be a more advantageous disposition of a given weight of metal in a bridge of known size and proportions, than that which would be attained by the uniform chain principle, it will be necessary to notice a mode of construction for which a patent has been obtained by Mr. Dredge, who proposes to erect bridges of equal, or even greater strength, than those on the uniform principle, with about  $\frac{1}{3}$ d of the quantity of iron usually employed in the latter; but as the practicability of such a result is wholly at variance with the demonstration proved by the calculations of the Rev. Mr. Pratt, now under reference, and as no one has yet impugned the correctness of the formulæ on which the strength of the uniform chain system is calculated, it is scarcely necessary to do more than base the rejection of Mr. Dredge's extreme taper chain system on the grounds of its non-conformity with the rules quoted above; unfortunately however, the Ballee Khâl Bridge near Calcutta, originally constructed in strict accordance with this principle, which fell by its own weight, and the inability of the "Kubudduk" Bridge near Jessore in Bengal, to withstand the ordinary proof trial, together with its subsequent failure, sufficiently confirm the accuracy of Mr. Pratt's conclusions. The iron work of the latter bridge was constructed by Mr. Dredge himself.

8. In the beginning of this "Paper" I remarked that I had practically, *i. e.* experimentally corroborated the fact demonstrated in Mr. Pratt's Memoir\* and the failure of the Ballee Khâl Bridge led to so much study and research into the principles which should govern a

\* Vide account of "Experiments" at the end of this Memoir.

Taper Chain Bridge, that the result has been an encouragement to combine the Taper Chain with the uniform system, possessing in conjunction the advantages of each, with the positive defects of neither, and which I will presently explain, after glancing at the evils which are acknowledged to exist in both the above principles.

9. The most important fact gleaned from the above experience and research is one entirely overlooked by Mr. Dredge, viz. that where *strength* or *section of Iron* is taken away from the chains, it should be made good in the *Longitudinal Beams* to which they are connected. Not that the precise quantity abstracted from the former should be added to the latter, but that additional strength should be given to the beams bearing a certain ratio to that taken from the chain. Mr. Dredge, and the uniform chain system, afford instances of opposite extreme cases. In the former, the section of the outer longitudinal beams at the centre, where the chains are a minimum, should be nearly equal to the entire section of the chains at the point of suspension, the portion of beam in the centre of the bridge standing in place of the chain theoretically, and almost so *in practice*; in fact the longitudinal beam is an indispensable item in the Dredgeian combination, whereas in the uniform system the reverse is the case, for by the non-diminution of the chain in the centre, there is no absolute necessity for the longitudinal beam as a component portion of construction.

10. The principal defects of Mr. Dredge's extreme Taper system are,

1st. The hazard of trusting a bridge, whatever the span may be, to the strength of *one*, or even *two* rods at the centre, for (admitting for the sake of argument, that the section there may not be disproportioned to the strain) yet the fracture of the link in the centre, (and being so slender there is the greater probability of such an event there than elsewhere) would be attended with very dangerous results; the conclusion therefore to be drawn from the admitted inexpediency of confiding in the strength of so small a section of iron in the very centre of the bridge is, that the chain should not diminish so rapidly as, in the extreme Taper system, it does.

11. 2ndly. As noticed above, the section of iron in the longitudinal beams is uniformly weak throughout with reference to the tension at the centre, which, where the beam comes in place of the chain, is infinitely great, as compared with that exerted near the standards.

12. Here, as regards the second defect, it may be objected, that Mr. Dredge never intended his bridges to be sustained by tension in the longitudinal beams at any point of their length, assuming in his theory that "the tension at the centre is a cypher." The capacity of the platform to resist *compression* in the two half curves, and not the power against *tension*, being brought into action.

13. Such has been Mr. Dredge's view and his rule of construction, but experience on a full sized scale, (independent of the failure of the bridges above noticed) has satisfied me that there is not strength in the combination of the platform to resist compressive power. The defect was proved as follows:—

14. The whole of the iron work of a complete half curve of a bridge of 120 feet span and 16 feet width of platform, was put up in the Government Iron bridge yard on standards erected of masonry for the purpose, thus: (See Fig. 1.)

The centre link was carried out horizontally in its proper position, and attached to a wooden beam abutting against two trees. The central ends of the longitudinal beams were left free, as shown above, the other ends being built firmly into the masonry in their cast iron boxes, whilst the half platform rested on three posts on each side, to preserve the horizontality till the whole was put up. Every thing being in position, the transverse beams, railing, &c. fixed, it is evident that on the removal of the posts the structure would not fail, if there was sufficient stiffness in the combination of the framing, to resist the compressive action by the combined oblique pull of the auxiliary rods depending from the chain; accordingly the posts were one by one removed, when it was immediately seen that there was not that degree of stiffness in the framing to resist the amount of compression from the centre towards the standards, for when all the posts were removed, about one-third of the length of the platform from the standards was bowed out 25 inches, as in the annexed figure. (See Fig. 2.)

There was at this time no extra load on the platform, and the conclusion seems obvious, that unless the longitudinal beams be kept straight by tension from the opposite half curve, the framing could hardly bear its own weight, far less be equal to a traffic load of 112lbs. per square foot. In other words, the combination and scantling assigned by Mr. Dredge have not strength to resist the compression; the stability

therefore of the structure must depend on the capability of the longitudinal beams to resist tension.

Mr. Dredge has in fact carried the principle too far, and has concluded that, because the lowest point of a chain is that of least tension, such an arrangement may be effected by which there shall be none at all. He has also assumed perfect rigidity for his platform, which is composed of a flexible combination, and which, if in the slightest degree displaced, causes collapion of the whole.

15. The third defect in the extreme Taper chain system is the great obliquity of the central auxiliaries, and the great difference in the angles of obliquity; varying from  $10^\circ$  at the centre to about  $65^\circ$  at the standards; the strains to which they are exposed by equal weights are consequently very unequal. This conclusion hardly requires elucidation, but the subjoined diagram (Fig. 3.) drawn to a scale, and on the principle that, when three forces are in equilibrio the strains in each direction are proportional to the sides of a triangle in the direction of the forces, shows the actual tension on the central oblique rod, and in that nearest the standard, of a bridge constructed strictly on Mr. Dredge's system, the angles of attachment being  $59^\circ 19'$  at the standards, and  $9^\circ 30'$  at the centre. (See Fig. 3) or as in Fig. 4, the weight being in both cases expressed by unity. (See Fig. 4).

The tension on the first oblique rod from the pier will be 1.18 and the horizontal tension 0.6, whilst that on the central oblique rod will be 6.14, and on the horizontal line 6.05, so that equal sections of iron are strained in the proportion of 6 to 1.

16. The advantages of the above system are, first, that a considerable portion of the platform is supported by rods direct from the standards, thus leaving a diminished tension due to the chain, and secondly, by the oblique action of the auxiliary rods the system is retained under the dominion of a certain amount of Tension, rendering the roadway free from the injurious effects of undulation and vibration, and making the transit more firm and pleasant.

17. The defects of the Uniform chain system are,

1st. The whole weight of the bridge is supported by the chains, rendering them very heavy, massive and costly, as also more susceptible of receiving the impulse, which in storms is the primary cause of the destructive motion given to the roadway.



Fig. 1.

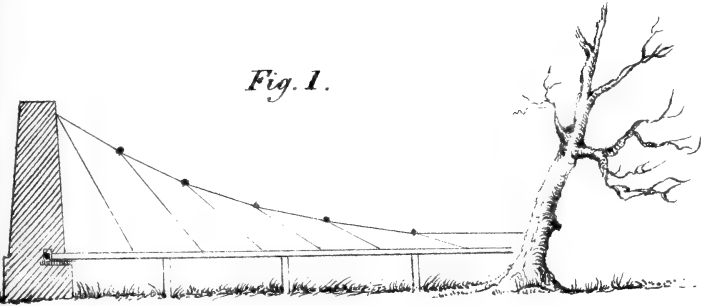


Fig. 2.

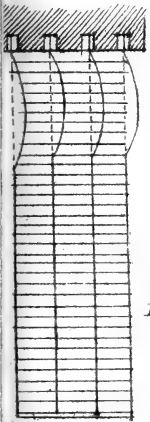


Fig. 3.

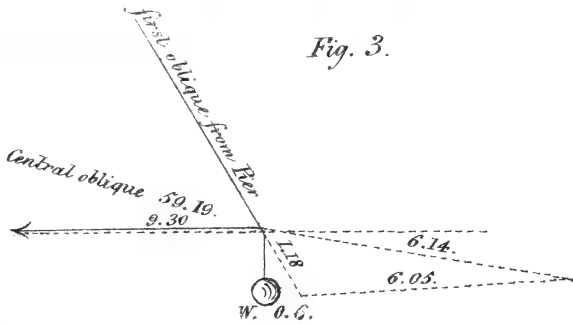


Fig. 4.

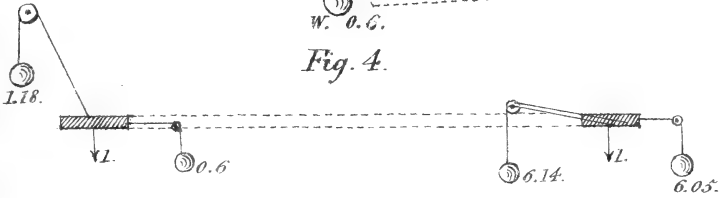


Fig. 5.

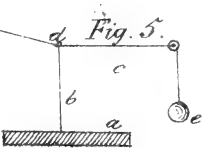


Fig. 6.

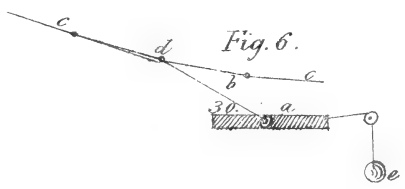


Fig. 7.

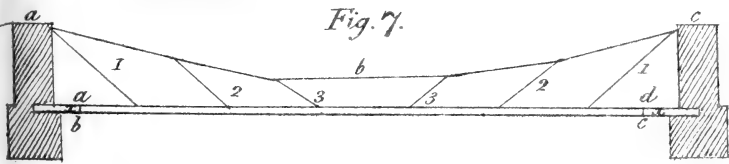
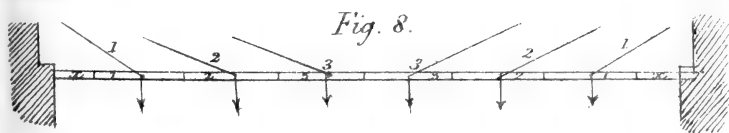
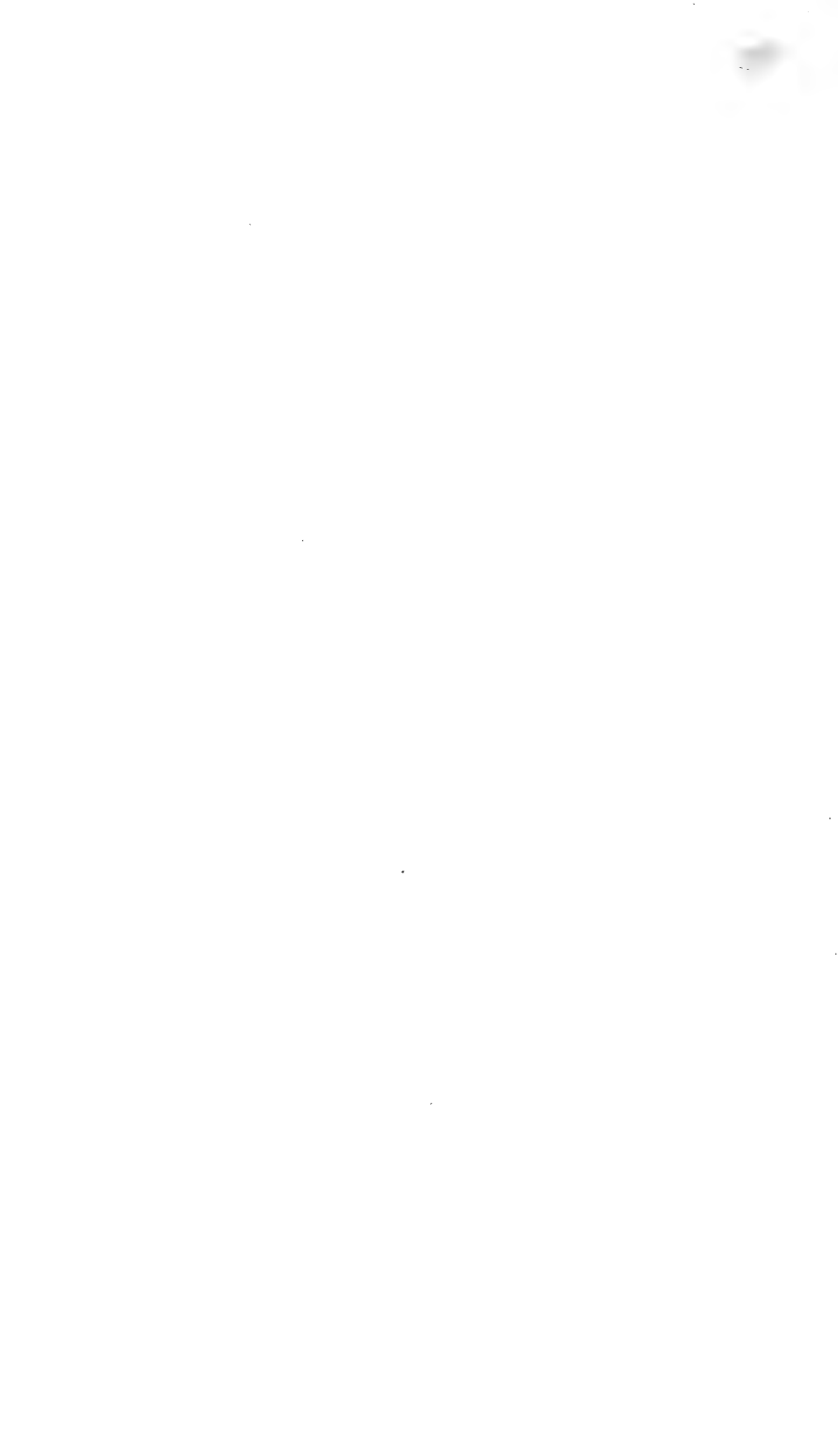


Fig. 8.





18. 2ndly. The platform being wholly supported by the action of gravity, the equilibrium of the system is disturbed by the most trivial causes, the transit even of a single foot passenger over a bridge of 200 feet span produces a sensible vibration, whilst the motion of heavy bodies is attended by effects actually injurious to the structure, and it may therefore be readily conceded, that the effects of storms is very much to be dreaded, of which the Menai, the Brighton Pier and Montrose bridges are instances.

19. Few, if any suspension bridges on the uniform system are constructed on any very close calculations of the strength of the different parts; generally a very wide margin is allowed over and above the power required by calculation; thus the Menai bridge is equal to a permanent load of nearly 400 tons above the weight of suspended roadway, added to a full load of 75 lbs. per square foot; and the bridge at Montrose is equal to nearly 100 tons in excess of the entire load to which it can be subjected, yet notwithstanding this excess of strength in actual section of iron in the chains, these bridges have been in imminent danger of total destruction when *unloaded*, from what may safely be called the defects of construction; surely nothing need be added to show the inexpediency of providing a vast excess of strength in any structure to meet a dead weight which it can never be subjected to, and at the same time leave it unprotected to encounter the danger of disruption to which at any hour it may be exposed from natural causes?

The lately constructed bridge at Hungerford Market over the Thames, 676 feet span, has a sectional area of 312 square inches, and as the actual tension on the chains, even with the enormous assumed weight of 170 lbs. per square foot of platform, could not exceed 1420 tons which @ 9 tons per square inch, requires 156 square inches, there is exactly double the section or strength necessary for the structure.

#### *Resultant System.*

20. I will now proceed to explain a system which only proposes to do what the formulæ in Mr. Pratt's Memoir says may be done, which is based on the experience and research I have above noticed, and which proves what it engages to do, in a manner, I trust, unexceptionable. For,

already have the Ballee Khâl bridge, the Kubudduk bridge, and five other bridges of spans varying from 200 feet to 120, which were originally constructed on the extreme Taper chain principle, been (as far as was practicable) remodelled on the system I am about to advert to, and most of which have now been erected 3 years, fully proved by previous loading, and subjected to very heavy traffic and storms. It is merely a different application of the uniform chain system, though it partakes of both that and the Taper chain; I term it "The Resultant," indicating thereby that the chains by construction, are in absolute strength, and in the direction of their links, "Resultants" of the tensions due to the adjoining link and auxiliary depending therefrom. It is in fact emphatically a system of equilibrium. The chief differences between it and the old system consist in a modified reduction of the section of iron in the chains from standard to centre, with a corresponding increase in the horizontal power in the opposite direction; in fact, transferring in part the horizontal tension, which, together with the oblique, is borne by the chain in the uniform system, to the line of the platform by means of the deviation of the suspending rods from the perpendicular.

21. In the uniform chain system, as is well known, the suspending rods are vertical. In the "Resultant," they are set at an angle with the roadway, and in proportion to the deviation of this angle from the vertical line, a new element is brought into operation, viz. tension in the horizontal line. This does not affect the principle of construction, but only renders necessary a new distribution of the forces required to support the structure; this will be evident from the consideration of annexed diagram (Fig. 5.) which represents the principle of the uniform chain, in which the oblique and horizontal tensions are borne by the chain alone, and as these are nearly equal, the power or section of the chain in either direction from point D must be equal also. (See Fig. 5).

Here the weight of the portion of platform A to be supported is sustained by a single force B, from the main chain C. C. If therefore  $A=8$  tons, the rod B must be equal to that strain. Fig. 6, is an example of the "Resultant" principle, in which the portion (See Fig. 6) of platform weighing, as before, 8 tons, is supported by two forces, viz. the oblique rod B, in the direction b D. and the horizontal force E. Supposing the angle at b to be  $30^\circ$  the rod B. will be strain-

ed with a power of (the weight  $\times$  by cosecant of the angle  $b$ )= $16$  tons, whilst the horizontal force or (weight  $\times$  cotangent of the angle  $b$ )= $14$  tons.

Now although in the first instance the actual tension on the rod B is only 8 tons, and by that the weight is upheld, whilst in the second the total amount of sustaining power is  $16+14=30$  tons, yet mark the difference of effect on the chains from which such rods are suspended. In a bridge of 160 feet span and 20 feet width of platform (for example) the area to be supported will be 3200 square feet, which, at 120lbs. per square foot will be 172 tons. With an angle of suspension of  $15^\circ$  the tension on the chain in the uniform system will be  $\frac{1}{2}$  weight  $\times$  by cosecant of the angle of suspension, or  $1\frac{1}{2} \times 3.86=332$  tons.

In the "Resultant" system (vide Fig. 17, in which the entire series of strains have been worked out as shown in the table) the extreme tension on the chain, or that due to the upper link, is 192.82 tons, the difference being made up in the tension on the horizontal beam, for which a proportionate section of iron is allowed, and this horizontal beam is not an extra item introduced merely to meet the strain, but is a component part of the system of framing of the platform, and as necessary to the whole as the platform of any ordinary suspension bridge.

Here then it is apparent that, in Fig. 5, the weight supported vertically causes a tension of 332 tons on the upper link of the example above mentioned, and that a proportional section of iron must be given to meet that strain, and not only that, but the same section must be continued throughout the whole series of links; whereas, as in Fig. 6, the extreme tension on the chain, with an equal load, is only 192.82 tons, so that its section can be reduced in the proportion of 1 to 1.72 in the upper link, each link in the descending curve becoming lighter in proportion to the extent of diminution allowed; in addition to which advantages the chain links, by the oblique position given to the suspending rods, are strained in the direction of their length, the most favorable to which they can be exposed. Finally if the weight of the whole series of chains, links, and vertical rods in the old system, be compared with the chains, oblique rods, and longitudinal beams of the "Resultant" system, for any given bridge, it would be seen that the two correspond as nearly as can be obtained in practice. This I have

proved beyond doubt from the result of those bridges enumerated in the 20th paragraph, as remodelled on the "Resultant" system.

22. I will now detail the theory on which the "Resultant" principle is based.

In Fig. 7, A B C represents the chain of a tension bridge, the centre link of which is above the level of the railing; a b c d, the roadway, or suspended platform, (See Fig. 7,) the small portions x x being supported by the abutments. Let 1, 2, 3; 3, 2, 1, be the auxiliary oblique rods from the chain, the angle of those at the centre not being less than  $25^\circ$  and those next the standards not greater than  $45^\circ$ . It is evident that the platform is entirely upheld by the auxiliaries, and it is to them therefore that our attention is first directed.

23. The auxiliary rods being by construction attached at equal distances, it is intended that each set shall bear an equal duty or tension, and as the stiffness of the platform to resist the force of gravity is uniform throughout, the whole series of oblique rods benefit equally thereby, and being thus common to all, it may be omitted in considering the strains on the auxiliary rods. (See Fig. 8).

Suppose the platform to be divided into as many equal parts as there are oblique rods, thus giving to each rod an equal load, the points of attachment of which being the centres of gravity, we have six rods, 1, 2, 3, 3, 2, 1, supporting the equal portions of platform having corresponding numbers.

24. The several portions of the platform acting by gravity whilst the sustaining force is oblique, a third force is necessary to preserve the whole in equilibrio. This force is, in the present system, tension in the horizontal line as shown in annexed Fig. 9, and acting from the standard towards the centre. These three forces, viz. vertical, oblique, and horizontal, being in proportion to the radius, cosecant, and cotangent of the angle of obliquity; the tensile force being that under consideration, it is necessary to connect the portions of the platform in Fig. 8, in such a manner that the weight or force of gravity shall act freely, whilst the several parts are prevented from separating. Fig. 10, will show the meaning.

Here we have the tensions on the several portions 1, 2, 3, on one side, or half span, counterbalanced by an equal amount of tension on the portions 3, 2, 1, of the opposite half, hence the greatest strain is in

the centre, which has the pull of  $3+2+1$  acting on it; the connecting link between 2 and 3, being strained with the tension of  $2+1$ , and that between the parts 1 and 2, with the strain due to the part 1 only. Now the outer longitudinal beams of the system stand in the place of the connecting links of the above Fig. 10, and are exposed to the varying tensile forces as described along the whole length, the amount of each of which admits of easy calculation, and whilst the precise spot of the greatest effect can be exhibited, the exact amount in every portion of the system can be accurately ascertained, and consequently provided for.

25. The following Figs. 11 and 12, will show the relative tensions in the oblique and horizontal directions, in both Mr. Dredge's and the present "Resultant" systems. Fig. 11, showing the strains where the oblique rod angles vary, as practised by Mr. Dredge from  $10^\circ$  to  $60^\circ$ , and Fig. 12, the strains where the variation of the angles is only from  $25^\circ$  to  $45^\circ$ . (See Figs. 11 and 12).

The force of gravity being represented by unity in both cases the extreme difference in the amount of tension in the oblique rods of Mr. Dredge's combination is as 5 to 1, and in the horizontal beam as 10 to 1, (Fig. 11.) whilst in the "Resultant" system under adoption, as shown in (Fig. 12.) the variation of tensions in either direction between the centre and standard is as 1.4 to 2.2 greatly to the advantage of the latter.

26. Now to apply the same principle of the composition of forces to the chain, so that the system may be in equilibrio. The span, width of roadway, its construction, the spaces between the oblique rods, and angle of the central one being determined, the weight to be assigned to each set of auxiliaries may be safely assumed at 120 lbs. per square foot of platform, including the weight of the structure.

27. The tension on the centre, or horizontal link may be arbitrarily assumed, i. e., it may be made any proportion of the link at the point of suspension, thus tapering the chain  $\frac{1}{3}$ d,  $\frac{1}{4}$ th or  $\frac{1}{n}$ th, part of the sectional area of the upper link, for it is evident that by the arrangement of the angles formed by the first link from the centre and first set of oblique rods, the strain on the centre link may be  $=0$ , or  $=1000$  tons, as is shown in annexed Figs. 13 and 14, where it is clear (Fig. 13.) that the tension on the centre link c. b. is increased or diminished as the line c. e. (the prolongation of a. c.) approaches nearer to c. b. or c. d.;

the tension on c. b. will be a maximum when a. c. b. are in one line, and a minimum (Fig. 14.) when a. c. d. are in one line. The minimum of the central angle has however been practically determined to be 25°, with a view to the equilization, as far as practicable, of the strains on the entire series of oblique rods.

28. We have thus the means of assigning to the centre link any amount of power ; its direction, (horizontal) is known as well as the tension and direction of the central oblique rods, we have therefore two forces, the magnitude and direction of which, with reference to each other, are known, from which to obtain a resultant, which shall be the first link from the centre. And here it must be borne in mind, that the height of the point of suspension and consequently deflection of the chain depend on the power of the centre link, for the resultant, or first link from the centre will form a greater or less angle with the horizon as its direction approaches less or more to that of the centre link, and the resultants arising therefrom, as the series of the chain draws nearer to the standards, will all be similarly affected.

29. The first resultant from the centre link and oblique rod is obtained from the following expression, (Fig. 15.)

Suppose given A B=200 centre link.  
 A C= 33 centre oblique rod. } The actual forces in  
 } the bridge designed  
 } for the "Jumna" at  
 } Agra.  
 $\angle A C E$  or  $C A B = 25^\circ$  .....

to find the magnitude and direction of A. D.

By Trigonometry,

$$A D^2 = A C^2 + A B^2 - 2 A C \cdot A B \cdot \cos : A B D$$

$$= A C^2 + A B^2 + 2 (A C \cdot A B \cos : A B)$$

$$= 1089 + 40000 + (13200 + 906)$$

$$A D = \sqrt{53048} = 230.32 = \text{magnitude of A D.}$$

Again,

$$A D : \sin. B A C :: \left\{ \begin{matrix} C D \\ A B \end{matrix} \right\} : \sin. C A D.$$

$$\sin. B A C = 25^\circ \dots \dots \dots \log. 9 \cdot 625948$$

$$A B = 200 \dots \dots \dots 2 \cdot 301030$$

---


$$11 \cdot 926978$$

$$A D = 230 \cdot 32 \dots \dots \dots 2 \cdot 362332$$

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$$\text{Angle } C A D = 21^\circ \cdot 32' \dots \dots \dots 9 \cdot 564646$$



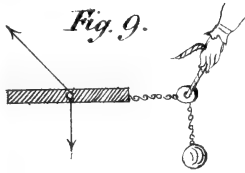


Fig. 9.

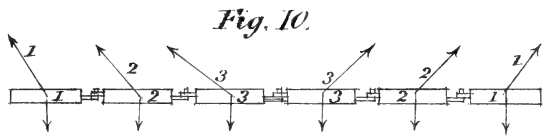


Fig. 10.

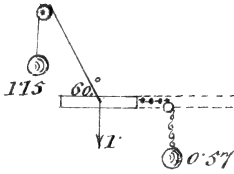


Fig. 11.

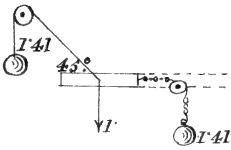
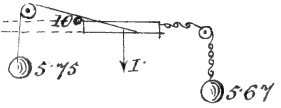


Fig. 12.

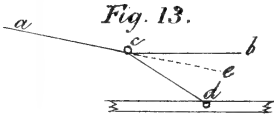
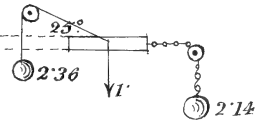


Fig. 13.

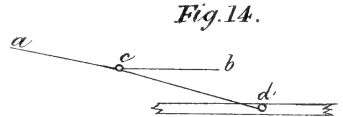


Fig. 14.

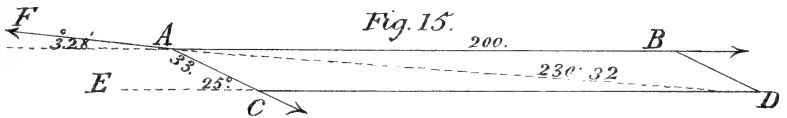


Fig. 15.

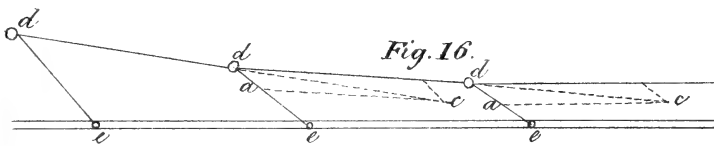


Fig. 16.

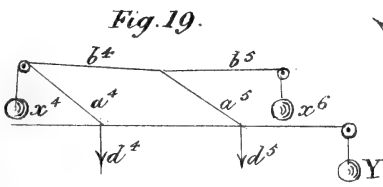


Fig. 19.

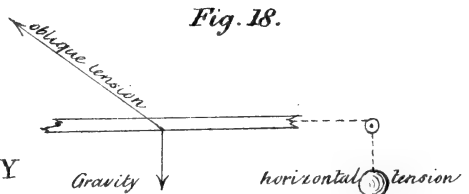


Fig. 18.



And angle C A B—angle C A D=25°—21° 32′=3°.28, or angle of first resultant A F with the horizon. Thus the magnitude and direction of the first link are found, and the link is a true resultant of the two forces acting at its lower extremity. In like manner can each link be ascertained till the series is complete, and thus a perfect system of links and auxiliaries will be obtained in equilibrio, under the maximum strain to which the structure can be exposed.

30. By reference to annexed Fig. 16, the formation of the chain will be readily understood from the mechanical construction, as, shown in the dotted lines, which are the forces taken from a scale of equal parts, and correspond with the results obtained by the mode of calculation above referred to. (See Fig. 16.)

The points of attachment, e, e, e, of the oblique rods and platform, are originally known, the span being divided into a number of equal parts; the length of the links or points d. d. d. are found by the annexed formulæ (Drewry, p. 172).

$\sqrt{\frac{(\text{deflection} + \frac{\text{deflection}^2}{3}) + \text{semichord}^2}{3}} = \text{semilength of chain, which}$   
 must be computed independent of the centre link. The semi-length thus obtained is to be divided into as many links as are required, which will of course depend on the number of spaces of the platform upheld direct from the standards (Fig. 17). The deflection may be assumed any proportion of the chord line from a 10th to a 15th. In small bridges the latter is the best as affording greater rigidity, with but little extra material; in large spans, perhaps a medium, or  $\frac{1}{12}$ th will be found most practicable. In the above Fig. 16, a c, a c, represent the strains on the main chains, a d, a d, the tensions on the oblique rods, and c d, c d, the resultants.

31. In a bridge on the resultant system of 500 feet span and 24 feet width of roadway, if the chain were made to taper at the centre to  $\frac{1}{3}$ th the section of the link at the point of suspension, which in this case would be equivalent to the tension of 1014 tons, the central link would have 9 times the strength, that in the extreme, or Dredge's tapering system, would have been assigned to it, whilst from the position of the resultant link, and collateral oblique rods, the iron in the centre, does not hang as dead weight tending to produce vibration by the slightest cause, as in the uniform system, but is kept under the dominion of tension drawn in the direction of its length, and thus preserved steady and rigid.

32. In paragraphs 24, 25, the principle that is to guide the construction of the longitudinal beams has been given, viz. as the third force acting by tension horizontally to preserve the equilibrium with the oblique force and that of gravity; and in paragraph 9, full explanation of the reason of the above arrangement has been entered into, and it has also been shown that provision can be made to meet the several amounts of tension acting on the beam in the horizontal line. If this were all that the longitudinal beam had to perform, a construction similar to Fig. 10, would answer the purpose, and the section of the different portions might diminish from the centre, towards the standards in proportion to the variation of the strains produced by the auxiliaries, but as these beams are intended to bear the vertical weight of the platform together with the heavy traffic load, and other contingencies, a compact or uniform section should be retained in bridges of small span equal to that demanded at the centre, which will be the most advantageous to the system, and facilitate the actual construction, though in larger spans a considerable reduction of section may be effected between the centre and standards.

33. The "Resultant" system as above elucidated, cannot surely fail to present many valuable points for recommendation, professing, as it does, practically to coincide with the theoretical and analytical conclusions of the author of the "Memoir" under notice, and moreover, whilst it is divested of the positive defects of both the systems which have been simultaneously reviewed, a powerful resultant is obtained from the composition of the advantages or forces of each of them. This system has been somewhat hastily "damned with faint praise," by some, because they would not take the trouble to ascertain its principles of construction; it has been passed over by others, from absolute inability to understand them, simple as they are, but from what has been shown above it will be clear that, with the condemnation of the "Resultant" system, the uniform must be included, the latter being nothing more than an extreme case of the general system in which the strain on the chain is a maximum, and the horizontal tension is 0, whilst the system of Mr. Dredge in a way aims at, (but does not attain,) the opposite extreme, where the tension on the chain is a minimum, and that on the horizontal line a maximum.

34. It now remains to show another advantage of the "Resultant" system with a diminishing chain. The annexed Fig. 17, is the con-

structed resultant curve of a bridge of 160 feet span as designed, with the several forces and angles delineated, and the subjoined table shows the forces from which each link has been obtained, their magnitude and direction; it will be obvious that the horizontal tension of each portion of platform supported by an oblique rod will be communicated through the medium of the side longitudinal beams from the standard to the centre, so that the tension on one half the bridge is counteracted by that on the opposite half; this amount of tension in a loaded bridge of large span is very great, (600 tons in a span of 500 feet, and 24 feet wide) being the sum of all the horizontal tensions  $A+B+C+D+E$ , &c., and as the ends of these side beams are securely built into the standard masonry, the swaying of the structure from side to side, or undulation vertically under the influences of storms, or other ordinary destructive causes, (excepting to a very slight extent) is prevented. At the proof trial of the Ballee Khâl bridge, 250 feet span, after its reconstruction on the Resultant principle, the transit of a large elephant, and 24 pounder siege gun (See Fig. 17. also Table next page) with all its appurtenances, caused no sensible vibration, or visible depression, whilst at the conclusion of the ceremony the entire platform was covered with a dense crowd of villagers, who, on the departure of the Governor and suite came to witness the opening, and congregated as far as they were able to one side of the bridge, thus giving fair proof of the stability and rigidity of the structure.

35. If therefore, as demonstrated by the Rev. Mr. Pratt, the quantity of iron calculated to resist a certain dead weight, be the same for bridges of equal span and width, and of equal strength, whether the metal be distributed, as in the uniform system, or as in the "Resultant," it surely is no small advantage in favour of the latter, that, by construction, it is defended from the severe trials to which all bridges, even when unloaded, are exposed, from the momentum which a comparatively light body obtains when put in motion.

36. The extra aid usually applied to suspension bridges on the uniform system for the purpose of stiffening them, has been found absolutely necessary, and duly commented on in paragraphs four and five, and whilst such means are almost indispensable in the old system, to compensate for vicious construction; in the resultant system they form an essential part of the principle; and considering the results of the experiments on a full-sized scale, (vide end of this memoir) the

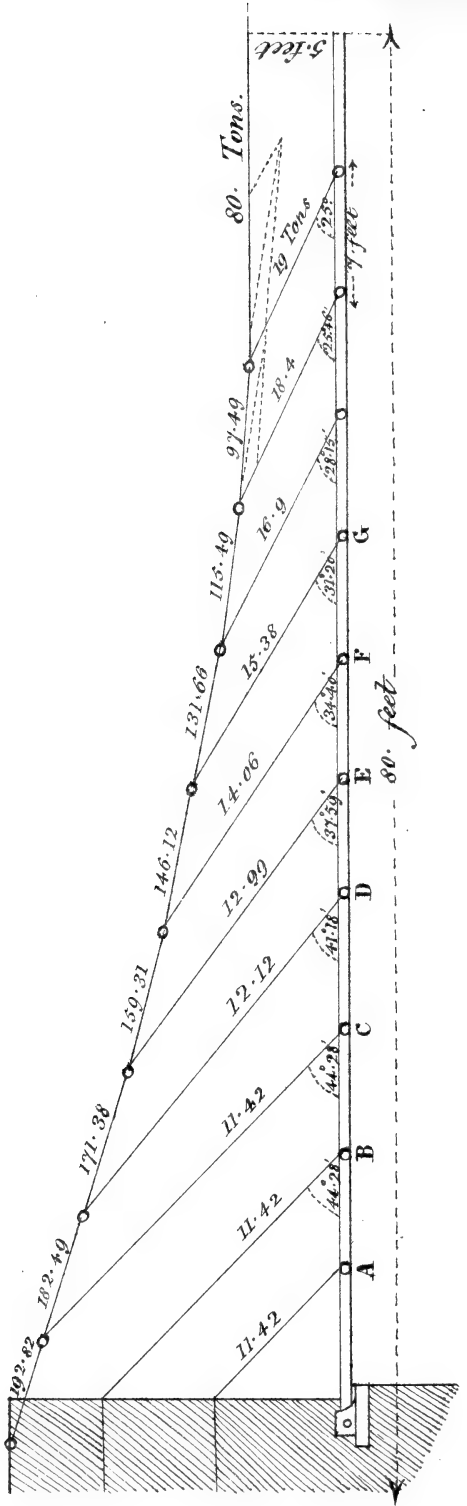
favourable reports on those bridges actually constructed on the resultant principle, together with the theoretical soundness of the details, it appears neither reasonable or consistent to object to it since it has every good quality that such a structure can require, to recommend it.

*Table Showing the Forces of Links and oblique Rods, with the Resultants obtained therefrom.*  
See Fig. 17.

| <i>Forces composing the Resultants or Link of chain.</i> | <i>Forces due to chain.</i> | <i>Angles of oblique rods with horizon.</i> | <i>Cosecants of angles of oblique rods.</i> | <i>Angles of oblique rods with chain.</i> | <i>Weight of one space of plat-links with form.</i> | <i>Angles of chain links with horizon.</i> | <i>Cal. Resultants or Tension on chain links.</i> | <i>Position of Link.</i>                                      |
|----------------------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------------|-------------------------------------------|-----------------------------------------------------|--------------------------------------------|---------------------------------------------------|---------------------------------------------------------------|
| Centre link,                                             | Tons.                       | 25°                                         | 2.366                                       | 25°                                       | 8 Tons.                                             | 5°.45'                                     | 97.49                                             | Centre link.                                                  |
| Centre oblique rods, ..                                  | 80                          | 25°.46'                                     | 2.3                                         | 20°.1'                                    | }                                                   | 8°.58'                                     | 115.49                                            | 1st link from centre.                                         |
| 1st link from centre, ..                                 | 19                          | 28°.15'                                     | 2.113                                       | 19°.17'                                   |                                                     | 11°.24'                                    |                                                   |                                                               |
| 2nd set of oblique rods,                                 | 97.49                       | 31°.20'                                     | 1.923                                       | 19°.56'                                   | }                                                   | 13°.27'                                    | 131.66                                            | 2nd link from centre.                                         |
| 2nd link from centre, ..                                 | 18.4                        | 34°.46'                                     | 1.758                                       | 21°.13'                                   |                                                     | 15°.17'                                    |                                                   |                                                               |
| 3rd set of oblique rods,                                 | 115.49                      | 37°.59'                                     | 1.624                                       | 22°.42'                                   | }                                                   | 16°.57'                                    | 146.12                                            | 3rd link—ditto.                                               |
| 3rd link from centre, ..                                 | 16.9                        | 41°.18'                                     | 1.515                                       | 24°.21'                                   |                                                     | 18°.31'                                    |                                                   |                                                               |
| 4th set of oblique rods,                                 | 131.66                      | 44°.28'                                     | 1.427                                       | 25°.57'                                   | }                                                   | 20°.                                       | 159.31                                            | 4th link—ditto.                                               |
| 4th link from centre, ..                                 | 15.38                       |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |
| 5th set of oblique rods,                                 | 146.12                      |                                             |                                             |                                           | }                                                   |                                            | 171.38                                            | 5th link—ditto.                                               |
| 5th link from centre, ..                                 | 14.06                       |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |
| 6th set of oblique rods,                                 | 159.31                      |                                             |                                             |                                           | }                                                   |                                            | 182.49                                            | 6th link—ditto.                                               |
| 6th link from centre, ..                                 | 12.99                       |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |
| 7th set of oblique rods,                                 | 171.38                      |                                             |                                             |                                           | }                                                   |                                            | 192.82                                            | 7th link—ditto,<br>8th link—ditto,<br>or upper link of chain. |
| 7th link from centre, ..                                 | 12.12                       |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |
| 8th set of oblique rods,                                 | 182.49                      |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |
| 8th link from centre, ..                                 | 11.42                       |                                             |                                             |                                           |                                                     |                                            |                                                   |                                                               |



Fig. 17.





*Results of a series of experiments instituted for the purpose of testing the newly proposed Resultant Taper Chain principles.*

Pl. XXIV. Fig. 1, is illustrative of the first experiment, which was intended to test the theory of a system based on the "resolution of forces," as explanatory of the proposed construction of the Agra bridge.

The idea of compression in the horizontal line having, from actual proof, been deemed untenable in bridges of any ordinary span, the opposite power of tension has been admitted as the third in the series to produce an equilibrium jointly with those of gravity, and the tension in the oblique direction from chain to platform, thus: (See Fig. 18).

The oblique and horizontal force in a series bearing theoretically a certain proportion to each other with reference to the obliquity of the former, the weights at each point being uniform; this experiment was instituted to prove practically how far that theory was correct.

It was also intended to illustrate practically the theory relative to the position and power of the chains, the links of which are calculated to be true resultants from the two forces immediately below them in the chain, viz. the link and oblique rod attached to the lower extremity of that resultant.

Fig. 1, shows the experiment which was to prove whether, individually or collectively, the several sets (three forces applied to any point to produce equilibrium) of forces which may be applied to any single rod, link, or the entire series of rods and links, will be proportionate to the different strains, which are those calculated as due to the parts of a bridge of 100 feet span, 16 feet wide, constructed on the above principle.

The experiment was on full scale as regards heights and distances, but formed of material  $\frac{1}{220}$ th of the strength of the real bridge, the uniform weights at the points of junction of the oblique rods with the platform being in the same proportion, allowing 120 lbs. per square foot.

The point of suspension is 2 feet from the centre of the standard, making the half span of the chain 48 feet.

The power of the centre link, by actual construction, was made equal to  $\frac{1}{4}$ th that of the upper link, or whole amount of tension which would be due to a uniform chain, and the angle of the central oblique rod determined to be  $30^\circ$ , the deflection being  $\frac{1}{11}$ th.

The chain was not at first attached, but the forces necessary to preserve equilibrium at the points of attachment of the oblique rods with the platform, first attended to, as follows, each of the portions of platform ( $c$ ,  $c^1$ ,  $c^2$ , &c.) being separate at first, and afterwards flexibly connected.

To the portion ( $c$ ) with a weight ( $d$ ) of 56 lbs. was attached a single rod ( $a$ ) passing over a pulley at point of suspension; a weight ( $x$ ), and part of weight ( $Y$ ) passing over a pulley in a horizontal line, were added in such proportions till they produced an equilibrium, i. e. till the portion of platform ( $c$ ) was made horizontal by the joint effects of the two weights  $x$  and  $Y$ .

The subjoined table shows in its several columns what the proportions of the weights ( $x$ ,  $x^1$ ,  $x^2$ , &c., and  $Y$ ) should be, theoretically calculated, to produce equilibrium at the different points as the rods were successively attached; and it also shows what the actual weights were particularly applied in succession, as well as the collective results on the whole series, with the differences.

At the distance of 7 feet the oblique rod ( $a^1$ ) was attached to a second piece of platform ( $c^1$ ), with its weight of 56 lbs., which latter was also connected to the piece ( $c$ ) flexibly; the weight ( $x^1$ ) appended to the rod ( $a^1$ ) and weight ( $Y$ ), increased till the equilibrium was produced, or both pieces of platform ( $c$ ,  $c^1$ ) were in a horizontal line. In like manner were all the obliques ( $a^2$ ,  $a^3$ ,  $a^4$ ,  $a^5$ .) attached to the several portions ( $c^2$ ,  $c^3$ , &c.) of platform, and the weights added and corrected: when the whole series was complete, the weight  $Y$  had attained its maximum. The table will show the differences between the actual weights ( $Y$ ,  $Z$ ,  $x^1$ ,  $x^2$ , &c.) and the numbers on the plate, which are those mathematically calculated as due to the several rods and beam.

The result shows that the whole were increased slightly beyond the calculated amounts; but this may be attributed to the friction of the chains upholding the oblique rods, which passed over cast iron pulleys 9" diameter. It will be observed, however, that the increase was proportional: thus the originally calculated weight ( $x^1$ ) due to the oblique rod ( $a^1$ ) was 74 lbs., but, to produce equilibrium, required to be increased to 95, and the calculated total amount of  $Y$  was 406 lbs., afterwards practically requiring 519; but the numbers 74 and 406, are relatively proportional, to 95 and 519.

To prove the proportions due to the chain links in connection with the rest of the parts, the oblique rods were severally disengaged from the pulleys, and attached to the chain as follows. The rod ( $a^5$ ) was first attached to the centre link ( $b^5$ ), the outer end of which was fixed to a chain passing over a pulley, and to which was appended weight  $x^6$ . The lower end of the link ( $b^4$ ) was likewise attached to the junction of the two rods, and its upper end to a chain passing over a pulley with weight  $x^4$  appended, the intermediate pulley and weight  $x^5$  being removed. In this position was remarked the amount of the weights required to produce equilibrium, and what proportion  $x^4$ , which denoted the tension on link  $b^4$ , bore to the numbers mathematically calculated: the result of the whole is shown in the table, and the annexed Sketch, the position of the rods at this period: (See Fig. 19) ( $b^4$ ), being a true resultant of  $b^5$  and  $a^5$ . Each other link ( $b^3$ ,  $b^2$ , &c.) was then added in succession, the weights ( $x^4$ ,  $x^5$ , &c.) being withdrawn in turn, and that attached to the link under investigation being increased as the experiment approached the upper link ( $b$ ), when the weight  $Z$  denoted the total tension on the upper link.

Thus was shown the separate tension on the oblique rods, the horizontal tension on longitudinal beam, and the tension on each link of the chain: the results, as compared with theory, are noted in the table, and are satisfactorily approximate to each other.

It was stated in the report of the Committee on the Ballee Khâl bridge, and referred to in the ninth paragraph of my statement on the resultant system, before alluded to, that the power of the longitudinal beam at the centre, added to the power of the centre link should, together, be nearly equal to the power of the upper link, so that whatever power was taken from the chains in the centre, should be compensated for in the longitudinal beam. Now the result of the experiment entirely coincides with that opinion, and confirms the view taken of this part of the construction. The total corrected amount of weight  $Z$  was 1086 lbs., and the sum of weights  $x^6$  and  $Y$ , or  $572+519=1091$  lbs.

Experiment the second, Fig. 2, was proposed by Colonel Forbes, on Mr. Dredge's extreme oblique principle, with the sole exception that the central portion of the roadway beam formed the horizontal connection between the first slanting links on each side of the centre, thus, in the Fig. 2, as before,  $c$ ,  $c'$ ,  $c^2$ , &c., denote the platform,  $b$ ,  $b'$ ,  $b^2$ , the

chain, the lower link of which is attached near the centre to the longitudinal beam at  $c^3$ . In this position only can Mr. Dredge's theory of a vanishing strain existing in the centre link (N, dotted line) be granted ; but at the same time the roadway beam must be equal (nearly) to the full section of iron in the upper link, as the result proved. The weights Z and Y were alone necessary for this experiment, the weights a, d, d', d<sup>2</sup>, d<sup>3</sup>, being, as before,  $\frac{1}{2}$  cwt. each.

The span of this half curve was only 40 feet, yet it required 1242 lbs. at Y, and 1302 lbs. at Z, to produce equilibrium, being a greater weight than in the former experiment, in consequence of greater tension being called into action by the greater obliquity of the rods ; and a proof that in Mr. Dredge's construction there is not iron enough in the centre of the longitudinal beam to resist the tension existing there. This experiment showed much more rigidity than the former one, being more powerfully acted on ; but to have manufactured it sufficiently strong to resist the tension, would have entailed a heavier outlay than the former.

There is no doubt but that this construction of making the longitudinal beam act centrally as part of the chain would tend to stiffen the structure, and might simplify the details in small spans ; but in large spans, where the centre link is of great substance, and with a double chain, practical difficulties occur which would render the centre link a necessarily distinct feature, and prevent its absorption into the roadway beam.

The reason why the chains are drawn tangent to the railing is to enable the railing to be placed centrally under the chains ; for if the chains were tangent to the roadway, though there would be a decrease in the height of the standards, there would be a loss of 2 feet in width of platform ; for with a wide chain dipping below the railing, the stanchions supporting it must be placed 1 foot on each side, within the central line of the chain, in order to avoid contact with it ; and an extra 2 feet of platform is more expensive in its consequences on the amount of iron than an additional 4 feet of masonry on the standards.

Experiment 3rd, of which Fig. 3 is illustrative, was a construction on the resultant principle, similar to experiment 1, carried to a much larger extent. The Fig. 3, shows only one half of it, as it was an entire curve of 490 feet between the points of suspension, the lengths of the

rods and beam, heights and distances, being to a full scale, whilst the sectional area of the iron was  $\frac{1}{198}$ th part of reality. The sections of the whole of the parts are given, and proof calculations that each was correctly proportional to the full sections of the actual bridge. The standards were formed of spars, firmly supported by struts in front\* and stayed back with ropes and chains, the latter having tackle on them to correct the perpendicularity of the masts, should they yield to the load.

The horizontal beam was upheld by forty-four rods from the chain and six direct from each standard; the chain double, tapering in the centre to a power equal to  $\frac{1}{5}$ th the upper link.

The angle of the centre oblique rod  $25^\circ$ , and that of the one next the standard  $38^\circ$ ; so that there was only a difference of  $13^\circ$  between the two extremes, divided amongst twenty-eight points, or a difference of tension between the extremes in the proportion of 2.63 to 1.62.

The deflection of the chain was equal to  $\frac{1}{12}$ th the span.

The section of the longitudinal beam at the centre, added to the section of the centre links, was equal to the sectional area of the upper links of the chain.

The whole of the experiment being, as before said,  $\frac{1}{198}$ th part of reality, is a model of the curve, which was designed for the Agra bridge, and the result of this experiment will go far to prove the correctness of the theory advanced.

The calculations show the proportional load for the experiment to be 1352 lbs., at the rate of 120 lbs. per square foot of platform, to be uniformly distributed over 56 points. This was done by slinging a basket at each point, and gradually loading them up to the amount of 57 lbs. each.

When loaded with 24 lbs. in each basket, or 51 lbs. per square foot (exclusive of weight of experiment), the deflection in the centre, after the masts were made upright, was  $1\frac{3}{4}$ '' only in the centre.

With an additional load of 16 lbs. per basket, making in all 40 lbs., or  $84\frac{1}{2}$  lbs. per square foot of platform, the deflection in the centre was  $5\frac{1}{2}$  inches, and midway between the centre and standards, on one side  $1\frac{1}{2}$ '' , and on the other  $2\frac{1}{4}$ '' , on account of the greater flexibility of one mast than the other. When the full load of 57 lbs. on each point, or

\* Left out in drawing, to prevent confusion.

120 per square foot, was put on, the deflection was  $13\frac{1}{8}$  inches in the centre. This load was allowed to remain on 3 days: it was subsequently unloaded and re-loaded several times with nearly the same results; and after the lapse of 17 days from the period of its first being loaded, when all the weight was taken out of the baskets except 24 lbs., which is proportional to the weight of the suspended platform of the real bridge without the traffic weight, the longitudinal beam sprang up to within  $\frac{3}{4}$ ths of an inch of the horizontal line on which it was first constructed.

Thus was this very extended curve, formed of such exceeding slender material, not any of which could be proved before it was put together, found equal, proportionally, to the greatest amount of the traffic load that could on any extraordinary occasion come on the bridge, without derangement of any of its parts: the combination appeared as stiff under the load as could reasonably be expected with such slender wires, and fully bore out the results detailed in experiment No. 1, and the mathematical demonstration of the powers of the bridge, as set forth in the specification of the Agra bridge.

Subsequent to the above detailed loading, I continued adding weight to the baskets, and correcting the masts as well as the power of the tackle enabled me to do, till the weight in each basket amounted to 81 lbs., when the longitudinal beam was torn asunder at the distance of 25 feet from the centre, and the whole immediately buckled up.

The breaking weight was therefore 174 lbs. per square foot of platform, or a tension of 15 tons per square inch of that slight material, the weldings of which were with difficulty made, and the strength of which there was no means of proving.

I cannot imagine any further proof to be necessary of the efficacy of such a system as has been proposed, manifestly having for its object the avoidance of the defects of both the uniform and extreme oblique system, combining the strength and solidity of the former with the rigidity, economy, and more scientific construction of the latter.

In this construction, admitting the action of tension in every direction, and where the rods and bars are drawn in the direction of their length, the full amount of tension that can possibly affect every part of the structure can be accurately ascertained, and thus certain data are afforded from which to proportion the sectional areas of every part of the bridge.

## Scantlings of Rods of Experiment No. 3.

|             |   |                         |                 |                |
|-------------|---|-------------------------|-----------------|----------------|
| Each chain. | } | Upper link. . . . .     | 15              | } of one inch. |
|             |   | 2 " . . . . .           | $\frac{29}{64}$ |                |
|             |   | 3 " . . . . .           | $\frac{28}{64}$ |                |
|             |   | 4 " . . . . .           | $\frac{27}{64}$ |                |
|             |   | 5 " . . . . .           | $\frac{26}{64}$ |                |
|             |   | 6 " . . . . .           | $\frac{25}{64}$ |                |
|             |   | 7 " . . . . .           | $\frac{24}{64}$ |                |
|             |   | 8 " . . . . .           | $\frac{23}{64}$ |                |
|             |   | 9 " . . . . .           | $\frac{22}{64}$ |                |
|             |   | 10 " . . . . .          | $\frac{20}{64}$ |                |
|             |   | 11 " . . . . .          | $\frac{19}{64}$ |                |
|             |   | 12 or centre, . . . . . | $\frac{18}{64}$ |                |

Oblique rod  $\frac{1}{8}$ " diameter.

Longitudinal beam at centre  $1'' \times \frac{3}{16}''$ .

" " 7th space from centre  $1'' \times \frac{9}{64}''$ .

*Explanation of the relative proportion between the Experiment and the real Bridge.*

Full section of two chains, one side of the real bridge.

Upper link, 17 bars  $2'' \times 1'' = 34'' \times 2'' = 68$  square inches.

Diameter of experimental upper link,  $\frac{16}{32}$  of one inch.

Area of which  $\cdot 178$  and  $\cdot 178 \times 2$  ch. =  $\cdot 346$  section of two chains.

$\cdot 346 \times 176 = 67\cdot 8$ , or section of real bridge.

Area of platform, real bridge,  $468 \times 11 = 5148$  square feet :

$5148 \times 120 = 617760$  lbs. on real bridge.

$617760 = 3156$  lbs. total load for experiment.

$\frac{196}{196}$

$3152 = 57$  lbs. on each point of experiment.

$\frac{56}{56}$

Area of oblique rods of real bridge  $2\cdot 405$  each.

Diameter of rods of experiment  $\frac{1}{8}$ " or sectional area  $\cdot 012$  :

$\cdot 012 \times 196 = 2\cdot 352$ , or very nearly the section of real bridge.

Sectional arc of longitudinal beam of real bridge at centre, 37 inches ;  
remainder  $27''$  beyond the 7th oblique rod.

Sectional of experimental beam at centre  $1'' \times \frac{3}{18}'' = .188$ ; and  $.188 \times 196 = 36.848$ , or nearly the section of real bridge.

Remainder of section,  $1'' \times \frac{9}{64}'' = .141$  at the 7th rod :

$.141 \times 196 = 27.636$ , as nearly as possible the section of real bridge.

*Table explanatory of the previously calculated theoretical tensions, and subsequently practically proved results, on an experiment undertaken to test the Taper Chain "Resultant" system.*

|                                  | Oblique rod forces.    |                   |             | Chain link forces. |                   | Total tension horizontal line. |                   |             | Total tension up-per line. |                   |             |      |     |
|----------------------------------|------------------------|-------------------|-------------|--------------------|-------------------|--------------------------------|-------------------|-------------|----------------------------|-------------------|-------------|------|-----|
|                                  | Previously calculated. | Practical result. | Difference. |                    | Practical result. | Previously calculated.         | Practical result. | Difference. | Previously calculated.     | Practical result. | Difference. |      |     |
| x or a                           | 68                     |                   |             | b                  | 814               |                                |                   |             |                            |                   |             |      |     |
| or a'                            | 74                     | 95                | 21          | b'                 | 750               |                                |                   |             |                            |                   |             |      |     |
| x <sup>2</sup> or a <sup>2</sup> | 81                     | 102               | 21          | b <sup>2</sup>     | 678               |                                |                   |             |                            |                   |             |      |     |
| x <sup>3</sup> or a <sup>3</sup> | 92                     | 107               | 25          | b <sup>3</sup>     | 596               | <b>Y</b>                       | 406               | 519         | 113                        | <b>Z</b>          | 814         | 1068 | 272 |
| x <sup>4</sup> or a <sup>4</sup> | 104                    | 132               | 28          | b <sup>4</sup>     |                   |                                |                   |             |                            |                   |             |      |     |
| x <sup>5</sup> or a <sup>5</sup> | 112                    | 145               | 33          | b <sup>5</sup>     |                   |                                |                   |             |                            |                   |             |      |     |





*Bal'amy's translation of the History of Tabary, and Ghazzály's History of the Prophets.*—By A. SPRENGER, Esq. M. D. (Communicated by H. M. ELLIOT, Esq. Vice-President.

Messrs. Silvestre de Lacy and Dubeux complain justly of the great incorrectness of the copies of the Persian translation of Tabary, and their discrepancy from each other, which is so great that little reliance can be placed on the book; that which is affirmed in one copy is not seldom contradicted in another. I thought this circumstance might be owing to a difference of original editions made by the author himself; a comparison of several copies however does not bear out this hypothesis; the various readings cannot be reduced to a certain number of original texts.

If we consider the age when Tabary was translated (between A. H. 350 and 366) and the comparatively modern language of the copies which we possess, another hypothesis suggests itself, viz. that these corruptions and discrepancies are owing to attempts on the part of the copyists to improve the obsolete expressions of the original. Though I have never met with a very ancient MSS. of Bal'amy's Tabary, this supposition has been confirmed by the discovery of a work of Imám Ghazzály (who died A. H. 505), which I believe has hitherto escaped the attention of bibliographers.

In the Moty Mahal library of the king of Oudh is a Persian MS. in 4to. of 250 pages, with the following title page written in the same hand in which the text is written :

كتاب قصص الأنبياء صنفه الامام العالم العلامة حجة الاسلام هادي الانام سيد  
الحكماء سلطان العلماء جامع العلوم وجاوي المناقب مجرز الفضائل زين الدبن  
ابو حامد محمد بن (sic) الغزالي

“History of the prophets, compiled by the learned Hojjat al-islam Zayn al-dyn abú Hámid Mohammad, the son (sic) of Ghazzály (sic).” The MSS. is executed in a very beautiful naskhy character, and is the most ancient, and one of the most correct *Persian* MSS. that I have seen. It was probably written in the sixth century of the Hijrah, and abounds in peculiarities in spelling, as will appear from the extracts given below.

On comparing this book with the Persian translations of Tabary it appears that the latter embodies the whole of the former. It is indeed likely that the History of the prophets of Ghazzály is nothing more than an abridged edition of Tabary. This seems to be borne out by the circumstance that the invocation of God and of the prophet,\* with which every Mohammadan book begins, is literally the same in our copy of Tabary and in Ghazzály, only the words *قال ابو جعفر محمد بن جرير الطبري* are omitted by the latter. In the same copy of Tabary we find the beginning of the first chapter of Ghazzály preceded by the words "know that Abú Jáfar Mohammad b. Jaryr Tabary says in the beginning of his work." But in another copy of Tabary, this passage is wanting, and there is a different invocation† of God and the prophet. On the other hand, as the Persians have taken so great liberties with their translation of Tabary, it is possible that they have inserted the whole of Ghazzály's book into it.

Be this as it may, this valuable MSS. enables us to restore a large portion of our copies of Tabary; moreover it is of great intrinsic value; it contains the passages of the Korán alluding to the ancient prophets, most skilfully arranged and connected, and illustrated in a natural manner and with great perspicuity. It is the only book which gives us a clear view of *Mohammad's* notions of the prophets; all other Mohammadan books on the subject are filled with fables, which not only belong to a later time but to different countries. Here is the index of Ghazzály's history,‡ which differs but little from that of Tabary.

1. Discussion on the object of the creation, fol. 4.
2. Tradition of 'Abd Allah b. 'Abbás from the prophet on the description of sun and moon, fol. 7.
3. Discussion on the duration of the world, fol. 9.
4. Discussion on the creation and in how much time it was accomplished, 10.
5. On the first inhabitants of the world, 14.

\* It begins: الحمد لله الاول قبل كل اول والاخر بعد كل اخر والدايم الحج

† It begins: الحمد لله العلى الاعلى الوافي من الى الوفي ذي الاسماء الحسنى الحج

‡ An index to Tabary is contained in the Zeitschrift der Detschen Morgenl. Gesellsch. II. 2. p. 159. See also DuCruX's translation of Tabary.

6. The angels worship Adam, 15.
7. The devil deceives Adam and Eve, 17.
8. Adam descends from the Paradise, 18.
9. Adam performs the pilgrimage (to Makkah).
10. Cain murders Abel, 19.
11. Adam the father of mankind.
12. Prophetic mission of Adam and his son Seth, 21.
13. Question of Abú Dzarr Ghifáry respecting the death of Adam, 22.
14. Seth the son of Adam, his children, and those who reigned on earth.
15. The first who worshipped fire and introduced musical instruments, 23.
16. Story of Idrys.
17. Noah, 23.
18. Nimrod, 26.
19. Húd, 27.
20. The Thamúdités and their prophet cálih, fol. 30.
21. Abraham, 33.
22. The flight of Abraham, 37.
23. Death of Nimrod, 39.
24. Birth of Ishmael, 41.
25. Abraham settles Ishmael (at Makkah), 41.
26. Abraham pays a visit to Ishmael, 42.
27. The people of Lot. Birth of Ishak, 42.
28. Hospitality of Abraham, 43.
29. Abraham sacrifices his son, 46.
30. Abraham and Ishmael build the temple of Makkah.
31. Death of Sarah, 51.
32. Death of Abraham, 51.
33. On Abraham's words, "O Lord, let me see how thou awakest the dead," 53.
34. Story of Ishmael; his prophetic mission and his death, 54.
35. Story of Ishak, 54.
36. Story of Esau and Jacob, 55.
37. Story of Joseph, 56.
38. Zalykhá and Joseph, 59.
39. Joseph released from prison, 62.

40. Arrival of Joseph's brothers, 66.
  41. Job, 72.
  42. Sho'ayb, 74.
  43. Moses, 78.
  44. Birth of Moses, 79.
  45. Flight of Moses to Madyan, 83.
  46. Prophetic mission of Moses, 85.
  47. God speaks to Moses, 85.
  48. Moses goes to Egypt to Pharaoh, and with Aaron he conveys to him the message, fol. 89.
  49. Pharaoh is drowned and the Israelites leave Egypt, 95.
  50. Moses goes to speak with God and the Israelites worship the golden calf, 99.
  51. History of the cow and the carnage among the children of Israel, 106.
  52. Moses and Khidhr, 109.
  53. Moses and the Israelites leave Egypt; they come into the country of the giants, whom they fight at Jericho, in the Balqá and at Jerusalem, 112.
  54. Death of Moses and Aaron in the desert, 115.
  55. Joshua heads the Israelites and fights the giants, 116.
  91. The Table, 119.
  92. The town on the sea shore, 119.
  93. Christ's ascension to heaven, 120.
  94. Death of the Virgin Mary, and execution of John Baptist, 122.
  95. Kings of the Romans, from Christ to Mohammad, 122.
- Unfortunately the copy is defective and gone; the most important chapters are wanting, the lacuna is after chapter 55. I give here the heads of the wanting chapters according to the index of the book.
56. Qárún and Moses.
  57. The kings of the Israelites after Moses and the march of Manújehr.
  58. Kaykobád.
  59. The prophet Hizqyl.
  60. The prophet Elyás.
  61. Alyása' and the kings of the Israelites after him.
  62. Samuel.

63. Samuel and Tálút.
64. War of Tálút with Jálút (Goliath). David slays Jálút.
65. Tálút, his intention to kill David and how God leads him into his own snare.
66. David.
67. Solomon.
68. Solomon and Bilqys.
69. Solomon and the Devil ; his temptation ; an image is put on his throne (Korân 38, 33.)
70. Death of Solomon.
71. The Ant in the story of Solomon and David.
72. The Horses in the story of Solomon and David.
73. Rehoboam son of Solomon.
74. Kishen and Zarj, the king of India.
75. The prayer which was acceded to.
76. Kings of the Israelites.
77. King Lohrásp.
78. His son Gushtásp.
79. Kings of Yuman after Solomon.
80. Buhman and his son Dárá whom he begat by his daughter Homáy.
81. The elder Dárá.
82. His son the younger Dárá.
83. Dzú al-Karnayn (Alexander) and his reign.
84. Greek kings after Alexander ; the kings of the Satrapies.
85. Birth of Mary and how she was destined to serve God (Korân 3, 31.)
86. Birth of John Baptist.
87. Birth of Christ.
88. Flight of Mary and Christ.
89. Zacharias put to death ; prophetic mission of his son John.
90. Prophetic mission of Christ.

#### *History of Húd.*

From the time of Noah to the time of Abraham, which is a space of one thousand two hundred years, there was no prophet except Húd, whom God sent to the 'Ádites and Cálíh, whom he sent to the Thamú-

dites. 'Ád and Thamúd were not two kings but two tribes descended from Shem the son of Noah. The father of our tribe was 'Ád the son of Uz b. Arem b. Shem b. Noah. The father of the other tribes was Thamúd b. Gether b. Arem b. Shem b. Noah. 'Ád had many children who were collectively called 'Ád ('Ádites). Thamúd had also many children and they were called Thamúd (Thamúðites). In the Korân the people of 'Ád are called 'Ád and Iram (Aremites). It is said in the Korân (86, 3). "Dost thou not see how thy Lord acted with 'Ád and Iram." Sometimes they are called by this name and sometimes by the other. Tabary observes in this book that the commentator of the Korân and the learned said: the reason why it runs in the Korân "their brother and not his brother" is that under the name of Thamúd the tribe of Thamúd is to be understood "To Thamúd we sent their brother Cálih" and not "his brother."

The 'Ádites and Thamúðites lived in the steppes of the Hijáz between the territory of Makkah and Syria. The country of the 'Ádites was near to the country of Makkah, but the country of the Thamúðites was farther from Makkah (this is precisely the position which Ptolemy assigns to his Tamuditæ and Oaditæ. The 'Ádites seem to have been still existing in the second century after Christ. All Mohammadan authors besides Tabary and Ghazzály say that the 'Ádites lived in the uninhabitable desert of Ahqáf, the latter inhabited a district called Hijr, which is on the frontier of Syria on the extremity of the steppes of the Hijaz. "The inhabitants of Hijr have accused the prophets of falsehood." The inhabitants of Hijr in this passage are the Thamúðites. The 'Ádites and Thamúðites were the descendants of cousins and descended from Iram, but the 'Ádites flourished earlier and the Thamúðites by two hundred years later. The 'Ádites are also called the first 'Ádites and the Thamúðites are called the second 'Ádites. In the Korân whenever one of the two is mentioned the other is mentioned as well, and the name of the 'Ádites stands first, and that of the Thamúðites last: as (26, 123.) "The 'Ádites accused the prophets of falsehood," and subsequently (v. 141), the Thamúðites are mentioned again (41, 14). "As to the 'Ádites they were overbearing on earth," and after that (verse 16) "and as to the Thamúðites, &c." In another passage it is said the 'Ádites and the Thamúðites. The same is the case wherever they are mentioned.

The 'Adites were stronger in body and more powerful than the Thamú-dites. There was no nation on earth equal to the 'Adites in tallness or strength. Every man was twelve spans high and some of them were so strong that if they struck the foot on the dry ground they would sink into it to the knee. They built houses in their country which were in keeping with their strength and of almost everlasting construction up to this day : if you see a strange building it is called 'Adian "Iram dzát imád, &c." It is said in the Korân "Do you not know how God has acted with the 'Adites, who were the Lords of 'imád." 'Imád is a pillar and the meaning of the passage is that they were in stature like pillars ; every one of them was like several pillars in height and strength. In another passage they are compared with palm roots "they are like palm roots strewed about on the ground."

They were idolators : God sent Húd to them who was the son of their uncle ; his name in Hebrew is Gháther. In the Korân he is called their brother "their brother Húd." Brother has a double meaning, brother by relationship and brother in faith. Húd was their brother by relationship and not by religion. Húd called them to God saying : "O people, worship God, you have no God besides him." Proud of their strength they said to him "Who is stronger than we?" They were fifty thousand men strong, and then therefore they said "what tribe is more numerous than we?" "Do you not see that God who has created them is stronger than they are?" Húd was incensed and said "Do you build a landmark on every place to direct yourselves? And do you erect strong edifices hoping that you may continue to live for ever," "and if you are at feud you are at feud with giants ; you seize them without mercy and you do not let them loose before they are dead, fear God and obey him." After this Húd enumerated to them the bounty of God. "Fear that God who has given you what you know, who has given you cattle, children, gardens, and springs of water." Cattle are mentioned first in this passage, because the wealth of the sons of the desert consists in the sheep, cows, camels and the like. The reason why first their property is mentioned and then their children, is that children may be a misfortune, and a rich man can easily obtain children. In another passage it is said "wealth and children." Here again wealth is placed before children, because wealth is most esteemed with men. Húd preached fifty years but they answered him "it is of

no consequence for us whether you preach or not." "O Húd, thou asseratest that these our Gods are no Gods, but you do not prove it, and therefore we will not give up our Gods on thy telling us to do so, and we will not obey thee." "We are certain thou art mad, and these our Gods, whom thou dost not worship have made thee mad."

In short Húd preached to them fifty years and no body believed in him, and those who did believe in him held their faith secret, and did not show their faith openly. After a long time Húd despaired of success. God knew that no one believed, and decided on punishing them; their spring of water which we have mentioned, became dry, and all their cattle died; they had three years no rain; they suffered of draught. It was the habit in the whole of Shám to go to Mukkah and offer there sacrifices and invoke God, though the inhabitants of Shám were unbelievers. At that time not a trace of the Kábah was left, having been destroyed by the deluge, and it was not rebuilt before the time of Abraham. This prophet (who lived later than Húd) raised the temple again. Yet the unbelievers knew that the soil of Makkah was sacred heaven, and they had preserved tradition, from the time previous to the flood, that there had been the house of God. The sacred territory was therefore always esteemed, and every one who was in need was aware that none but the God of heaven could help him. If they wished that a sick person should recover, or if a prisoner was in the hands of the enemy, or if there was an oppressor with whom they could not cope, they went to the spot on which now Makkah stands, offered sacrifices and invoked God on the top of that hill. The cause of this was that God never left the world without evidence of his existence, nor was mankind ever in complete ignorance. It is true there was no prophet in those days who showed to mankind the road, but God made the sacred territory the proof of his existence, for as they were there assisted in their needs, and as they saw these miracles, they knew that there was a God besides those idols and that he does all these works. This was the proof of God for mankind which left no excuse for an infidel who might say I did not know better, or I have not heard the name of God, there was a proof of the existence of God and it was just that those who would not believe should be thrown into hell.

When the 'Ádites were in great distress they said: Let us send messengers and sacrifices into the sacred territory that they may pray



and that we may obtain rain. They sent a man of the name of Loqmán. He was the eldest, the most influential, and the strongest man among them, and was nearest to 'Ád in descent: he was Loqmán son of Loqaym and grandson of 'Ád, and was secretly united with the prophet Húd. They also sent another man of the name of Marthad b. Sa'd who professed the religion of Húd and who was equally one of their chiefs; there was another man with them of the name of Qayl, who was an unbeliever and an adversary of Húd, but he was the greatest chief of the three, they sent these three men with much cattle, sheep, cows and camels, and they gave them orders to sacrifice them at Makkah and to pray for rain from God. The distance to Makkah was three days' journey, Húd said to the 'Ádites: "O people, believe in me that God may give you rain if you want it. Pray God for pardon, then repent your sins and he will give you fair enjoyments, and he will increase your strength." But they shut their ears to the admonitions of Húd and dispatched these three men to the country of Makkah. They had relations at Makkah who lived on the hill. The tribe of Mo'awiyah b. Bokr received them as guests, and told them to enjoy three days their hospitality and then to attend to the object of their mission; they spread the tables, gave them wine to drink and amused them with the singing of slave girls. One whole month they spend in drinking and did not think of their tribe. After the lapse of this time their hosts became mindful that they had forgotten their tribe, and they were sorry first, for the 'Ádites were their relations, yet they were ashamed to turn them out of their houses and make them attend to their work. They therefore taught a song to the slave girls that they might call to their mind in music the drought of their country. As soon as the messengers had heard the singers mention their tribe their memory was awoke and they said we have committed a great error in forgetting our countrymen: they broke up in order to perform the sacrifices. Marthad and Loqmán who believed in Húd professed their faith and said to Qayl who was an unbeliever, if our tribe was to believe in Húd, it would rain by itself and there would be no need of these sacrifices. Qayl knew that they believed in Húd; he was not afraid of the destruction of the tribe, and left them and went on the top of the hill; the place for sacrificing was on the hill of Minà. He killed the sacrifices turned his face towards the heaven and said, O God of

heaven, thou knowest that I am come here in need ; my need is not sickness from which I wish to be relieved, nor captivity from which I want liberation, but I want rain for my tribe who are nearly perishing from thirst. He thus spoke and prayed until three clouds made their appearance in the air, one was white, one red, and one was black. A voice came from the wind: Choose which of the three clouds thou wantest, that it may go to thy tribe! He said to himself I know that this white cloud is dry and that it contains no rain ; I do not know what there is in the red cloud ; but in the black cloud is rain, for if a black cloud comes its rains. He therefore exclaimed I wish that the black cloud should go to my tribe. In this black cloud was the wind of destruction. God ordered the angels of destruction to bring the black cloud to the country of the 'Adites. Qayl descended from the hill and went to his two companions, and said a black cloud came with rain and I sent it to my tribe, saying this he sat down with them to drink ; the cloud went to the 'Adites and it was preceded by a wind. When the cloud came near they were delighted that wind, clouds, and rain were coming, "and when they saw it coming to their valleys they said this will bring rain." But Húd knew that it was the punishment ; for God had informed him thereof and he said, "On the contrary this is what you have brought untimely upon yourselves ; it contains wind by which a painful punishment will be inflicted upon you." When it was over their heads it stopped, and a sterile wind broke forth from it—"And in the 'Adites when we sent against them a sterile wind"—'Aqym (sterile) is that from which there flows no advantage. Wind may be very useful after this world, it brings water for trees and makes them fertile, it propels ships on the sea, it carries sweet odors, it cools water, but a wind which has none of these advantages is called 'Aqym (sterile). In another passage of the Korán the wind is called 'Áty (destructive)—"As to the 'Adites they were destroyed by a cold and destructive ('Áty) wind." All the quadrupeds which they had, were taken up from the ground by the wind and carried into the air, from whence they fell to the ground and were dashed to pieces. "Whatever it touched was reduced to rotten bane." When they saw this they said, have patience, for after the wind it will rain. They went out of their houses into the open field were they sank into the ground to their thighs and stood there with great courage. Húd thought they were

coming to him in order to express their wants, and that they would believe in God but they did not believe. The wind came and took every one of them up from the ground and carried him up into the air from whence he fell to the ground and died. They were strewed over the ground like trees, "as if they were palm trees thrown on the ground;" "they are like the roots of torn up palm trees," whoever fled was overtaken by the wind thrown to the ground and killed. The women had remained in their houses, they were equally raised from the ground and struck against the walls until they were dead. This wind lasted a whole week. "God caused the wind to assail them seven nights and days successively." Not a soul of them remained alive except Húd and those who believed in him: they suffered no harm from the wind. "When we sent the punishment we saved in our mercy Húd and those who believed, we saved them from the heavy punishment." The three men sent to Makkah were during all this time in that city feasting and remained ignorant of the fate of their tribe, until a man of another tribe who had passed the valley of the 'Adites and had seen them, arrived at Makkah and give intelligence that they had all perished except Húd and those who believed. The two believers rejoiced, but Qayl, who was an unbeliever, was sorry; he got up and ascended the hill of Minà; Loqmán and Marthad accompanied him, and said to him, believe in Húd, to avoid thy destruction. He answered, I have no object in life since my friends are dead, and raising his head he exclaimed: O God of heaven, if it is true that my tribe is destroyed, destroy me as well. A wind came which took him up from the top of the mountain, threw him on the ground, and killed him. The two men who believed in Húd heard a voice which proceeded from the hill: "Whatever each of you wisheth ye shall have." Marthad b. Sa'd said, I wish that I should have a sufficient quantity of wheat to be able to afford to eat wheaten bread all my life. He obtained it; he descended from the hill and went to Makkah where he remained till he died. Loqmán said, I wish to have a long life. He heard a voice, saying: However long thou mayest live thou must die in the end. He answered, grant it! The voice said thou shalt have the life of seven vultures! He also settled at Makkah. He used to visit the top of a hill where the vultures laid their eggs and watch the chickens. When they came from the egg he took them away and took care of them.

Thus he kept seven vultures in succession, the last was called Lobad. Loqmán and Lobád died at the same time. Tabary observes that a vulture lives eighty years; but according to other accounts, they live longer. Húd remained with his follower in the country of 'Ad and lived fifty years after the 'Adites and died at an age of 150 years. There was no prophet for one hundred years after Húd until the time of Cálìh and of the Thamúdités. There were only kings, and every one had a different religion, one was an idolater, another was a fire-worshipper, &c. This continued to the time of Cálìh.

*Ghazzúly.*

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|------------------------------------------------------------------|----|
| القول في المعنى الذي خاق الله الخلق من اجله *                    | ١  |
| حديث عبد الله بن عباس عن النبي عليه السلام في صفة الشمس والقمر * | ٢  |
| القول في مقدار مدة الدنيا *                                      | ٣  |
| القول في صفة الخلق وفي كم كان ذلك *                              | ٤  |
| ذكر اول من اسكنه من البشر *                                      | ٥  |
| ذكر سجود الملائكة لآدم عليه السلام *                             | ٦  |
| ذكر مخدعة ابليس لآدم وحواء *                                     | ٧  |
| ذكر هبوط آدم من الخيطة *                                         | ٨  |
| ذكر حج آدم عليه السلام *                                         | ٩  |
| حديث قتل قابيل لهابيل *                                          | ١٠ |
| القول في اخراج الذرية من صلب آدم *                               | ١١ |
| نبوت آدم و ابنه شيث *                                            | ١٢ |
| سؤال ابو ذر غفاري وفات آدم *                                     | ١٣ |
| ذكر شيث بن آدم و اولاده من بعده ومن ملك *                        | ١٤ |
| ذكر اول من عبد النار و اتخذ المعارف *                            | ١٥ |
| قصة ادريس عليه السلام *                                          | ١٦ |
| قصة نوح عليه السلام *                                            | ١٧ |

- ١٨ قصة زمرود بن كنعان \*
- ١٩ قصة هود عليه السلام \*
- ٢٠ قصة ثمود و صالح النبي عليه السلام \*
- ٢١ قصة ابراهيم الخليل عليه السلام \*
- ٢٢ ذكر هجرة ابراهيم عليه السلام \*
- ٢٣ ذكر هالك الذمرون عليه اللعنة \*
- ٢٤ مولد اسمعيل عليه السلام \*
- ٢٥ اسكان ابراهيم لاسماعيل عليه السلام \*
- ٢٦ زيارة ابراهيم لاسماعيل عليه السلام \*
- ٢٧ ذكر قوم لوط و مولد اسحق عليه السلام \*
- ٢٨ حديث صديق ابراهيم عليه السلام \*
- ٢٩ قصة ذبح ابراهيم ولدته عليهما السلام \*
- ٣٠ بقاء ابراهيم و اسمعيل البيت عليهما السلام \*
- ٣١ وفاة سارة رضي الله عنها \*
- ٣٢ وفاة ابراهيم عليه السلام \*
- ٣٣ قوله رب انني كيف تحيي الموتى \*
- ٣٤ قصة اسمعيل و نبوته و وفاته \*
- ٣٥ قصة اسحق عليه السلام \*
- ٣٦ قصة عيص و يعقوب \*
- ٣٧ قصة يوسف عليه السلام \*
- ٣٨ قصة زليخا و يوسف \*
- ٣٩ خروج يوسف عليه السلام من السجن \*
- ٤٠ درود اخوات يوسف عليه السلام \*
- ٤١ قصة ايوب عليه السلام \*

- ١٤٢ قصة شعيب \*
- ١٤٣ قصة موسى \*
- ١٤٤ مولد موسى \*
- ١٤٥ هجرة موسى الى مدين \*
- ١٤٦ نبوت موسى \*
- ١٤٧ قصة موسى حين كلمه الله تعالى \*
- ١٤٨ مسير موسى الى مصر الى فرعون و اداء الرسالة مع هارون \*
- ١٤٩ غرقه شذن فرعون و رفقن بني اسرائيل با موسى از مصر \*
- ٥٠ زهاب موسى الى المناجات و اتخان قومه العجل \*
- ٥١ قصة البقرة و انقل الذي و جد في بني اسرائيل \*
- ٥٢ قصة موسى و خضر \*
- ٥٣ خروج موسى من مصر مع بني اسرائيل الى ارض الجياورة و قتالهم  
بارثخا و بلقا و ايليا من الشام \*
- ٥٤ وفاة موسى و هارون في التيه \*
- ٥٥ خروج يوشع مع بني اسرائيل و محاربة الجياورة \*
- ٥٦ حديث الهائدة \*
- ٥٧ حديث القرية التي كانت حاضرة البحر \*
- ٥٨ رفع عيسى الى السماء \*
- ٥٩ وفاة مريم و مقتل يحيى بن زكريا \*
- ٦٠ قصة ملوك الروم من بعد عيسى الى وقت ظهور محمد النبي عم \*
- ٦١ حديث قارون و موسى \*
- ٦٢ خبر ملوك بني اسرائيل من بعد موسى و خروج منو جهر الملك \*
- ٦٣ خبر كيقباد الملك \*
- ٦٤ حديث حزقيال النبي \*

- ٦٥ حديث الياس النبي \*
- ٦٦ حديث اليسع والملوك الذين كانوا من بعده في بني اسرائيل \*
- ٦٧ حديث اشموئيل النبي \*
- ٦٨ حديث اشموئيل و طالوت \*
- ٦٩ حديث حرب طالوت مع جالوت و قتل داؤد جالوت \*
- ٧٠ حديث طالوت و ما همَّ به من قتل داؤد و كفاه الله شره \*
- ٧١ حديث داؤد \*
- ٧٢ حديث سليمان بن داؤد \*
- ٧٣ حديث سليمان النبي مع بلقيس \*
- ٧٤ حديث سليمان مع الشيطان الذي فتن به والقي على كوسية \*
- ٧٥ وفات سليمان \*
- ٧٦ حديث النمل من اخبار سليمان بن داؤد \*
- ٧٧ حديث النخيل من اخبار سليمان بن داؤد \*
- ٧٨ حديث رخبم بن سليمان بن داؤد \*
- ٧٩ حديث كيشان و زرج ملك الهند \*
- ٨٠ ذكر دعای مستجاب \*
- ٨١ خبر الملوك الذين ملكوا على بني اسرائيل \*
- ٨٢ ذكر بهراسب الملك \*
- ٨٣ ذكر كشقابت بن بهراسب \*
- ٨٤ حديث ملوك الحق من بعد سليمان بن داؤد \*
- ٨٥ حديث بهمن وابنه دارا من ابنته همامي \*
- ٨٦ حديث دارا الاكبر و ملكه \*
- ٨٧ حديث داراء الاصغر بن داراء الاكبر \*
- ٨٨ حديث ذوالقرنين و ملكه \*

- ۸۹ حدیث الملوك الیونانیین من بعد ذوالقرنین و اخبار ملوك الطوائف \*
- ۹۰ مولد مریم و تحریرها \*
- ۹۱ حدیث مولد یحیی بن زکریا \*
- ۹۲ حدیث مولد عیسی \*
- ۹۳ حدیث هجره مریم و عیسی \*
- ۹۴ حدیث مقتل زکریا و نبوة ابذه یحیی \*
- ۹۵ حدیث نبوة عیسی \*

The following extracts will enable the reader to compare the ancient text of Tabary as preserved by Ghazzály, with the modern text, as found in our copies of Tabary. I still hope that a copy of the original will be discovered in India or in Persia.

*Text according to our copies of  
Tabary.*

و درین ایام پیدامبر نبود اندر جهان  
مگر هود پیدغامبر و صالح پیدغامبر که  
هود را علیه السلام بسوی قوم عاد  
فرستاد خدای تعالی و صالح علیه السلام  
را بسوی قوم ثمود و ابن عاد و ثمود  
به ملک بودند لیکن دو قبیله اند از  
فرزندان سام بن نوح علیه السلام یک  
قبیله را نام پدر عاد بن عوض بن سام  
بن نوح علیه السلام و این هر دو را  
فرزندان بسیار بودند و هر قبیله را بنام  
پدر خواندندی چنانکه بنی تمیم  
و بنی اسد پس خدای تعالی آن همه

*Text according to Ghazzály.*

و از وقت نوح تا بوقت ابراهیم بدین  
هزار و دو بست سال در پیدغامبری  
نبود مگر هود کی او را سوی قوم عاد  
فرستاد ایزد تعالی و صالح را سوی  
قوم ثمود فرستاد و عاد و ثمود ملک  
نبودند ولیکن دو قبیله بودند از فرزندان  
سام بن نوح و یکی قبیله را پدر عاد  
بن عوض بن ارم بن سام بن نوح بود  
و یکی قبیله را پدر ثمود بن حابر بن  
ارم بن سام بن نوح بود پس عاد را  
فرزندان آمدند بسیار همه قبیله را عاد  
خواندندی و ثمود را فرزندان آمدند



*Text of Tabary.*

قوم را بعد خواند و گفت وَالِیَّ عَادٌ  
 أَخَاهُمْ هُوْدًا أَخَاهُمْ كُفْتٌ وَ نَهْ كُفْتٌ  
 اخاه از آنکه يك تن را نخواست و همه  
 قبيله را خواست چون ایشان را پدر  
 عاد بود خدای تعالی ایشانرا هم بعد  
 خواند و هم یارم و ایدون گفت الْمَمَّ تَوَّ  
 كَيْفَ فَعَلَ رَبُّكَ بِعَادِ اِرْمَ و هردو پدر  
 ایشان بودند و همچنین ثمود را نام  
 برد و قوم ثمود را خواست چنانکه  
 گفت وَالِیَّ ثَمُوْدٌ أَخَاهُمْ صَالِحًا عَادٌ و  
 ثمود هردو گروه بیکجای نزدیک بودند  
 ببادیه حجاز میان زمین مکه و شام  
 زمین عاد بمکه نزدیک بود و زمین  
 ثمود زمینی بود نام او حجر و آن بطرف  
 شام بود بکنار بادیه حجاز چنانکه  
 خدای تعالی گفت وَلَقَدْ كَذَّبَ اَصْحَابُ  
 الْحِجْرِ الْمُرْسَلِیْنَ و اصحاب حجر قوم  
 ثمود بودند و قوم ثمود و قوم عاد هردو  
 گروه عم زادگان بودند و ثمود از فرزندان  
 ارم بن سام بن نوح بودند علیه السلام  
 لیکن قوم عاد بیشتر بودند و قوم ثمود  
 کمتر و میان ایشان دویست سال بود  
 و عاد را عاد اول خوانند و ثمود را ثمود

*Text of Ghazzály.*

بسیار همه قبيله را ثمود خواندندی  
 و خدای تعالی قوم عاد را بعد باز خواند  
 و هم یارم و گفت قَوْلُهُ تَعَالَى اَلَمْ تَرَ كَيْفَ  
 فَعَلْنَا بِرَبِّكَ بِعَادٍ اِرْمًا كَهَيِّ بَدِیْنِ بَاز  
 خواند و گهی بدان و محمد جریر گوید  
 بدین کتاب اندر کبی مفسدان و علما  
 گفته اند تابدانی کی چرا گفت اخاهم  
 و نگفت اخاه و هم چنین نیز ثمود را  
 نام برد و قرم ثمود را خواست قَوْلُهُ تَعَالَى  
 وَالِیَّ ثَمُوْدٍ اَخَاهُمْ صَالِحًا و نگفت اخاه  
 عاد و ثمود هردو گروه ببادیه حجاز  
 بودند میان زمین مکه و زمین شام  
 و زمین عاد بمکه نزدیک بود و زمین  
 مکه از ثمود دورتر بود و بزیمینی بود  
 نام او حجر و بطرف شام بود بکناره  
 بادیه حجاز قَوْلُهُ تَعَالَى وَلَقَدْ كَذَّبَ  
 اَصْحَابُ الْحِجْرِ الْمُرْسَلِیْنَ و اصحاب  
 الحجر قوم ثمود بودند و ثمود و عاد  
 هردو گروه عم زادگان بودند و از فرزندان  
 ارم بودند ولیکن قوم عاد پیشین بودند  
 و قوم ثمود بسین و میان ایشان دویست  
 سال بود و عاد را عاد اول خوانند و ثمود را  
 عاد الثانی خوانند و در قرآن هر جا کی

*Text of Tabary.*

ثانی و چون بقران اندر نگری هر کجا  
 حدیث ایشان یاد کرد نخست عاد را  
 یاد کرد پس ثمود را و آیدون گفت  
 كَذَّبَتْ عَادَ الْمُرْسَلِينَ وآنکه گفت ثمود  
 و دیگر جای گفت فَأَمَّا عَادُ فَاسْتَكْبَرُوا  
 فِي الْأَرْضِ و عاد از ثمود قوی تر بودند  
 بخلق و نیرو و بجهان اندر خلق نبود  
 بدالا و نیرو و قوم عاد و هر دو مردی  
 را دوازده ارش بالا بود و چندانی  
 نیرو بود که پای بر زمین برزندی  
 تا زانو بر قوی و بدان زمین اندر بناها  
 کردند چنانکه جا و دانگی باشد و تا  
 امروز هر جا که بنای بزرگ است  
 و قوی است انرا بنای عاد میخوانند  
 و هر مردی که بزرگ و قوی بود انرا  
 عاد میگویند چنانکه گفت جَلَّ و علا  
 أَلَمْ تَرَ كَيْفَ رَبَّكَ بَعَادَ إِرْمَ و معنی  
 أَلَمْ تَرَ بَسْمَعِ باشد بقول مفسران گفت  
 نشنیدی یا محمد که خدای تعالی  
 بقبیله ارم ذات العمد چه کرد خداوند  
 ستون بودند و ستون از بالا های و راز  
 ایشان خواست گفتا هر یکی ستونی  
 بودند از بالا و قوت و جای دیگر ایشانرا

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حدیث ایشان آمده است هر دورا بایک  
 دیگر یاد کنند نخست عاد را پس ثمود را  
 قوله تعالی كَذَّبَتْ عَادَ الْمُرْسَلِينَ و نگاه  
 گفت ثمود قوله تعالی فَأَمَّا عَادُ فَاسْتَكْبَرُوا  
 فِي الْأَرْضِ پس گفت و اما ثمود و گفت  
 و عاد را و ثمودا و هر کجا ایشانرا یاد  
 کرده است و عاد از ثمود قوی تر بود  
 بخلق و بنیر و تر و بجهان خلقی نبود  
 ببلا و نیروی قوم عاد و بالای هر مردی  
 دوازده ارش بود چندان نیرو داشتی  
 کی پای بر زمین خشک زدی تا زانو  
 بر زمین فرو بردی و بدان زمین خویش  
 اندر خانها کردند اندر خوردشان چنانکه  
 جاویدان باشد از قوت بنیاد و امروز  
 هر کجا بنیادی استوار تر بینی انرا  
 عادی خوانند قوله تعالی إِرْمَ ذَاتِ  
 الْعِمَادِ الَّتِي لَمْ يُخْلَقْ مِنْهَا فِي الْبِلَادِ  
 گفت نشنیدی کی خدای عزوجل چگونه  
 کرد بقبیله عاد خداوندان عمد و عمد  
 ستون بود یعنی کی بالای ایشان  
 بستون می ماند و هر یکی چند ستون  
 بودند از بالا و قوت و جای دیگر  
 ایشانرا بخر ما نیان مانند کردند

*Text of Tabary.*

به خرمانیان نسبت کرد و آیدون گفت  
 كَانَهُمْ اَعْجَازُ نَخْلٍ خَاوِيَةٌ پس بهدرازی  
 وقوت ایشانرا به خرمانیان و ستونها  
 مانند کرد و از ذات العماد قبیله را  
 خواست پس گفت اَللّٰهُ لَمْ يَخْلُقْ  
 مِثْلَهَا فِي الْاِبْلَادِ هم قبیله را خواست  
 که چون ایشان خلق نبود بر زمین  
 و ایشان بت پرست بودند و بتان  
 داشتند بسیار و خدای تعالی هود  
 علیه السلام را بایشان فرستاد پیامبری  
 و هود علیه السلام پسر عم ایشان بود  
 و از فرزندان نوح علیه السلام و هود  
 بزبان نازی است و بعبروانی عابر بود  
 بن صالح بن ار قحشد بن سام نوح  
 علیه السلام و خدای تعالی ایشانرا  
 برادر هود خواند و آیدون گفت اَخَاهُمْ  
 هُوْدًا و برادران از دو گونه بودند یکی  
 بقرابت برادر در دین و هود علیه السلام  
 ایشانرا بخدای خواند و گفت يَا قَوْمِ  
 اَعْبُدُوا اللّٰهَ مَا لَكُمْ مِنْ اِلٰهٍ غَيْرِهٖ  
 خدایا پرستید و بت مپرستید که  
 شما را جز حق سبحانه تعالی خدای  
 نیست و اگر نه پرستید شما را عقوبت

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گفت كَانَهُمْ اَعْجَازُ نَخْلٍ خَاوِيَةٍ و بت  
 پرست بودند خدای تعالی هود را  
 بایشان فرستاد و هود پسر عم ایشان  
 بود و بعبروانی نام او غابر بود و در  
 قران برادرشان گفت اَخَاهُمْ هُوْدًا و  
 برادر دو کس را گویند برادر بقرابت  
 و دیگر برادر در دین و هود بقرابت  
 برادر بودند بدین و هود ایشان را دعوت  
 کرد و بخدای خواند و گفت قَوْلَهُ تَعَالٰى  
 يَا قَوْمِ اَعْبُدُوا اللّٰهَ مَا لَكُمْ مِنْ اِلٰهٍ غَيْرِهٖ  
 گفت خدای عز و جل را بپرستید کی  
 شما را جز او خدای دیگر نیست و الا  
 شما را عذاب کند ایشان بدان زور و نیروی  
 خویش فریفته شدند و گفتند مِنْ  
 اَشَدِّ مِمَّا قُوَّةً از ما قوی تر کیست کی ما را  
 عذاب تواند کرد و پنجاه هزار مرد  
 بودند گفتند و از ما بیشتر کیست  
 بشمار قَوْلَهُ تَعَالٰى اَوِ الَمْ يَرَوْا اَنَّ اللّٰهَ  
 الَّذِي خَلَقَهُمْ هُوَ اَشَدُّ مِنْهُمْ قُوَّةً يَعْنٰى  
 ندانست کی آن خدای کی مرا ایشانرا  
 آفرید قوی تر است پس هود ایشانرا  
 عذاب کرد و گفت اَنْبِذُوْنَ بِكُلِّ رِيْحٍ اَيَّةٌ  
 تُعْبِدُوْنَ وَ تَلْحِذُوْنَ مَصَانِعَ لَعَلَّكُمْ

*Text of Tabary.*

کند ایشان بقوت تن فریفته شدند و گفتند مَنْ أَشَدَّ مِنْنَا قُوَّةً از ما قوی تر نیست که ما را عذاب کند و عدد ایشان بیش از پنجاه هزار مرد بود و گفتند کیست از ما قوی تر و بیشتر که ما را عذاب کند خدای تعالی گفت  
 اَوَلَمْ يَرَوْا أَنَّ اللَّهَ الَّذِي خَلَقَهُمْ هُوَ أَشَدُّ مِنْهُمْ قُوَّةً معنی اولم یروا اینجا اولم یعلوم است گفت ندانستید که آن خدای که ایشانرا بیافرید از ایشان قوی تر است پس هود علیه السلام ایشانرا عذاب کرد ایستاد گفت اَتَبَدُّونَ بِكُلِّ رِيحٍ آيَةٌ تَعْبُدُونَ گفت بهر جا بنا همی کنید و تَخَذُونَ مَصَانِعَ لَعَلَّكُمْ تَخْلُدُونَ و کوشکها بنا همی کنید و بمحکمی و استواری چنانکه درین جهان جاودان مانید و اِذَا بَطَشْتُمْ بَطَشْتُمْ جَبَّارِينَ چون کسی را خشم گیرید چون جباران و خشم گرفتن جباران آن بود که نه رحمت بود و نه بخشایش و دست از او باز ندارند تا او را هلاک نکنند فَاتَّقُوا اللَّهَ وَاطِيعُونَ از خدای بترسید و مرا فرمان کنید پس نعمتهای

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تَخْلُدُونَ گفت بهر جای چیزی همی بنا کنید چنانکه بازی کنید و کوشکها همی بنا کنید محکم و استوار چون کسی کی او بدین جهان جاودان خواهد ماند و اِذَا بَطَشْتُمْ بَطَشْتُمْ جَبَّارِينَ و چون کسی را بخشم بگیرید گرفتن جباران گیرید بی رحمتی و بی بخشایشی و دست از او باز ندارید تا او را هلاک نکنید فَاتَّقُوا اللَّهَ وَاطِيعُونَ از خدای عزوجل بترسید و مرا فرمان کنید پس نعمتهای خدای بزیشان می شمرد  
 قوله تعالی وَاتَّقُوا الَّذِي أَمَدَّكُمْ بِمَا تَعْلَمُونَ أَمَدَّكُمْ بِأَنْعَامٍ وَبَنِينَ وَجَنَاتٍ وَعَيْونَ إِنِّي أَخَافُ عَلَيْكُمْ عَذَابَ يَوْمٍ عَظِيمٍ گفت بپرهیزید از آن خدای بزرگ کی شما را ازین جهان آن داد کی شما دانید چهار پایان و فرزندان داد و باغهای و چشمای آب و بهر آن چهار پایان یاد گرد کی مردمان بیابانی را نعمت گوسپند و گاو و شتر و مانند این بود و نکته آنکه نخست مال را یاد کرد پس فرزندان آنست کی فرزند و بالست و بمال فرزندان

*Text of Tabary.*

خدای تعالی بر ایشان یاد کرد گفت  
 وَالَّذِي الَّذِي آمَدَكُمْ بِمَا تَعْمَلُونَ آمَدَكُمْ  
 بِأَنْعَامٍ بَدِيئَةٍ وَجَدَّاتٍ وَعَيْونِ أَنِّي  
 أَخَافُ عَلَيْكُمْ عَذَابِ يَوْمٍ عَظِيمٍ گفتا  
 بترسید از ان خدای که شما را ان داد  
 برین جهان از چهار پایان و فرزندان  
 و بوستانها و چشمهای آب و از بهران  
 چهار پایانرا یاد کرد خواسته ایشان  
 دریدبان چهار پای بود از گاو گوسفند  
 و اشتر و این برایشان گرامی بود  
 و حکمت اندرین آنست که نخستین  
 چهار پای را یاد کرد و باز خواسته که  
 بر مردم درسبز از فرزندان بینی که مردم  
 نخست کسب خواسته آرزو کند پس  
 فرزندان پس هود علیه السلام ایشانرا  
 پنجاه سال بخدای تعالی همی خواند  
 و موعظه کرد و پند داد شان ایشان  
 جواب دادند و گفتند سَوَاءٌ عَلَيْنَا أَوْ  
 عَطَتْ أَمَّ لَمْ تَكُنْ مِنَ الْوَاعِظِينَ  
 گفتند خواهی پند بدی و خواهی  
 مده و ما بتو نخواهم گردویدن  
 چنانکه خدا تعالی گفت حَكَايَةٌ قَالُوا  
 يَا هُوْدُ مَا جِئْتَنَا بِبَيِّنَةٍ وَمَا نَحْنُ

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توان داشتن و گفتست الْمَالِ وَالْبَنُونَ  
 مال را پیش از فرزند یاد کرد از آنکه  
 مال بر خلق گرامی بود هود ایشانرا  
 پنجاه سال همی بخدای عزوجل می  
 خواند و پند می داد و برا جواب دادند  
 سَوَاءٌ عَلَيْنَا أَوْ عَطَتْ أَمَّ لَمْ تَكُنْ مِنَ الْوَا  
 عِظِينَ گفتند خواهی پند ده و خواهی مده  
 همه یکیست کی بتو نخواهیم گردویدن  
 قوله تعالی قَالُوا يَا هُوْدُ مَا جِئْتَنَا بِبَيِّنَةٍ  
 وَمَا نَحْنُ بِتَارِكِي آلِهَتِنَا عَنْ قَوْلِكَ وَ  
 مَا نَحْنُ لَكَ بِمُؤْمِنِينَ گفتند ما را  
 همی گوئی کی این خدایان ما نه  
 خدایان اند و بدین حجت و درستی  
 نیاوردی و ما بگفتار تو این خدایانرا  
 دست باز نخواهیم داشتن و بتو نخواهیم  
 گردویدن اِنْ نَقُولُ اِلَّا اِعْتِرَافٌ بَعْضُ  
 آلِهَتِنَا بِسُوءِ مَا چندان دانیم کی تو  
 دیوانه شده و این خدایان ما کی تو  
 ایشان را نمی پرستی ترا دیوانه کرده  
 اند بس هود پنجاه سال ایشانرا  
 می خواند و کس بوی نگرودند  
 و آنکه بگرود دین خویش پنهان  
 می داشت و آشکارا نیارست کردن

*Text of Tabary.*

بِقَارِكِي آلِهَتِنَا وَمَا نَحْنُ لَكَ بِمُؤْمِنِينَ  
گفتند یا هود ما را میگوئی که این  
خدایان ما نه خدایند و بدین حجتی  
درستی نیاروی و ما به گفتار تو  
نخواهیم ازین خدایان دست باز  
داشتن و به تو گرویدن چنانکه خدای  
تعالی گفت انْ نَقُولُ اِلَّا عَذْرَاكَ بَعْضُ  
آلِهَتِنَا بِسُوءِ اَيْدُونِ گویم که تو دیوانه  
شدی و این خدایان ما ترا دیوانه  
کردند پس پنجاه سال ایشانرا بخدای  
تعالی خواند هیچ نگر ویدند و آنچه  
بگرویدند دین خویش پنهان می  
داشتند پس چون روزگار بسیار برآمد  
و هود علیه السلام نومید شد از ایشان  
خدای تعالی خواست که ایشانرا  
عذاب کند آن چشمهای آب همه  
خشک شد و چهار پایان همه بمردند  
و سه سال باران نیامد و قحط برایشان  
افتاد و آن مردمان که بزمین شام و  
حجاز بودند هرگاه که باران باز ایستادی  
به زمین مکه آمدندی و انجا قربان  
کردندی و خدای تعالی را خواندندی  
هرچند که کافران بودند و خانه را اثر

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چون روزگاری بسیار برآمد و هود  
از ایشان نومید شد و خدای تعالی  
دانست کمی کس از ایشان نگرود  
و خواست که ایشانرا عذاب کند ان  
چشمهای ایشان خشک شد و چهار  
پایان شان همه بمردند و سه سال شان  
از آسمان باران نیامد و قحط برایشان  
افتاد و هرکجا از زمین شام کی چون  
باران شان نیامدی سوی مکه آمدندی  
و انجا قربان کردندی و خدای  
عزوجل را خواندندی هرچند کافر  
بودندی و خانه را اثر بدید نبود کی  
خانه از وقت طوفان نوح ناپدید بود  
تا وقت ابراهیم علیه السلام کی ابراهیم  
آن برورد ولیکن کافر آن همه می  
دانستند کی این زمین مکه زمین  
حرم است و شنیده بودند کی ایذا  
خانه خدای آسمان است پیش  
از طوفان نوح اندران حرم را بزرگ  
داشتندی و هرکجا حاجتی بودی  
دانستی کی این حاجت جز خدای آسمان  
روا نتواند کردن و چون بیمار را  
عافیت خواستندی و چون کسی را

*Text of Tabary.*

پدید نبود و از وقت طوفان تا زمان  
 ابراهیم علیه السلام ناپدید بود پس  
 این کافران همی دانستند که این  
 زمین مکه زمین حرم است و شنیده  
 بودند که آنجا خانه بود پیش از  
 طوفان و آن حرم را بزرگ داشتندی  
 و جایگاه حرم تا نگاه بالای او بود چون  
 کوه پاره بر دیگر جایها بلند و برج  
 و هر کرا حاجتی بودی که دانستی  
 که آن حاجت را جز خدای تعالی  
 روا نکند چون باران و فرزندان و از  
 دشمن فرج و از دوست راحت  
 بر سر آن کوه خدای را بخواندندی  
 پس خدای تعالی حاجت‌های شان روا  
 کردی و علما و متکلمان ایدون گویند  
 که این از بهر آن بود که خدای تعالی  
 هرگز زمین بی حجت ندارد و خلق را  
 بغفلت اندر نه پسندید و بزمانه پیشین  
 از هود علیه السلام پیامبری نبود  
 که خلق را بخدای خواندی از حرم  
 راحت خویش کرد به زمین تا چون  
 این حاجت‌ها شان همه روا شدی  
 و علامتها پدید آمدی بدانستندی

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اسیری بدست دشمن بودی و چون  
 ستمگار بودی کی با او خصم او بر  
 نیامدی بزمین مکه آمدندی و قربان  
 کردندی و بر سر آن کوه خدای عزوجل  
 را بخواندندی و این از بهر آن بود  
 کی خدای تعالی زمین را بی حجت  
 ندارد و خلق را در غفلت نگذارد  
 و دران زمانه پیامبر نبود کی خلق  
 را راه نمودی حرم را حجت خویش  
 کرد بزمین تا چون این حاجت‌ها شان  
 روان شدی و این علامتها بدیدندی  
 بدانستندی کی ایشانرا خدای هست  
 نه این بتان کی این گارها او همی کند  
 آن حجت خدای عزوجل بود بر خلق  
 تا هر يك بخدا عزوجل نگررد او را  
 حجت نبود و نتواند گفتن کی من  
 نشناختم و ندانستم و نام خدای  
 تعالی نشنیدم بل کی حجت خدای  
 عزوجل را بود تا چون او را نپرستند  
 ایشانرا بدوزخ کند بحجت پس چون  
 کار بر قوم عاد سخت شد گفتند ما رسول  
 فرستیم بحرم و قربان فرستیم تا دعا  
 کند و ما را باران آید از آسمان یکی را

*Text of Tabary.*

که ایشانرا آفرید کاری هست و این بدان چیزی نیست و چیزی نتوانند کرد و این حاجتها خدای تعالی روا کند نه بدان آن حجت خدای بود بر ایشان تا هرکه بر خدای عزوجل نگرید او را حجت نبود و نتواند گفتن که من نشناختم خدا را ندانستم چه حجت بر ایشان بود و اگر خدای را نه پرستند و بدوزخ بردشان پس گفت چون کار سخت شد بر قوم عاد و صلیت ندانستند گفتند یا رسول فرستیم تا دعا و قربان کند تا باران آید از آسمان و سه کس را اختیار کردند از مهتران یکی را نام لقمان بن هذیل و او از مهتران بود و به نسب بعد نزدیکتر بود و با هود علیه السلام گرویده بود و از مردمان پنهان همی داشتی و آن دیگر مردی بود نامش مرثد بن سعد او نیز بر دین هود علیه السلام بود و بوی آشکارا گرویده بود و هم از مهتران ایشان بود و سویم را نام قیل بن عمر و بن مرثد آنکه پادشاه بود و کافر بود و با هود

*Text of Ghazzaly.*

فرستادند نام اول لقمان و از ایشان بدلا و بسال مهتر بود و بقوت و بعد بنسب نزدیکتر بود و لقمان بن لقیم بن عاد بزرگ بود و در نهان با هود پیغامبری یکی بود و مردی دیگر نام او مرثد بود بن سعد و بر دین هود بود و بدو گرویده بود آشکارا و هم مهتر ایشان بود و هم دیگر مردی بود نام او قیل و کافر بود و با هود بتعصب بود و مهتر ایشان هر سه بود بس هر سه تن را بفرستادند با چهار پایان بسیار از گوسپندان و گاو و شتر و گفتند این چهار پایان را بمکه قربان کنید و از خدای تعالی ما را باران خواهند و میان ایشان و میان زمین مکه سه روزه راه بود هود علیه السلام ایشانرا گفت ای قوم بمن بگروید تا خدای تعالی ما را باران دهد اگر باران خواهید قوله تعالی اسْتَغْفِرُوا رَبَّكُمْ ثُمَّ تُوبُوا إِلَيْهِ يُمَدِّعْكُمْ مَتَاعًا حَسَنًا وَيُزِدْكُمْ قُوَّةً إِلَهِي قُولْنِمْ بس سخن هود نشیدند و آن سگانه را بفرستادند تا بزمین مکه آمدند و ایشانرا بمکه خویشاوندان



*Text of Tabary.*

عليه السلام بتعصب بود و مهتر  
ایشان بودم سه تن را بفرستادند با  
چهار پایان بسیار از گاو و گوسفند  
و اشتر و ایشانرا گفتند بشوید بمکه  
و این قربانها را آنجا بکشید و از خدای  
آسمان ما را باران خواهید میان  
ایشان و مکه سه روزه راه بود و هود  
عليه السلام ایشانرا گفت یا قوم بمن  
بگروید تا خدای تعالی شمارا باران  
دهد چنانکه گفت اَسْتَغْفِرُ وَارَبِّكُمْ ثُمَّ  
نَبَّأُوا إِلَيْهِ يَرْسِلُ السَّمَاءَ عَلَيْكُمْ مِدْرَارًا  
وَيَزِدُّكُمْ قُوَّةً إِلَى قُوَّتِكُمْ ایشان سخن  
هود عليه السلام نشنیدند و این سه تن  
را فرستادند و چون بیامدند به زمین  
مکه ایشان را خویشان بودند هم از  
قبیله عاد ازان گروه یکی معاویه  
بن بکر بود ایشانرا فرود آوردند و مهمان  
داشتند و دانستند که ایشان عاد اند  
بیاران خواستن آمده اند گفتند  
سه روز مهمان باشید و آنکه بکار  
خویش مشغول شوید گرامی کردند  
ایشانرا و نبیند آوردند و کنیزگان  
مغذیه و ایشان به بینند و مهمانی

*Text of Ghazzúly.*

بودند از کوه معویه بن بکر ایشانرا  
مهمان داری کردند و گفتند کی سه روز  
بر ما مهمان باشید و نگاه بکار ما مشغول  
شوید و خوانها شان نهادند نبیند شان  
دادند و کنیزگان مطرب آوردند و بمی  
خوردن مشغول شدند يك ماه و از  
قوم خویشتن شان یاد نیامد بعد از  
یکماه این مهمان داران دانستند کی  
اینان بلهوه نبیند قوم خویش را  
فراموش کرده اند و غم همی خوردند  
کی آن قوم عاد هم خویشان ایشان  
بودند و شرم داشتند کی ایشانرا از  
خانه خویش بیرون کنند و باز گار  
فرستند آن کنیزگان مطرب را شعر  
آموختند تا آنرا بلحن و سرود پیش  
ایشان بگفتند دران یاد قوم و آنچه  
برایشان می رود از تشنگی چون آن  
قوم از مطربان حدیث قوم خویش  
شنیدند از قوم خویش یاد آمد و گفتند  
کی ما خطا کردیم کی قوم خویش را  
فراموش کردیم برخاستند کی قربانها  
بدرند این مرثد و لقمان کی بهود  
گرویده بودند دین خویش را پیدا کردند

*Text of Tabary.*

خوردن مشغول شدند یکماه آنجا  
 بهاندند و امروز بعرب اندر مثل زندی  
 هر جا که رسولی فرستند بکاری و آن  
 بکار خویش مشغول شود و او را فرستد  
 یاد نکند او را و فد عا گویند پس  
 چون یکماه ببودند میزبان دانست  
 که ایشانرا قوم خویش فراموش گشت  
 قوم عا خویشانان او بودند شرم  
 داشت که ایشان را از خانه خویش  
 بیرون و نا کاری فرستد که آمده اند  
 سر آن کنیزگان را که مغذیه بودند بیتی  
 چند شعر بگفت و آن کنیزگان را  
 بیاموخت تا درسورن بگفتند \* شعر \*  
 ایا قیل و یحک قم فهم لعل الاله  
 سحبا سحبا \* فیبقی ارض علینا  
 سحبا فقد صارت دیارکم خرابا \* فانت  
 عاد قومک یا بن عمرو عیب مذاک  
 لدکت اسکابا \* فما هذا التهاون عن  
 مقام یرجی فیه قومک ان نجانا \*  
 پس چون ایشان این بیتها بگفتند  
 بوی اندر حدیث عاد گروه و آن سختی  
 و تشنگی که بر ایشان بود چون این  
 بشنیدند ایشانرا یاد آمد آنکه با

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و مرقیل را گفتند این یکی را که کافر  
 بود اگر قوم ما بهود بگرویدندی خود  
 ایشانرا باران آمدی و این قربانها  
 نبایستی قیل دانست کی ایشان بهود  
 گرویده بودند و از هلاک قوم پاک ندارند  
 ایشانرا بگذاشت و خود تنها برفت  
 و بر سر گوه بر شد کی جای قربانست  
 بکوه منی و آن قربانها بگشت و سر  
 سوی آسمان کرد و گفت ای خدای  
 آسمان تو دانی کی من اینجا بحاجت  
 آمدم و حاجت من نه بیماریست کی  
 ورا شفا خواهم و نه اسیری کی راحتش  
 خواهم ولیکن باران خواهم قوم  
 خویش را کز تشنگی هلاک شدندی  
 و میگفت و دعا همیکون تا سه ابر  
 بر آمد و بهوا بایستاد یکی سپید و یکی  
 سوخ و یکی سیاه و آوازی از هوا بر آمد  
 کی ازین سه ابر کدام خواهی بگزین  
 تا بقوم توشوند با خود گفت کی این  
 سپید دلم کی تهیست درو باران نبود  
 و این سرخ ندانم کی بمیان او چه بود  
 و ابر سیاه میان او باران بود کی مارا  
 چون ابر سیاه آمدی ازو باران آمدی

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خویشدن بگفتند که ما خطا کردیم  
 قوم خویش را فراموش کردیم  
 برخواستند که قربانها ببرند لقمان  
 و مرثد که با هود علیه السلام گرویده  
 بودند دین خویش را پیدا کردند و قیل  
 را گفتند که اگر قوم ما بهبود علیه السلام  
 بگرویدندی ایشانرا باران آمدی  
 و این قربانها نبادیستی و رنج آمدن  
 هم نبدوی قیل چون این حدیث  
 از ایشان بشنید خشم گرفت برایشان  
 مرثد و لقمان از پیدایش او برفتند تا  
 بکعبه فواز رسیدند مرثد دست بر  
 آسمان برداشت و گفت \* شعور \*  
 یارب یارب الجود و الماجد القرو العلی  
 الواحد \* ان ابن عمرو قد اتاک طالبا  
 مستعمیا \* ملک الیک داعیا بین  
 معشر \* فرد حجاز هم بارزاق العباد \*  
 تفسیر این بیتها بفارسی گوید ای  
 خدای دهنده و بزرگوار پسر عمرو از  
 برای تو آمد باران خواهنده از برای  
 قوم کافر حاجت او روا کن ای روزی  
 دهنده بندگان پس چون او بگفت  
 لقمان برخاست و گفت بدعا \* شعور \*

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بانگ کرد کی این ابر سیاه خواهم  
 کی بقوم من شود و دران ابر سیاه  
 باد غدار بود خدای عزوجل فرشتگان  
 عذاب را فرمود تا آن ابر سیاه را بزمین  
 قوم عاد راندند و قیل از کوه فرود آمد  
 و سوی آن دوبار خویش رفت و گفت  
 کی ابر سیاه بر آمد با باران و بقوم  
 خویش فرستادم و با ایشان بشراب  
 نشست و آن ابر بقوم عاد رفت و پیش  
 ابر باد همی شد چون ابر سیاه نزدیک  
 ایشان رسید شادی کردند کی باد و  
 ابر بر آمد و باد ان قوله تعالی فلما  
 رآه عارضاً مستقبلاً اودیتهم قالو هذا  
 عارضٌ مطربنا و هود می دانست کی  
 آن غدا بست کی او را خدای تعالی  
 آگاه کرده بود ایشانرا گفت بل هو ما  
 استعجلتم به ریح فیها عذاب الیم پس  
 چون بوابر سر ایشان رسید با یستاد  
 و آن باد عقیم از و بیرون آمد چنانکه  
 خدای عزوجل گفت وَ فِي عَادِ اَنْ  
 ارسلنا علیهم الريح العقیم و عقیم  
 آن بود کی از و هیچ منفعت نبود و از  
 باد بدین جهان اندر منفعتهای بسیار

*Text of Tabary.*

یارب انی قدم من مصدق \* و انت ربی  
 یهدی موفق \* فمن یارب علی منّا \*  
 ان یحبس القطر ولا نضا \* بپارسی  
 چنین گوید که ای خدای راست گوی  
 راه راست دهندۀ من مومنینم و گفتار  
 تو خدای راست دارم منت کن بر من  
 که باران باز داری و ندهی پس بازگ  
 آمد که دعای شما نزدیک خدای  
 تعالی مستجاب شد پس ایشان بکناره  
 شدند و بخواستند که بادشاه ایشان  
 بداند که پیش از او بدعا آمدند بخلاف  
 آنکه او همی خواهد چون یکزمان  
 بود بادشاه آمد که نام او قیل بود و  
 کافر بود تنها برفت بر سر کوه بر شد  
 آنجا که جای قربانست بکوه مناوان  
 قربانها بکرد و باز آمد تا به کعبه  
 پس گفت \* شعر \* یارب قد جیت  
 مستعمدا فقد مننا بالذی وهیذا \* من  
 شدم الاکحاط و الثغوب فذلنا فی الناس  
 من حزبت فیما یلسا \* عذ امساک  
 المطر من الشد الحال مما ان مقولا  
 الیک فاستقمنا \* الغیث حتی یعجم  
 الحزن والدما \* بپارسی چنین گوید

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است کی درختانرا آب بریزد و میوها  
 بگیرد و کشتیهارا بدریا براند و بویهای  
 خوش بیارد و آب سرد کند و بر بادی  
 کی اندروازین معنی چیزی نبود آنرا  
 عقیم خوانند و جای دیگر عاتی خوانند  
 قوله تعالی وَاَمَّا عَادٌ فَاهْلَكُوْا بِرِيْحٍ  
 صَرْصَرٍ عَائِيَةٍ و صرصر باد سرد بود  
 و عاتیة بی فرمان آنکه کسی او را از  
 خویش نگاه نتواند داشتن بس هرچ  
 ایشانرا چهار پای بود باد از زمین  
 برگرفت و بر هوا بود و بر زمین زد  
 و باره پاره بکرد قوله تعالی مَا تَذَرِيْنَ  
 شَيْءًا اِنَّتِ عَلَيْهِ الْاَلَّا جَعَلْنٰهُ كَالرَّمِيْمِ  
 و رمیم آن استخوانها بود کی بر و سالها  
 گذشته باشد و باران بسیار برو برگذرد  
 چون بدست مالی همه خاک شود  
 پس چون ایشان آن هول بدیدند  
 گفتند صبر کنید کی از بس باد باران  
 بود از خانها بیرون آمدند و بساده  
 زمین پای فرو بردند تا ساق و بیدانند  
 بمردی و هود پنداشت کی بسوی  
 او آید و خواهش خواهند و بخدای  
 عزوجل بگروند نگر و بدند و بان اندر آمد

*Text of Tabary.*

که یا خدای ما با تو آمدیم باران خواهیم  
 که مبتلا گشتیم با آنچه به ما رسید از قحط  
 و کم بودن چهارپای و اشتر و بهیچ  
 کس نتوانیم گریختن الا ما را تو بارانی  
 ارزانی دار و مرا و هامون را تر کن و  
 ما را سیلاب کن و سر بآسمان کرد و  
 گفت یا خدای تو دانی که من بحاجت  
 آمده ام حاجت من نه بیمار است که  
 عافیت خواهم و نه اسیر است که راحت  
 خواهم ولیکن باران خواهم مر قوم  
 خویش را که از گرسنگی هلاک شدند  
 و همی دعا کرد تا سه ابر آمد و بهوا  
 اندر ایسان یکی سپید و یکی سرخ و یکی  
 سیاه و او را از هوا بانگ آمد که ازین  
 سه ابر کدام خواهی بگزین تا بقوم تو  
 شود او بخویشتن اندیشه کرد و گفت که  
 این ابر سپید دانم که تهی بود و میدان او  
 باران نه بود و این ابر سرخ ندانم  
 بمیانش چه بود و لیکن ابر سیاه را  
 باران بود که ما را چون باران آمدی  
 ابر سیاه آمدی ابر سیاه را بگزید و بانگ  
 کرد که این ابر سیاه خواهم که بقوم من  
 شود و بدان ابر سیاه اندر باد عذاب بود

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و هر یکی را از زمین برگرفت و بهوا  
 بریزد و بزمین برزد و بکشت تا همه  
 را بکشت و هر یکی را چند درختی  
 بر زمین افکند قوله تعالی کانهم اعجازُ  
 فُخْلِ خَاوِیةٍ کُفَّتْ چُونِ دَرِخْتَانِ خَرْمَا  
 کَزْ مِیْنِ بَر کُنِی وَ بَفْکُنِی وَ الْخَاوِیةِ  
 السَّاقِطَةِ عَلَی الْاَرْضِ خَوِی النِّجْمِ اِذَا  
 سَقَطَتْ قَوْلُهُ تَعَالَى کَانَہُمْ اَعْجَازُ فُخْلِ  
 مَذْقَعٍ وَ هَوَکَ اَزِیْشَانِ بَگَرِ یَخْتِ بَادِ  
 اَزِ بَسِ اَوْ بَشَدِ وَ اَوْرَا نِیْزُ بَرِ مِیْنِ  
 زَدِ وَ بَکَشْتِ وَ زَنَانِرَا نِیْزُ بَخَانِہَا اِنْدَرِ  
 شَدِ وَ اِیْشَانِرَا اَزِ مِیْنِ بَرِ مِیْ گُوفْتِ  
 وَ اَزِیْنِ دِیْوَارِ بَدَانِ دِیْوَارِ مِیْ زَدِ تَا هَمَہُ  
 رَا بَکَشْتِ هَفْتِ شَبَانِوَزِ اَن بَادِرَا  
 بَرِیْشَانِ مَسْلُطِ کَرْدِ قَوْلُهُ تَعَالَى مَسْخَرَهَا  
 عَلَیْہِمُ سَبْعًا لَیَالٍ وَ ثَمَانِیَّةً اَیَّامٍ حَسُوْمًا  
 یَعْنِی دَاِیْمَہُ وَ هِیْچِ کَسِ اَزِیْشَانِ نَمَانْدِ  
 مَگَرِ هُوْدِ پِیْغَامْبَرِ عَلَیْہِ السَّلَامِ وَ اَن کَہُ  
 مَوْصِنِ شَدَہُ بُوْدَنْدِ بَادِ اِیْشَانِرَا هِیْچِ زَبَانِ  
 نَکَرْدِ قَوْلُهُ تَعَالَى فَلَمَّا جَاءَ اَمْرُنَا لِنَجِیْنَا  
 هُوْدًا وَ الَّذِیْنَ اٰمَنُوْا مَعَهُ بِرَحْمَةِ مَنَّا  
 وَ نَجِیْنَا لَهُمْ مِّنْ عَذَابٍ غَلِیْظٍ وَ اِیْنِ  
 وَ فَدَاِیْشَانِ بَہْکَہُ نَشَسْتَهُ بُوْدَنْدِ هَرَسَهُ

*Text of Tabary.*

خدای تعالی فرشتگان عذاب را فرمود  
تا ابر سیاه را براندند و بزمین قوم  
عاد بردند و قیل از کوه فرود آمد  
بسوی یاران خویش و ایشانرا گفت  
ابر سیاه پر باران فرستادم بسوی قوم  
و بایشان بمی خوردن بنشست و این  
ابر برفت بقوم عاد و باد پیش او همی شد  
چون ابر نزدیک ایشان برسید شادی  
کردند و گفتند باد آمد و ابر برآمد  
و باران آمد چنانکه خدای تعالی گفت  
فَلَمَّا رَأَوْهُ عَارِضٌ مُّسْتَقْبِلَ أَوْدِيَّتِهِمْ قَالُوا  
هَذَا عَارِضٌ مِّمَّنْ بَدَأْنَا وَ هُوَ عَلَيْهِ السَّلَامُ  
دانست که آن عذاب است که خدای  
تعالی او را آگاه کرده بود و ایشانرا گفت  
بَلْ هُوَ مَا اسْتَعْجَلْتُمْ بِهِ رِيحٌ فِيهَا عَذَابٌ  
أَلِيمٌ چون ابر بر ایشان رسید بایستاد  
و آن باد عظیم از آن جا بیدون آمد  
چنانکه گفت وَ فِي عَادٍ إِذْ أَرْسَلْنَا  
عَلَيْهِمُ الرِّيحَ الْعَقِيمَ وَ عَقِيمٌ آن بود که  
ازو هیچ نفع نبود و از بادها بدین  
جهان منفعتها است که درختان را  
آب بریزد و میوه ها بگیرد و کشتی ها  
بدریا اندر براند و بویهای خوش بپارد

*Text of Ghazzaly.*

و همی خوردند و خبر نداشتند  
تا مردی آمد بر شتری نشسته نه از قوم  
عاد ولیکن بوادی عاد برگزیده بود  
و آن بدیده بود ایشانرا خبر داد گی  
همه خلق هلاک شدند مگر هود و آنکه  
بدو گرویده بودند این دو تن مومن  
شاد گشتند و قیل کافر از بهر قوم  
خویش اندوهگین شد برخاست و بر  
کوه منی بر شد و این لقمان و مرثد  
با او بر شدند و او را گفتند بهود بگو  
والا تو نیز هلاک شوی هم چنانکه  
قوم عاد شدند او گفت مرا بس ایشان  
زندگانی نیابد و سر درکود و گفت ای  
خدای آسمان اگر این سخن راست است  
و قوم من هلاک شدند مرا نیز هلاک کن  
بادی برآمد و ویرا از سر کوه برگرفت  
و بر زمین زد و بکشت و این دو تن کی هود  
ایمان آورده بودند ایشانرا از کوه آواز  
آمد کی شما هر کسی چیزی بگزیند  
خویشتن را تا بیاید مرزد بن سعد  
گفت خواهم کی مرا گندم بود چندانی  
کی تا زنده باشم نان گندمین خورم  
اورا اجابت آمد برفت و به مکه آمد

*Text of Tabary.*

و هر بادی که اندر وی منفعتها بود  
 اورا عقیم نگویند و عاقبه و مصرص که  
 یاد های عذاب است و بر سر ایشان  
 بایستاد و هر چه ایشانرا چهار پای بود  
 از زمین برگرفت و بهوا برد و پاره پاره  
 کرد چنانکه خدای تعالی گفت مَا تَذَرُ  
 مِنْ شَيْءٍ اَنْتَ عَلَيْهِ اِلَّا جَعَلْتَهُ كَالرَّمِيمِ  
 و رمیم آن استخوانها بود که سالهای  
 بسیار بر او بر آید و سست و فرسوده شود  
 و اگر بدست بمالی خاک شود و گفت  
 هر چیزی که آن باد بدو آمده  
 چون خاک گردانیدی پس چون  
 ایشان هول آن باد بدیدند هر يك  
 با دیگر گفتند صبر کنید که از پس  
 این باران بود پس از خانها بیرون  
 آمدند بر سادۀ زمین و پای بر زمین  
 فرو بردند تا ساق و بایستادند و هود  
 علیه السلام ایستادند و هود  
 و بزهار آید و خواهش کند و بخدای  
 عز و جل بگروند ازین قوم هیچ  
 نگرویدند چون آفتاب فرو شد بادی  
 برخاست عظیم از میان دوکوه بزرگ  
 و هر زمان که برآمد سخت تر بود

*Text of Ghazzúly.*

ازان کوه و انجا بنشست تا بمزد و لقمان  
 گفت من عمر خواهم بسیار اورا آواز  
 آمد کی هر چند دیر تر زیی آخر هم  
 ببااید مرد گفت روا است گفت ترا باد  
 عمر هفت کرگس و نیز هم بمکه  
 بنشست و بر سر کوه بر شدی انجا  
 کی کرگس خابه کزد و بچه کرگس را  
 نگاه داشتی چون از خابه بیرون آمده  
 بر گرفتی و بیروردی تا هفت کرگس  
 بیرورد باز بسین کرگسان لُبد نام بود  
 پس لقمان با لُبد هر دو بیکجای  
 بمردند محمد جریو گفت کی هرگز  
 کسی هشتاد سال نزیست و بجزهای  
 دیگر بیشتر گفتند کی بزیستی و هود  
 با آن مو مغان بز زمین عاد همانند  
 از بس عاد پنجاه سال بس بمرد و عمر  
 او صد و پنجاه سال بود و نیز از بس  
 هود صد سال دیگر تا قوم صالح  
 و ثمود و اندران صد سال هیچ پیغامبر  
 نبون همه ملوک بودند و هر یکی را  
 دینی جدا بود یکی بت پرست  
 و یکی آتش پرست و هر گونه تا وقت  
 صالح علیه السلام \*

*Text of Tabary.*

پس زنی از ایشان که او را بهدوانی خواندندی بمیان منیع اندر نگرست  
تف آتش دیدند که زمانه همی زد آن زن بترسید و دست بردست زد و  
اینکه اکنون کسی را محنتی رسد دست بردست زند ازان وقت باز ماند پس  
آن زن بانگ زد تا همه بزرگان نزدیک او آمدند و آن زن گفت \* شعر \* ان  
الذي فطر السماء نارا \* انبشرو من حرفها اثر زارها \* فاستخروا بالرسول  
هود \* نبي الرب الواحد المعبود \* فقد آناكم عنقير و اینه \* وليس يبقي  
فيكم من باقية \* پارسي گوید ای مردمان من بمیان آسمان آتشی  
همی بینم درخشند زد و با شید و دست بهود پیامبر زید که شمارا عذابی  
همی آید و کاری بزرگ همه بدان هالك شوند و هیچ کس نمانید هیچ  
کس بگفتاری او گوش نکردند و باد هریکی را بگرفت و بر هوا برد و بر  
زمین زد و بکشت و هریک از ایشان چون خرما بنان بدرازی افتاده  
بودند چنانکه مرده صد ساله و خدای تعالی گفت **كَانَهُمْ اَعْجَازٌ نَخْلٌ  
مُنْقَعَرٌ** گفت چون بودند که درخت خرما را برکنی و بیفگنی تا آنهمه را  
اینچنین قد بود و هریک چون خرما بنی افتاده و چنین گویند بدان  
هنگام که باد یک یک را بر زمین زدی در میان ایشان یکی بود نام او  
خلجان بگریخت و بکوهی بوشد و از دور همی دید که بر باران اوچه می رسد  
باز فراز آمد از سرکوه و بنزدیک هود علیه السلام آمد هود علیه السلام  
گفت یا خلجان مسلمان شو تا برهی گفت یا هود مرا خدای تو چه دهد  
اگر مسلمان شوم هود علیه السلام گفت ترا بهشت دهد پس آنکه خلجان  
گفت چه بود که میان ابر چون اشتران بختی است هود علیه السلام  
گفت آن فرشتگانند خلجان گفت اگر من مسلمان شوم خدای تعالی  
مرا ایشان گرداند هود علیه السلام گفت آدمی را فرشته نگرداند گفت پس  
مسلمان نشوم همان ساعت بادی پیامد و بر هوا برد و به زمین زد



*Text of Tabary.*

و بکشت و آنها که به خانها شدند و درها بسند باد بخانها اندر شد و ایشانرا از زمین برگرفت و بردیوار همی زد تا می مردند و این باد هفت شبانه روز برایشان مسلط بود چنانکه خدای تعالی گفت کَذَّبْتُ ثَمُودَ وَعَادَ بِالْقَارَعَةِ فَاَمَّا ثَمُودُ فَاهْلَكَوا بَرِيحَ صَرْصَرٍ عَاتِيَةٍ سَخَّرَهَا عَلَيْهِمْ سَبْعَ لَيَالٍ وَتَمَّازِيَةَ أَيَّامٍ خُسُومًا فَاتْرَأَلُّوهُمُ فِيهَا صَرْعَى كَانَهُمْ اَعْجَازُ نَخْلٍ خَاوِيَةٌ فَهَلْ تَرَى لَهُمْ مِنْ بَاقِيَةٍ حَسُومًا كَقَتِ يَعْنِي دَابَّةً وَكَقَتِ عَزَّوَجَلَّ فَهَلْ تَرَى لَهُمْ مِنْ بَاقِيَةٍ بیدنی که از ایشان کسی نماند مگر هود پیدغامبر علیه السلام و انسانی که مومن بودند و بهود علیه السلام گرویده ایشا نرا باد هیچ زیادتی نکرد چنانچه گفت جَلَّ جَلَّالُهُ فَلَمَّا جَاءَ اَمْرُنَا نَجَّيْنَا هُودًا وَالَّذِينَ اٰمَنُوا مَعَهُ بِرَحْمَةٍ مِنَّا وَنَجَّيْنَا هُمْ مِنْ عَذَابِ غَلِيظٍ و این وقد ایشان بعهکه نشسته بودند و هر سه می میخورند و گاهی نداشتند تا یکی مردی همی آمد بر اشتری نشسته نه ازان قوم ولیکن بوادی عاد برگذشته بود با ایشان خبر آمد که همه هلاک شدند مگر هود علیه السلام بدو گرویده بود پس آن دو تن که مومن بودند لقمان و مرثد بعهکه شادی کردند و سپاس داری مرخدای را عزوجل کردند و آن دیگر که قیل بود دژم و غمگین نشسته بود از بهر قوم خویش آن دو تن مومن گفتند که برسر کوه مینا بودند پیش قیل آمدند و گفتند یا قیل از نسل عاد زندگانی نیابی قیل گفت یا خدای آسمان اگر این سخن راست است و قوم من هلاک شد تو نیز مرا هلاک کن پس همچنان پادی بیامد و او را از سر کوه در ربود و بر زمین زد و کشت لقمان و مرثد شکر خدای کردند عزوجل پس هود علیه السلام ایشانرا آواز داد از آنجا که بود و خدای تعالی آواز هود علیه السلام بایشان رسانید و گفت شما هر کسی چیزی را بگزیند تا خدای تعالی شما را بدهد مرثد گفت خواهم مرا گندم چنانکه تا باخر عمر مرا بس

*Text of Tabary.*

بود اجابت شد و بیکه رفت و آنجا بود تا بهرد و لقمان گفت من درازی عمر میخواهم پس گفت اگر چند دیر بهمانی عاقبت بهمیری گفت روا است پس خدای تعالی او را زندگانی داد چنانکه هفت پادشاه پادشاهی کردند و بهردند و چنین گویند که کرگس را زندگانی دراز بود پس این لقمان بچه کرگس را بگرفتی و بداشتی پس کرگس آخر را که داشت نامش لبد بر نهاد و هفتصد سال بزیست آن کرگس پس عرب گفتی بمثل که طَال الْأَمَدَ عَلَى لَبَدٍ پارسی چنین گویند که دراز شد مدتی زندگانی بر لبد و این لفظ مثل شد در عرب پس لقمان و لبد در یکروز بهردند و هود علیه السلام با موذن اندر زمین عاد ببودند و از پس قوم عاد پنجاه سال دیگر بزیست و عمر هود علیه السلام صد و پنجاه سال بود تا وقت صالح علیه السلام و قوم ثمود همه ملکان بودند هر کسی بدینی جدا جدا آتش پرست و بت پرست و آفتاب پرست و هرگونه دینها بود تا وقت صالح علیه السلام \*

What follows is not found in Ghazzaly.

و ابن عباس رضي الله عنه چنین گفت که ایزد تعالی باد صرورا بمقدار فواخنی انگشتوری فرستاد که قوم عاد را هلاک کردند و اگر فزون تر بودی همه خالق هلاک شدی و دغفل چنین گوید یا علی بن ابیطالب رضي الله عنه نشسته بودم که پیدی کهن سالی فراز آمد و پرسید که امیرالمومنین کدام است گفتم اینکه روی را بعلي رضي الله عنه کرد و گفت \* اسيمع بكلامي هداك الله من هداك فا فرح بعملك عن علت صادي \* سمعت بالدين دين الحق يا به محمد و هو بني الحضرة والهادي \* فدك على القصد و اعلى الترتيب من خلدی بشرعة ذاة ايضا حتى و ارشاد \* ان الهداية بالايمن ناجية عن العمرو اللقي من خيل الراد \* پارسی این بیتها چنین گوید که ای راه نهای راست بشنو و دلیل باش برحق تا شك از دل من بزوالی که

دين محمد صلى الله عليه وسلم حق است و بهترين دينها است اميرالمؤمنين  
 علي رضي الله عنه عجب ماند از شعر و فصاحت او پس گفت از كجائي  
 گفت از حضر موت پدش تو رغبت كردم تا مسلماني بياموزي علي رضي الله  
 عنه گفت ترا خدای تعالی توفيق دهد هر چه تو از او خواهی از من بيايي  
 پس او را گفت دانش تو چگونه است بدین کارها باحقاف رسیدی مرد  
 گفت از گور هود علیه السلام خواهی علي رضي الله عنه گفت که بیان کن  
 آن مرد گفت که من بوقت برنائی با گروهی از اهل بیت خویش بگور هود  
 علیه السلام رسیدم اشکاق دری با یست شدن سخت تنگ در میان کوه بر کونته  
 سرو آبه مطبق بدو سنگ بزرگ انجا یکی خانه چهار سو کذده بود و چهل  
 ارش بدن خانه اندر یکی تخت نهاده از رخام دراز و فراخ هود علیه السلام را  
 بر انجا خوابانیده دست بدو فراز کرد تازه ایستاده بود بر مثال زنده و  
 بر سر آن لوح نهاده بود از رخام و انجا نوشته بود که **بَا سَمَكَ اللّٰهُ الْعَلِيِّ وَاَنَا**  
**هُودُ النَّبِيُّ رَسُولُ رَبِّ الْعِبَادِ اِلَى الْمَلَاَءِ عَادُ فَدَعُوْنَهُمْ اِلَى الْاِيْمَانِ وَخَلَعَ الْاَنْدَادِ**  
**وَالْاَوْتَانَ هَلَكُوا بِرَبِّهِ الْعَقِيْمِ فَاَصْبَحُوا كَالرَّمِيْمِ** چنين است که بنام  
 خدای بزرگوار من هود پيامبرم بقوم عاد و ايشان را با يمان خواندم تا  
 از بت پرستيدن باز دارم فرمان من نبردند همه بباد عقيم هلاک شدند علي رضي  
 الله عنه گفت صداقت راست همي گوئي و فرمود تا او را سوره چند از قران  
 بيا موزند و بسيار هديه داد چنين گويد دغفل که چون قوم عاد را هلاک برآمد  
 پزويدن يمن مرا کسان بودند که يهود عليه السلام بگرویده بودند که بحضر  
 موت بودند چون يعرب بن قحطان بن عابرون شالح بن ارفخشذ بن سام  
 بن نوح عليه السلام برادران خویش را گرد کرد و همه از يك مادر بودند مادر  
 شان از قوم عاد بود بدان سبب همه نازي بودند و مهمترين ايشان يعرب  
 بود پس جرهم و لقمان و مملثمس و عاصم و قطای و عاصيب همه بدست  
 گرفتند و پيشين همه يعرب بود پس قحطان که انجا رسيد همي بود \*

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR SEPTEMBER, 1848.

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The usual monthly meeting of the Asiatic Society was held at the Society's house on Wednesday evening, 6th September.

The Hon. J. W. COLVILLE, *President*, in the Chair.

The proceedings of the last meeting were read.

The accounts and vouchers for August were submitted.

Baboo Gobindchundra Sen and C. Thornhill, Esq. having been duly proposed and seconded at the August meeting, were balloted for and elected members of the Society.

The following gentlemen were named as Candidates for election to be balloted for at the October meeting.

*Capt. Pakenham*, Body Guard, *Capt. Powel*, Ship "Precursor," proposed by Mr. Frith, seconded by Mr. Laidlay.

*Capt. Banks*, proposed by W. Taylor, Esq. seconded by G. A. Bushby, Esq.

*Lieut. F. W. Stubbs*, Artillery, proposed by Lieut. Staples, seconded by Mr. Laidlay.

Read letters—

From G. A. Bushby, Esq. Secy. to Govt. of India, Home Dept. regarding the past and future application of the grant for Oriental Publications.

*Home Department.*—No. 685.

*From G. A. BUSHBY, Esq., Secretary to the Government of India,  
To W. B. O'Shaughnessy, Esq. Secretary to the Asiatic Society, dated the 29th  
July, 1848.*

Sir,—With reference to my letters Nos. 240 and 247, dated 24th April 1847, I am directed by the Governor General in Council to inform the Asiatic Society that the Hon'ble the Court of Directors, in a Dispatch recently received, have authorized the grant to the Society of the privilege of drawing upon the Company's Dispensary for monthly supplies of spirits of wine not exceeding ten Gallons, on the understanding that a part of it will be applied in preparing specimens of Natural History for transmission to the Museum at the East India House.

2. The Hon'ble the Court of Directors have also sanctioned the remission of the demand to which the Society has become liable by the misapplication of the Government grant of 500 Rs. per. mensem for the publication of Standard Oriental works; and have authorized the continuance of the allowance, on condition that it be scrupulously applied to the collection and publication of Oriental works of interest and utility, an annual account being furnished to the Government of the appropriation of the sums received. I am accordingly directed to request that such accounts may be regularly furnished in future, and that a Statement be submitted of the appropriation of the sums received by the Society since April 1847, when the misapplication of the allowance was brought to notice.

3. With reference to the employment of this grant in the publication of the Vedas, you will be pleased to inform the Society that the Hon'ble Court have sanctioned the printing of the Rik Veda in England. It will therefore not be necessary to undertake the publication of that work in Calcutta. There are, however, other Vedas or portions of them which it is desirable to preserve through the means of the press, and which may very properly become the objects of the Society's attention.

I have the honor to be, Sir,

Your most obedient Servant,

G. A. BUSHBY,

*Secretary to the Government of India.*

*Council Chamber,  
The 29th July, 1848. }*

From W. Seton Karr, Esq. Under Secy. to Govt. of Bengal, forwarding a communication from Mr. Robinson, on the languages spoken by the Tribes inhabiting the valley of Asam and its confines.

Referred to the Oriental Section.

From H. M. Elliot, Esq. Secy. to Govt. of India, Foreign Dept. forwarding a narrative by Capt. Reynolds of our former relations with the Densarie Garrows.

From Capt. Thuillier, Officiating Deputy Surveyor General, forwarding Meteorological Register for August.

Communications were received and presented;—

From Dr. Aloys Sprenger, through H. M. Elliot, Esq. a Notice on Tabary and on an Historical work of Ghazzály.

From Prince Gholam Mohamed, presenting 2 copies of a Persian work, and 2 of English Memoirs of his grandfather and father, Hyder Ali Khan and Tippoo Sultan.

From H. Cuming, Esq. acknowledging the receipt of a bill of exchange for £25 10s. and requesting to know whether he is to continue to forward the Conchological Works of which portions had been sent to the Society. (To be referred to the Section of Natural History.)

From M. Eugene Burnouf, dated Paris, 10th January, regarding the edition of the Vedas now publishing by the Society.

From Lieut R. Maclagan, Principal of the Poostu College, forwarding some fragments of the History of Moultan.

From Messrs. Allen & Co. announcing shipment of the stock of copies of the Researches—also volumes of the Mahabharat and Mega. The expense amounting to £31 7s.

From Lieut. J. Strachey, forwarding two papers to be printed with his brother's Journal on the height of places in his route and on the construction of the map.

On the disposal of the business of the evening, Mr. H. M Elliot, V. P. after adverting to the heavy loss the Society had sustained by the death of Brigadier Stacy, so eminently distinguished for his antiquarian zeal, proposed the following resolution which was seconded by Mr. Laidlay, and carried unanimously.

“That the Society testify their respect for the memory of Brigadier Stacy, C. B., one of their most distinguished and liberal contributors, by entering upon record, their regret at the loss they have experienced by his death; and that this resolution be communicated by the Secretary to the surviving members of his family.”







JOURNAL  
OF THE  
ASIATIC SOCIETY.

NOVEMBER, 1848.

*Anatomy of Ailurus, Porcula, and Stylocerus, in continuation, with sundry miscellaneous emendatory Notes. By B. H. HODGSON, Esq.*

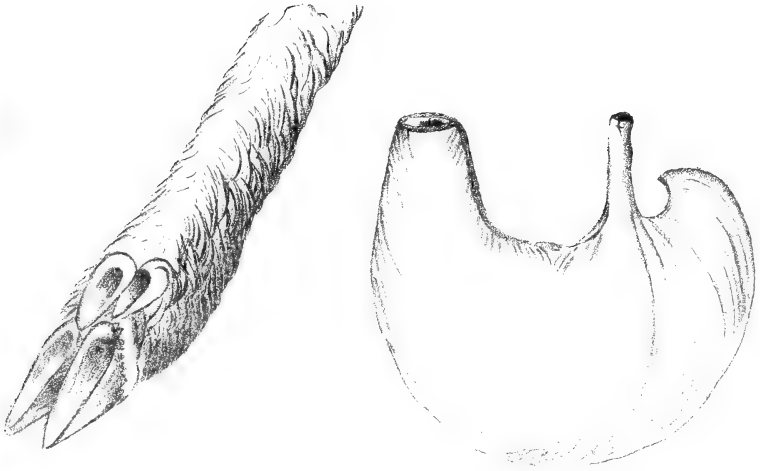
In presenting to the Asiatic Society of Bengal my paper on the structure and habits of Ailurus, I noticed the circumstances which had tended to render my account of the anatomy less full and satisfactory than I could have wished, and I promised to take the first fresh opportunity to rectify and complete that account. I now proceed to redeem my pledge so far as my materials and the very frail state of my health have allowed me so to do. Last month I obtained a couple of young Wáhs alive. They were taken from the nest, a perforation in the bole of a lofty decayed tree, and were about half grown, male and female, alike in every respect of size and colours. They must have been born in April or May, and were certainly six months old when I got them. Yet they had not quitted the retreat in which they were born, nor had their mother ceased to tend them; whence we may safely infer that the period of infantine helplessness is much protracted in these most singular animals. So long as they lived they were fed with milk, or milk and rice. But they died in about 15 days under the terrible process of cutting the molar teeth. Each was from 12 to 13 inches long between the snout and anus. Testes of male in the groin, that is void of scrotum. Penis small, sheathed, directed forwards and downwards, and upon the whole assimilated to the same organ in Felis and Viverra, rather than in Canis or Paradoxurus,\* though void of all semblance of

\* Paradoxurus differs greatly from the Felines and Viverrines in the canine character of this organ, which is large and plainly directed, in its sheath, along the abdo-

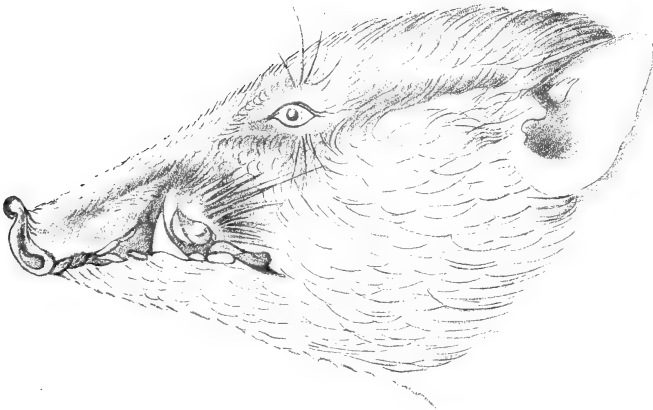
preputial sac or gland, and lastly, furnished with a small simple bone. Teats of female 8. Her vulva simple, that is, without trace of preputial gland. Anus of both with a large nude margin, but no appearance whatever of special anal glands, and no other semblance of pores than two very shallow simple reduplications of the skin, having a central lateral position (one on each side), probable only subservient to the lubrication of the parts. Peroneum of both sexes hairy and void of all trace of glands.

*Ailurus ochraceus. Soft anatomy.*—*Male* 12½ inches long from snout to anus. The male's thoracic and abdominal viscera are as follows:—The lungs have 4 main and 6 total divisions, and are disposed bilaterally on each side the œsophagus. The liver has 3 main divisions, that is, the laterals and the central. Of these the laterals are bifid, and the central, trifid, and there is no lobulus, so that the total divisions are 7. The lateral lobes are the larger and are very unequally divided. The gall-bladder is half imbedded in one of the clefts of the central lobe, and is of an elliptic shape, pouring its thin yellowish bile into the intestine about two inches below the stomach by one long clear duct. The pancreas is a very fragile, colourless, glandular, linguiform organ lying parallel to the biliary duct and close in contact with it. I could not satisfactorily trace the pancreatic ducts; but there seemed to me to be one, very short, put off from the lower or postæal end of the organ, and entering the intestine close to the entrance of the biliary duct, perhaps ½ inch above it. Spleen 3 inches long by two, dark-coloured as a gizzard, tongue-shaped, and lying along the greater arch of the stomach with merely membranous attachments thereto. Heart 1⅓ inch long by ⅓ of greatest diameter, muscular and firm. Stomach pyriform, inclining to hemispherical and decidedly of the solvent type, though its outer coat shows some faint signs of muscularity upon the surface of its equable, thickish and membranous walls. Inner coat of uniform surface, void of folds or bands. Orifices nearly but not quite terminal. Greater arch of the stomach 7½ inches; lesser, 2 inches. Towards the pyloric orifice is a sort of subsidiary stomach, extremely glandular and resembling in character but not in position the succenturiate ventriculus of

men. The special secretory glands are preputial and form a parallelogramic nude subvalvular field, in the centre of which lies the large membrum. In the female the lips of the vulva are the seat of the glands.



*Foot, Stomach, and Head of the Pigmy Hog.*



*Porcula Salvania.*



birds and of some few mammals. It has longitudinal bands along the inner surface and is very thick-coated. Intestines about  $4\frac{3}{4}$  lengths of the animal, that is, somewhat shorter than in maturity; 4.  $10\frac{1}{2}$  long, of large equable diameter, void of cœcum, and exhibiting on their inner surface nor valves, nor folds, nor other retardatory processes, not even, I think, a valvula coli to distinguish the small from the great intestine. And, in fact, no such distinction has place, the intestinal canal being of equal breadth throughout and similar aspect internally,\* save the last 6 inches, which are wider, thicker-coated and furnished internally with longitudinal bands, not unlike the post ventricle above noticed.

Kidneys 1 inch long, elliptic and lobulated, there being 3-4 distinct divisions of the body of the organ under the strong and uniform cortical substance or cover.

*Soft anatomy. (Female.)* The liver has 7 divisions in all; the right and left lobes about equal and bifid, but very unequally so; the central lobe, smaller and trifid.

The elliptic gall-bladder is freely suspended between the larger 2 lobules of the central lobe and discharges the bile into the intestine by a large clear duct about 2 inches long, and which enters the intestine about that distance from the stomach. The lungs have 4 chief divisions, but 6 in all, the 2 latter being very subordinate. The spleen is dark-coloured, tongue-shaped, and lies along the stomach longitudinally and centrally on its outer arch. The pancreas, in form, structure, and position as noted in the male, seems to discharge the pancreatic juice into the intestine just below where the bile enters it. The intestines are 4.  $9\frac{1}{2}$ , of one equable diameter of half an inch, and void of cœcum or valves internally. The stomach is a large, membranous and simple sack, showing something of muscularity without, but no folds or bands of any sort within. I could not satisfactorily determine the form of the uterus in this young subject.

*Hard anatomy. (Male.)* Cervical vertebræ 7, dorsal and ribs 15, lumbar 5, sacral 3, caudal 18.† Total 48. Carpal bones 7, metacar-

\* This remark refers to salient retardatory, and not to minute secretory, processes (villi) characterising the inner surfaces of various intestines.

† I have some doubt as to the number of sacral and caudal vertebræ, because the former are not clearly distinguished from the proximate vertebræ by any of the usual signs of ankylosis, depression, &c. The circumstances which have determined

pal 5, digital 3, for each digit, fore and aft, save the innermost, which has but 2. Tarsal 7, exclusive of the os calcis. Metatarsal 5. Digits 5, before and behind, with very free action on each other, and the so called thumb not much removed from the front, and of course not at all opposeable, being articulated in the same plane with the rest of the digits.

The alæ of the atlas and falciform process of the axis are small, and so also are the spinous and transverse processes of the vertebræ generally. The pelvis is short, broad and obliquely deflected from the plane of the spinal column. It is feeble too, owing chiefly however to the very imperfect ankylosis or osseous blending of the vertebræ of the sacrum. The bones of the pelvis in front (ossa pubis) are united merely by cartilage and form a short bridge of which the keystone is wanting. The ribs, of which 8 only, I think, are true and 7 false, are much curved or bulged; and this, with the large flat muscles laid over them, gives an ursine breadth to the chest, despite the narrowness of the sternum. The sternum is long, and consists of 7 bony cylindric pieces very distinctly articulated and having a very small ensiform cartilage. Admirable a climber as is the *Ailurus*, it has no clavicle, nor even pseudo-clavicle or os-claviculare; and as I have noticed the same thing in other eminently scansorial subplantigrades, I am rather surprised at the unqualified terms in which recent and eminent anatomists\* express themselves on the subject.

The scapula is a stout broad triangular bone, but somewhat rounded along the superior elongate margin. Its glenoid cavity is rounded but inclines to an ovoid rather than a strictly special form. It is deep enough to afford secure lodgment to the condyle of the humerus, but not so deep as to interfere with free motion of the fore limb. The keel

me in regard to the joints constituting the sacrum are, distinct enclosure between the pelvic bones (ilia) and the openings for the passage of the nerves. In regard to the coccygeal vertebræ an envious rat, which ate off 3 or 4 of the vertebræ before I had completed my examination, but not before I had roughly counted all the joints of the spinal column, is the cause of my doubt.

\* Lawrence and Coulson apud Blumenbach. Manual, Eng. Edit. of 1827, p. 49. Carpenter is more guarded. An. Physiol. p. 469. And Bell, The Hand, p. 46. It is possible I may have overlooked a very small os claviculare. And it is difficult to decide whether what I have assumed to be the metacarpal bone of the thumb be not rather the first phalanx.

of the scapula is strongly developed, and at its antea! extremity terminates in a cylindric process which advances as far forwards as the foremost part of the scapula, and appears designed to prevent dislocation of the shoulder in climbing when there is a violent outward pressure on the shoulder-joint. The acromion and coracoid are very slightly developed. The humerus is a single, stout, cylindric bone, as long as the radius and furnished with very large articulating surfaces at each end, especially the lower, towards which the strong ridge for the attachment of the supinators is conspicuous. The radius and ulna are quite separate, nearly equal in size and strength, cylindrico-depressed, with very ample and perfect articulating surfaces. The olecranon is small, like the os calcis. The carpal bones are beautifully jointed so as to allow the freest motion to the wrists; and the digits play with the greatest freedom on one another. The talons or claws, fore and aft, are very highly curved, and much compressed. They have deep bases which are suddenly contracted forwards where they are grooved underneath. Their points are very sharp, and they can be turned over the penultimate phalanges as completely as in *Felis*, but they are only partially sheathed. The femur is as long as the tibia, a single, stout, cylindric bone, very similar in size and form to the humerus, and like it, distinguished by its enlargement at the distad end suited to afford room for the finest jointure. At its proximate or upper end is a very distinct neck, oblique to the shaft, as in the human subject, only thicker and shorter perhaps; and the ball and socket-joint whereby it is united to the pelvis is not so deep as in man, so that the leg has much freer motion, very similar indeed to that of the arm, wherein however the glenoid is not so round or so deep. The tibia and fibula are completely separate; the former stout; the latter, feeble, but both entering into the composition of the ankle-joint and both cylindric in form. The tarsus is as finely articulated as the carpus and the postea! digits have as free play as the antea!, both being quite alike in size and shape. The above details of the skeleton of *Ailurus* exhibit more conformity with the Plantigrade than with the Digitigrade model, except in regard to the talons, which are thoroughly feline or musteline. The separation of the ossa pubis\* appears to be a

\* It is possibly only an effect of non-age. The interval of the bones is very narrow. So short is the pubic bridge that it appears to run as much transversely as longitudinally.

remarkable character of *Ailurus* associating it, quoad hoc, with the Marsupials. Blumenbach (*Man*: pp. 46 and 53) and after him all others have noticed the length of the humerus and femur as a special character of the Plantigrades, and particularly of *Ursus*, their type. Quoad locomotive organs, *Ailurus* is very decidedly framed on the plantigrade model. Nor will it fail to be remarked how decidedly the small feeble processes of the cervical vertebræ in *Ailurus* sunder it from the *Carnivora* par excellence. Yet *Ailurus* has *their* talons and even *their* nutritive viscera, whilst its masticatory organs are of a diametrically opposite character. Such is the ænigma we are contemplating, which, however, may be thus far explained that if width of gut be allowed to be equivalent to\* length, the extreme breadth of the intestines of *Ailurus* will bring them into harmonious correspondence with its triturant dentition. And we may always rest assured that there are no real anomalies in nature, how surprising soever, and at first not wholly intelligible to us that rich variety of means by which the same end is accomplished without violation of a given model of organization. But the state of my health warns me not to prolong these comparative remarks, which will be better made by others. I proceed therefore to my next subject, the Pigmy Hog of the Saul forest, an apparent second species of which form I have recently discovered in the *Sus-Papuensis*† of New Zealand. Since my account of that most rare and interesting animal, the Pigmy Hog, was submitted to the Society, I have been so fortunate as to obtain another and complete specimen of an old male. He was sent to me alive from the Saul forest, but died on his way up, and though the entrails thus became considerably corrupted before the examination took place, there was no destruction of parts, nor any thing to impede a just appreciation of the structure of the soft as well as hard anatomy. To enable me the better to appreciate the structure and affinities of the Pigmy Hog, I procured and dissected at the same time a sample of the ordinary domestic hog of this place, which is native to the Tarai though imported largely into the mountains, to satisfy the appetites of the lazy and carnivorous mountaineers.

*Porcula Salvania. Soft Anatomy.* A fine mature male. Length

\* Blum. *Man*. p. 112. In the mature *Ailurus* the width of the intestines is one inch.

† Voyage de la Coquille, as quoted in the Penny Magazine, voce *Sus*.



from snout to vent 26 inches. Colour a clear amber brown. Pelage ample, ordinary. No mane. A strongly marked mystaceal tuft. Testes and penis as in *Sus*, but only 6 mammæ, which are clearly developed in the male, and are much more remote from each other than in *Sus*, the type of which has 12 teats. Liver 2 lobes, each sub-divided into 2, and no lobulus? 4 divisions in all. Gall-bladder half embedded in the great cleft,  $1\frac{3}{4}$  inch long by  $\frac{7}{8}$  wide. Biliary duct 3 inches, discharging the secretion into the nutritive canal close to the pyloric orifice of the stomach, so that the bile seems rather to pass into the stomach itself than into the intestine. Lungs 7 divisions in all, and more nearly equal in size (as are the lobes of the liver) than in *Sus*, but otherwise similar. Heart  $2\frac{3}{8}$  inches by 2 of maximum width. Spleen very long and narrow like a *Manis*' tongue,  $6\frac{1}{2}$  inches by  $\frac{3}{4}$  inch. Position and general character as in *Sus*, but the organ is very decidedly longer and narrower in *Porcula* than in *Sus*. Pancreas too much decayed for examination. Stomach  $10\frac{1}{2}$  inches along the greater arch, 3 inches along the lesser, in shape like the segment of a circle or crescent, longer and narrower than in *Sus*, and having a fundus in every respect of length and width much less considerable than in *Sus*. The orifices are more remote than in *Sus*; and the fundus, which contracts teatwise and is curved like a ram's horn towards the œsophageal canal, almost touches the cardiac orifice, partly by reason of this incurvation and partly because of the nearly terminal position of the upper orifice. Otherwise the stomach has the usual characters of *Sus*; but it is perhaps thicker in the coats. Great intestine 9 feet long and  $1\frac{3}{4}$  inch wide, singly and slightly banded and saccéd, whereas the same intestine in *Sus* is doubly and strongly banded and saccéd. Cœcum  $4\frac{3}{4}$  inches by 2 inches, conoid, not sacculated at all. In *Sus* the cœcum is banded and sacculated like the colon, and is also much more capacious than the plain cœcum of *Porcula*. Lesser intestines  $14\frac{1}{2}$  feet long and  $\frac{3}{4}$  inch wide.

To summarize the differences in the chylopoietic viscera of *Sus* and of *Porcula*, we may note that in *Porcula* the stomach is narrower, has the orifices more terminal, and altogether is of a much less retardatory character in regard to the passage of the food; that the great intestines and cœcum of *Porcula* uphold the same character of diminished retardation, the cœcum being less in size and void of sacculæ, whilst the colon is only singly and slightly sacculated, not doubly and strongly as in

Sus; that the intestines are shorter\* in Porcula and more equally divided into great and small gut, thus yet further continuing the character of diminished retardation of the passage of the food; that the lobes of the lungs and liver of Porcula show less disparity of relative size and that its liver has apparently one lobule less than in Sus; that the spleen is much longer and narrower in Porcula; and lastly, that this Lilliputian member of the Suidæ or Hog kind has invariably six remote, instead of twelve proximate, teats.

*Pigmy hog. Osteology.* The cervical vertebræ are 5, the dorsal and ribs 14, the lumbar 6, the sacral 5, the caudal 10. Total 40. All these bones bear in general a resemblance to those of Sus, both as to number and character, the only material difference being the extraordinary diminution of the caudal vertebræ, which are 10 in Porcula, 20 in Sus. The skulls of the two with the same general characters, have two important disparities, to wit, that the length of the facial portion of the cranium is greatly contracted in Porcula, which likewise wants the characteristic and normal nasal bone of Sus. It should further be remarked of the skull of Porcula that in consequence of the diminished length of the face the molar teeth are carried much more backwards than in Sus. The extremities of the two types have characters too similar to make it worth while to enumerate the bones of the legs and feet in Porcula, which however differs from Sus, and approaches the Peccaries by the unusually diminished size of the inner back digit.

It will be seen above that I have assigned 5 cervical vertebræ to Porcula, and by implication, to Sus also. Both in fact are so characterised beyond all possibility of doubt, and I call attention to the facts with reference to the unqualified language of the most eminent Anatomists and Physiologists† to a contrary effect. Thus Doctor Carpen-

\* As compared with the tame, but perhaps not as compared with the wild, hog. Porcula has 10 lengths for the intestines, great and small; and so also has the wild Boar, though the tame Pig has 13 and 14 lengths. (Blumenbach's Manual, page 114.) Some other differences may be resolved in the same way: but other and material ones, not.

† Blumenbach, Cuvier, Laurence, Coulson, Carpenter. (Manual, p. 42. Animal Physiology, p. 461.)

Cuvier makes one exception to the otherwise universal 7 cervical vertebræ among the Mammalia. His exception is the 3-toed sloth. (Leçons d'Anatomie comparée, 1. 154.)

ter in his very recent work of 1844, "It is remarkable that the number of the cervical vertebræ should be the same in *all Mammals*, the long necked Giraffe and the seemingly neckless whale having each 7 vertebræ, like all the rest."

I cannot lay my hands upon any osteological formula for *Sus*, and I am aware that the tame breeds of the Pig manifest a strange variability in regard to some parts of their osseous frame-work. But I believe such deviations do not belong to the vertebræ of the neck in *Sus*, and upon the whole I think that the citations and quotation I have given will fully justify my having called special notice to the 5 vertebræ in the neck of *Porcula*, a perfectly and exclusively wild type.

I now proceed to the Stilthorns or Muntjacs.

*Stylocerus Ratwa. Soft anatomy and cuticular organs.* Young male, procured in April, died in October. Two-thirds grown yet not the least sign of horns. Small knobs as in the female in lieu of horns. Eye-pits large. Muffle large. Facial creases conspicuous, and their glands developed. Feet-pits in the hind extremities only, but there conspicuous. Inguinal pits none. No calcic gland nor tuft. Canines distinct but not yet exerted from the lips. Mamma 4. Liver with one grand lobe very partially divided, and a second small lobe. Gall-bladder none. Lungs with a primary dichotomous division. Right lobe quadripartite; left, tripartite and a lobulus. Spleen round, flat, attached to outer side of paunch. Pancreas tongue-shaped, narrow, pale; its ducts vague and doubtful. 4 stomachs a l'ordinaire. Great gut 10. 10. 0. First foot, or that next the cœcum, as wide nearly as it, or 2 inches. Cœcum 13 inches by  $2\frac{3}{4}$ , void of sacculation and banding. Small gut 41. 0. 0. very narrow, the average width being half an inch.

*Osteology* (from a mature specimen). The vertebræ of the spinal column are as follows: Cervical 7. Dorsal 13. Lumbar 7. Sacral 5. Caudal 13—14. Total 45-6. The sternum consists of 7 bones, which are broad and flat, except the first and last, and these are narrow and cylindric. Ribs 13, whereof 8 are true and 5 false. The ribs are compressed, or very little bulged laterally, and the chest exhibits the perfection of the "thorax carinatus" type, whence one is rather surprised at the breadth and flatness of the sternal plates; the very reverse moreover (to add to the riddle) being equally true of the broad-chested climbing Wáh! Ensiform cartilage of the sternum large and

spatulate. Reverting to the spinal column we note that the vertical and lateral processes of the cervical vertebræ are very inconspicuous, while the spinous processes of the dorsals are of perfectly uniform and very inconsiderable height. These are interesting points, having such harmonious and direct reference to the short neck and light head and horns of the Mantjacs. The processes of the lumbar vertebræ, on the other hand, are well developed; the spinous chiefly in depth (fore and aft), and the transverse in length. The spines of the lumbar and dorsal vertebræ are about equal in height. The vertebræ of the neck and back, possess extreme mobility. The sacrals are anchylosed, and have but small vertical or lateral processes. The ilia of the pelvis are united to the first, and first only, of the sacral vertebræ. The pelvis has the usual characters of elongation parallel to the spine in all its parts, even the symphysis pubis or pubic bridge being perfectly longitudinal and not less than  $1\frac{3}{4}$  inch in extent. The bones of the extremities have the ordinary number and character with one signal exception, to wit, that the humerus and femur\* are nearly as long as the radius and tibia, the length of the metacarpus and metatarsus being I think proportionally diminished. To those who are conversant with Anatomy this elongation of the 1st joint of the legs will seem strange, and the more so when I add that the whole bones of the forelimb of the Ratwa are so far from any approach to perpendicularity or rigidity† that they are signally remarkable, even among Cervines, for the opposite characters. The fact is that the Ratwa has no powers of sustained speed or extensive leap: but it is unmatched for the facility with which it passes unscathed and delayed under that low, tangled and rigid undergrowth of the forest which forms its constant abode. I have seen the Ratwa often chased to death in an hour by a couple of the rude bowmen of these hills, aided by 3 or 4 chiens de rue. And on the other hand, I have, whilst stalking the Ratwa, myself been constantly foiled and amazed by the rapidity with which the creatures would glide out of sight and reach amid dense thickets of bamboo by a succession of

\* Length of humerus  $4\frac{5}{8}$  inches, of radius  $4\frac{9}{16}$  inches, of femur  $5\frac{3}{4}$  inches, of tibia  $6\frac{1}{16}$  inches.

† See Bell's fine remarks on the rationale of the structure of the limbs in fleet quadrupeds, and especially of their fore extremities. (*Treatise on the Hand*, p. 54, et alibi.)

rapid bendings of the spine and limbs that enable them to wend on their way without kneeling or a moment's pause, where there were scarcely six inches of free perpendicular passage room. It is no, their speed, a quality of which they have little, but this weasel-like flexibility of the spine and limbs that enables the Ratwas, amid the peculiar copse-wood they inhabit, to foil their great enemy the wild dog or *Cyon primævus*. The Mantjacs of the genus *Stylocerus* or *Stilthorn*, though strictly Cervine animals, are no doubt the most aberrant of their family; and the singular habits I have just remarked on may serve, in part at least, as a key to the apparent anomalies, but real adaptations, of the Cervine model of structure as seen in them. Who, for instance, that has observed the Ratwa, whether at rest or in motion, has failed to remark the invariable and extreme low carriage of the neck and head? Now this I apprehend is as clearly referable to the length of humerus, which protrudes and depresses those parts, as it is perfectly suitable to the exigencies of the animal's position and its consequent comfort and safety.

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I solicit the particular attention of those who have perused my Essay of the Ruminants of India (Journal, No. 180) to the following emendata et addenda. Character of the Cervidæ,—add Gall bladder wanting. Genus *Rucervus*, for type C. *Elaphoides* vel *Duvaucelli*, read Types C. *Elaphoides* et *Duvaucelli*. Captain Hutton assures me I may safely recur to my old notion that these two species are not identical, for that he possesses live samples of both. I conjecture that Mr. Gray's *C. Smithii* is but a synonyme of *Duvaucelli* verus. Genus *Procervus*; I have procured another specimen of this very rare animal, but alack! the horns were cast. It was a male and mature, and had no interdigital pits. Nor had the original specimen, nor my description of it, though the corrector of the press was pleased to make me say otherwise in print.\*

Genus *Rusa*, for Feet-pits in all 4 feet, read Feet-pits none? Two recent specimens of the Jarai show no foot pores, and Captain Hutton assures me that his samples are similarly characterised. Wherefore I must presume mistake in my Nipalese memoranda, a portion only of

\* See Vol. XVII., page 690, line 2. The expression there is "*Feet-pits none.*"  
—EDS.

which, of very various dates and unequal value, was saved on my hurried departure for Europe.

Genus *Axis*. Read canines in males only or in both sexes. And below as follows: Their breeding time is spring, their rutting season, autumn. They gestate about 6 months. Horns cast in January, and, in confinement at least, not perfect till June-July. With September, when the horns are in full perfection the males begin to rut.

Character of *Moschidæ*,—add Gall-bladder constant; and in the native names, for *Múskhi haran*, read *Múskh* simply. Character of the *Cavicorniæ minores*, add Gall-bladder constant. Character of the *Antilopidæ* for canines constant, read canines rare. Genus *Antelope*, add canines none. So also Genus *Gazella*. Genus *Tragops*. The name, I hear, is pre-occupied. Wherefore I substitute *Tragomma*. Colonel Sykes (*Zool. Journal*) says of this type, "Eye-pits very small." But there are certainly none in my samples nor in those of *Procapra*, though there be slight depressions in the skulls of both. Such embryotic organs however cannot be admitted as characters of genera, how interesting soever they be as indications of those links by which genera are connected.

Genera 13, 14, 15, 16. Add to the generic character of each, Canines none. Native name of *Nemorhædus*, for *Saraw* read *Saráon*, vulgo *Sarrow*. Genus *Kemas*, for *Calcic tufts?* read, No calcic gland or tuft.

Genus *Hemitragus*,—add Horns in both sexes.

Genus *Capra*,—add no eye-pits.

Note. I have just ascertained by careful experiment that goats gestate 5 *lunar* months. Genus *Ovis*, the assertion that the wild type or *Ammoides* gestates 6 months rests necessarily on native information. I feel confident that the gestation is identical with that of domestic sheep. *Cavicorniæ majores*, character of the group, dele "laterally;" and for mufle large, read mufle variable. Character of *Bovinæ*, for large angle, read acute angle, and for mufle very large, read mufle large and constant. Genus *Bos*. Type *Bos domesticus*, add this note. Domestic types are bad, but I have none other to refer to, *Bos* being a form proper to temperate climes and authors having rather lumped together than discriminated the various wild types of *Bos* and its allies. I believe however that *Bos Scoticus*, the Chillingham breed, and the *Wizend* of Germany, are genuine

wild types of *Bos*, as above defined, and if so, they should be at once and exclusively substituted and cited. *Bubalus* is the tropical, *Bos* the temperate, and *Bison* the Arctic, type. We cannot therefore look for a true wild *Bos* in India where it is represented by the very distinct but allied forms *Bibos* et *Gavæus*. The range of these latter beyond India is unknown; but judging by Cuvier's expressions I should say that some of his fossil and extant animals belong to one or the other. Genus *Bibos*. Character. After *Cranium* massive, add, nor compressed nor depressed. Genus *Bison*. Add as a note. Blumenbach says the *Aurochs* has a suborbital sinus. This, if correct, must refer to the scull some slight depression on which may indicate an embryotic character of analogy with other genera. But, as already observed, no osteological indication of that sort can be admitted as a generic character, for there is no developed and apparent organ. The *Bison* has some singular analogies with the *cervidæ* and this may be one of them. The *Yak*, a genuine *Bison*, has no trace of real suborbital sinus. I have now two female *Yaks* which came to me in December enceinte. They calved in April and July; and I am assured that the domestic *Yak* drops its calf at all seasons save dead winter. One of my young ones is very vigorous and sprightly, and its mother also: the other, dead.

Genus *Bubalus*: for Types *Bubalus buffelus* et *B. Arna*, read, Type *Bubalus Arna*, and add to the note, after "true *Buffaloes*," of which the *Arna* is the unquestionable, best and sufficient type. The tame animal is therefore needlessly as falsely cited.

It having been asserted in the *Journal*, No. 177, that that noblest of all the Indian *Cervines*, *C. Affinis*, is, in fact, not an Indian species at all, but an American, of which my sample was purchased for the Court of Nepal by its Vakeel at Calcutta, I beg to state, first, that this idle story, originating with the vanity of the *Upádhyas*, was, with all the other circumstances of the case, thoroughly sifted by me and the *Durbar* before I published the species, and, next, that having referred the point a fresh to the present Resident Major *Thoresby* upon the appearance of the cited No. of the *Journal*; that gentleman wrote me as follows: "The story trumped up in the *Journal*, is baseless. The *Deer* in question was shot in the *Mórang*, so far as appears in *Ran Bahádur's* time, as was stated to you after much investigation."

*Routes from Darjeeling to Thibet, by A. CAMPBELL, M. D. Superintendent of Darjeeling.*

In March last, I had the pleasure to forward to the Society an Itinerary from Darjeeling to Lassa, which appeared in the April No. of the Journal; I would not so soon again be a contributor of conjectural information regarding this portion of the Himalaya if any thing at all was known to the Society of its geography: or if circumstances did not preclude the obtaining of precise information by the travels and observations of competent geographers. So it has been however, and the Sikim division of the mountains, with the contiguous border of Thibet, is as yet almost unknown to the public. This will, I am sure, be accepted by the Society as a sufficient excuse for the presentation of these Routes.

They have been compiled with a good deal of trouble from native travellers. The rude diagram annexed, exhibits the line of 7 routes from Darjeeling towards Thibet. Five of these pass all the way through Sikim to the Thibet frontier, and cross the Snowy range to the east of Kunchinjinga.\* The remaining two run through Sikim to the north and westward of Kunchinjinga, and uniting at Yamgatcha in the Nepal territory, cross the frontier of that state into Thibet by the Kanglacha Pass.

*Boundaries of Sikim.*—Sikim is continuous with Thibet on the north and east from the western shoulder of Kunchinjinga to the Peak marked Notolah. Its south-east boundary is formed by the Rungoh river, which rises from Notolah and falls into the Teesta, dividing it from Bootan; on the north-west the boundary with Nepal is formed by the Kanglanamoo spur of Kunchinjinga and the continuous ranges of Singalelah, Phugloot, Jonglah and Myong, to the head of the Mechi river; on the west by the Mechi river and on the east by the Teesta river. The southern boundary is on the plain and continuous with our Province of Purneah.

*Mountains.*—The grand feature in the geography of Sikim is Kunchinjinga; it towers over all the neighbouring peaks of the Himalaya, and is I believe, one of, if not, the highest mountain in the world. The highest peak is about 40 miles north by west of Darjeeling, and is a

\* For "Chola route," see Journal As. Soc. for April 1848.



stupendous object from every part of Sikim. Besides the highest peak of Kunchinjinga, and forming portions of this glorious mountain, are the subordinate ones of Pundeem, Kubroo, Nursingh, &c. covered with perpetual snow. To the north-east of Darjeeling and at no greater distance are the snowy peaks of Chola, Gangri and Yakla. These latter mountains, with the giant Kunchinjinga, form the great barrier between India and Thibet in this direction, and lying under their mighty shadows is the sub-Himalaya, which forms the principality of Sikim.

*Rivers.*—All the rivers of Sikim noted in these Routes have exit in the plains by the Teesta, or the Koosi. The Teesta is the great drainer of Sikim, and receives all the waters of its upper regions. The lower hills being drained on the west of the Darjeeling Tract by the Balasun and Mechi, and on the east by the Mahanuddi. The feeders of the Koosi which occur in the route *viâ* Kanglachema No. 1, all rise in Nepal to the north and west of the Kanglanamoo spur of Kunchinjinga, and by a south and westerly course fall into the Tambur or most eastern branch of the Koosi, the principal feeders of the Teestah. West of Kunchinjinga are the little and great Rungeet, the Rumam, the Kullait, Ratong, Chooroong and Rungbee. From the east of Kunchinjinga the Rungbo, Lachoong, Lachen, and the Teesta proper so called, which rises in the eastern face of Kunchinjinga itself. The Rungbo is sometimes called the little Teesta, and divides Sikim from Bootan above its junction with the Teesta, whence to the plains the Teesta is the boundary between these two countries.

The Tashirukpa and Choomachoo of the Route No. 1, rise in Thibet and are feeders of the Arun which is, I believe, the greatest branch of the Koosi.

The Machoo noted in the Yakla and Chola routes runs through Bootan and reaches the plains I believe by the Gudada, which falls into the Burumpootra at Rangamutty.

I hope by and by to furnish the Society with a protraction of these routes by Major Crommelin.

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No. I.

*Route from Darjeeling to Digarchi (Shigatzi) by Jongri and the Kanglachema Pass of the Snowy Range.*

1. *Seriong viâ Tuqvor.*—Cross the little Rungeet, ascend to Goke,

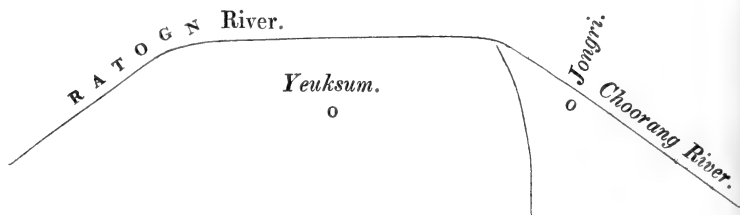
cross the Rumam and then ascend to Seriong, which is a village inhabited by Limboos and Lepchas. Direction north.

2. *Hee*.—Ascend to “Murmium Lah,” then descend to encamping ground—a village of Limboos. Direction north.

3. *Pemiong Chi*.—Descend about a cos cross the Kullait river; ascend gradually to Linchong in an easterly direction, thence to Tigzhuk still in an easterly direction and by a gradual ascent. From Tigzhuk the direction is north and the ascent steep to Pemiongchi. The Kullait rises at Singalelah or Tolimbo. Old Sikim is about 2 miles from Pemiongchi to the east. The Lepchas name the Old Durbar “Pheeoong Ghurry;”—the Bhotiahs “Rabdengching;”—Limboos “Lapteuchi.”

4. *Yoksum*.—Descend to “Chongpoom;” cross the Ringbi Nuddi, ascend to Tingleng, a village of Bhotiahs, Lepchas, and Limboos. Descend to and cross the Ratong river, whence ascend all the way to Yoksum where there is much level ground and which is a place of ancient note. Before there was a Raja of Sikim, there were three Goompas here, and it was the head Lamas of these who agreed that it would be desirable to have a king for their country, and they accordingly despatched Agents to Gantoke, whence the first Raja of Sikim was brought and installed. This individual had previously come from Thibet, was a Khamba, and the ancestor of the present Raja. “Yeuk,” in the Lepcha language, means a chief; “Yeuksum” is three chiefs, hence the name of this place as the residence of the three great men above alluded to. Direction north by west.

5. *Jongri*.—Ascend gently in a westerly direction from Yeuksum. Descend a very little and cross the Ratong river, whence you ascend all the way to “Jongri.” The Ratong rises from Kunchinjinga, takes a westerly course, where it is crossed in this march, and then turning round Yeuksum runs east to the Great Runjeet, which it joins at Tassiding, thus—



“Jongri” is at the west foot of Kunchinjinga and half a day’s journey or less from the perpetual snow. The snow lies at Jongri for two or three months in severe winters and is continuous with the snow of Kunchinjinga, which descends a long way below Jongri and lies there in severe weather.

6. *Yalloong*.—Descend to the Choorong Nuddi, which is about 4 or 5 miles in a north-west direction, then ascend to the Kanglanamoo ridge, which is a spur of Kunchinjinga; thence descend to Yamgatcha, and go along the Yamgatcha choo due west to Yalloong, which is at the confluence of the Yalloong choo and the Yamgatcha choo. The Choorong rises from the east face of the Kanglanamoo, and falls into the Rantong, half a journey below Jongri. The ridge of Kanglanamoo is the boundary of Nepal and Sikim, and always has snow on it. The Yamgatcha choo rises from the north-west side of Kanglanamoo, and runs into the Yalloong river, which falls in the Tambur river two journies below Yalloong.

The Tambur is the great eastern feeder of the Koosi. Yalloong is a village in the Nepal territory, through which passes the trade from Thibet with Nepal and Sikim by the Walloongchoong and Kanglachema passes. Singalelah is about three journies from the crossing of Kanglanamoo above described, in a south and west direction. The ridge is continuous to Singalelah. Laden Yaks, sheep and goats, travel from Jongri to Yalloong and onwards by Kanglachema and Walloongchoong to Thibet. Direction N. W.

7. *Kanbacheu*.—Cross the Yalloong and ascend to the ridge of Choomjerma, whence descend to Kanglachen, which is a village of Bhothias on the river of the same name. Opposite the village—and across the river—is the Tassichooding Goomba, which belonged to Sikim when the Raja occupied the old Durbar, but since then it is in the hands of the Nepalese. The Kanbacheu river is a feeder of the Tambur, into which it falls one day’s journey below Tassichooding Goomba. Direction N. by W.

8. *Nangola*.—An easy journey, the usual stage for unloaded travellers being “Yangma.” Cross to the Tassichooding Goomba and ascend gradually to Nangola. Direction west by north.

9. *Yangma*.—Descend to the encamping-ground, which is on the Yangma river. On the opposite bank is “Mending Goomba.”

The Yangma and the Walloong river unite half a journey below Mending Goomba and their united waters fall into the Tambur one day's journey from their confluence, whence the course is southerly. You may go on from Mending to Thibet by Walloongchoong, but the thoroughfare is to

10. *Kanglachema*.—Direction west by north. The route lies along the Yangma for half a journey, then leaving the river ascends to Kanglachema, which is the boundary of Nepal and Thibet, and is always under snow. The descent from Kanglachema to the Choomachoo is about 5000 feet; road good. No trees on north face of Kanglachema, nor any on this side above "Yangma"

11. *Choomachoo*.—Descend to this river, which runs west by south and into the Arun. It is the source of the Arun. At the crossing is the Tashirukpa Chaiten (Chaitya) a very fine and large one. Here 4 roads meet, viz. the Yangma road just described. 2. The Walloongchoong road. The Tokpay road, leading from Duncoota by the Arun river. Shingsha is at the junction of the Choomachoo with the Arun; there is a gola here. I have been to it from Tashirukpa all the way; the bed of the Choomachoo is the route for the greater part of the way; after leaving the bed of it I crossed the Kakula Pahar to Shingsha. It is too far round to go by the river all the way. From Tashirukpa to Kakula is nearly level; quite a plain, but very cold; Shingsha is in Nepal and here it is mountainous.

The Tashirukpa choo is a small stream which falls into the Choomachoo at the Chaitya.

12. *Koodoojong*.—Along the Tashirukpa all the way. The direction is north, country level and pretty well inhabited by Bhotiahs. No cultivation, it is too cold for anything to ripen. The people live by trading and get their supplies from Shingsha on the south: and also from the north. They keep Yaks, make butter from their milk and sell it. There is a Thibetan officer stationed here. He is styled "Neabo."

13. *Chankpook Goomba*.—The route lies all the way in the bed of the Tashirukpa river, which has still a southerly course. The country is level, and at the Goomba there are about 40 houses. There is cultivation here and wheat ripens; also pease, radishes and turnips. Koodoojong is like Phari; nothing ripens at either place. They are too near the snowy mountains. The country along this march is quite level.

14. *Sarrh*.—Direction north. The Neela range is crossed on this march. The ascent is commenced about half way from Chankpook, and is not above 500 feet. No snow on Neela in August, or till the cold weather.

15. *Badong*.—Direction north, country level, but not cultivated; thinly inhabited by herdsmen who keep herds of Yaks and live by the sale of the butter, which is very fine. There are no trees nor shrubs even. The Yaks browse on short grass, and people use their dung as the only fuel.

16. *Dobtah*.—A hundred houses here or more. The people are all Bhotiahs, and cultivate a good deal. They are subject to the Sekim Raja and pay their rents at Choombi, which is 4 horse journey to the east viâ Phari, 6 on foot. The country is quite level from Badong to Dobtah, but very bare and stony. There is a large lake close to Dobtahjong and east of it. It takes more than a day to walk round it. It is very deep and has sweet water. The Tashirukpa rises from it. The name is “Tsomootethoong,” which means the “Lake the mule drank of,”\* and the origin of this is as follows. “There was a well here originally, but a mule one day knelt down and drank out of it. No sooner it did so than the waters rose and formed this large lake.” The neighbouring lands are irrigated from it; the banks are grassy, and it is well stocked with good fish. There are no trees to be seen here and the cultivation is confined to wheat, pease, turnips and radishes.

17. *Kochoochen*.—About 5 cos over a level bare country, but thinly inhabited. There is a hot spring here which is used medicinally; it rises out of the level ground, not from a hill. The Sikim Raja visits it when he comes to Dobtah from Digarchi. When at Choombi he uses the hot springs of Kamboo Sahoo, which are near the Phari road at Bukcha. Kochoochen belongs to the Thibetans, not to the Sikim Raja. Direction north.

18. *Shejong* or *Bhejong* on the She river. This is the residence of a Soubah, and has about 100 houses. The route is due north and over a level country, i. e. there are but small hillocks scattered over a plain. No trees except the willow, which however is not indigenous but brought from a distance—Lachen-Lachoong. The only crops grown are wheat, pease, radishes and turnips; grass is abundant; rains

\* Tso, lake; te, mule; thoong, to drink.

fall but seldom. There is more rain at Phari and Choombi than here. The "She" choo, which runs close to the village and the Soubah's residence, has here a westerly course, and I believe it falls into the Yaroo. The "Jong" or Shoubah's dwelling is on the top of a small hill, and this is the general usage in this part of Thibet.

19. *Looghri*.—Direction north; cross the Shechoo, which is fordable; at 2 cos further on ascend the Lassoom ridge, which is 2 or 300 feet high, and descend to your ground, which is on the plain.

20. *Digarchi*.—About 5 miles due north over the level land, which is very bare, nothing to relieve the eye except a few willows and the "Shaboo," a large tree brought from a distance and much liked in Thibet. Around Digarchi there is a good deal of cultivation, which is irrigated from the Painomchoo, which falls into the Yaroo about 2 cos below Digarchi. This is a good-sized river, not fordable in July, August and September; "it runs from the eastward, being close to Giangtchi, where it rises I do not know. It is as large as the great Rungeet; the ferries are served by leather boats. There is a bridge over it at 4 miles above its confluence with the Yaroo. The Yaroo comes easterly and takes a northerly turn at Shigatzi."

The Tingri road from Nepal is joined by this route a cos from Looghri.

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No. 2.

*Route from Darjeeling to Yamgatcha by Yangpoong Gola and Doomdonglah.*

This route runs through Sikim to the west of the Jongri one, and by Tuqyor and Seriong to Hee, and thence to

*Lingcheet*.—Cross the Kullait river and ascend to Lingcheet; direction north by west.

*Talet*.—Ascend to the top of the Tengechok Yongchek ridge, cross it and ascend to this stage. Direction north-west.

*Phiongdang*.—Descend to the Rungbee-nuddi and go along its banks to this encamping-ground; direction north. The Rungbee falls into the Ratong below Yoksum.\*

*Choonjom*.—Along the Rungbee all the way and due north. The Rungbee rises from the Singalelah ridge.

\* See Jongri route.

*Yangpoong.*—Leave the Rungbee to the left and ascend to this place, where there is a customs chokey of Sikim. Salt is brought into Sikim by this route from Thibet, but the trade is liable to interruption from the Nepalese, who stop its passage in the portion of their territory through which the road runs beyond Choolongkook.

*Gomothang.*—Ascend the Pekionglah; cross the ridge and descend to this stage, which is on a small stream of the same name.

*Chodomdong.*—Cross the Gomothang stream and ascend along it to this place. There is a lake here which is the source of the Gomothang; it runs easterly and falls into the Ratong below the junction of the Choorong with that stream.

*Choolangkeok in Nepal.*—Ascend to the crest of Domdonglah, cross it and descend to this ground. The Domdonglah ridge forms the present boundary between Nepal and Sikim, and is a continuation of Kunglanamoo. There is a small stream at this stage; it is a feeder of the Tambur Koosi.

*Yangatcha.*—Ascend and cross the Giroonglah, whence descend to this stage, where you fall into the Jongri road.

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No. 3.

*Route viâ Lachen and the Latong Pass.*

From Choongtam, at the confluence of the Lachen and Lachoong rivers to

*Dema.*—All the way along the Lachenchoo, direction north-west.

*Latong, on the plain of Thibet.*—About 5 cos from Dema ascend to the ridge of Latong, cross it, and without any descent you are on the Table-land of Thibet. On either side of the pass there is a high peak. You can go round by the bed of the Lachen, but the pass is the better route. Taloong is on the Lachenchoo, which rises to the eastward from a lake near Cholamoo.\* The Lachen cuts off Kunchin from the range to the eastward.

*Geeroo.*—Over the level land in a north by west direction, and here you join the road from the Dankia pass. There is a fifth route to Thibet east of Kunchinjinga and west of this Lachen one, of which I have no particulars. It strikes off at Garrh† on the Teesta, whence the

\* See Lachoong route.

† See route by Lachoong.

next stage is "Barfok," thence Lingjah "Ba;" at Taloong, the confluence of Taloong and "Ba" streams there is a Goomba. The Teesta proper is left to the west at Lingjah, where it is crossed to the east bank. The road beyond Taloong is not known to my informants, but it goes along the stream of this name and over the Tekonglah into Thibet; Takong is a continuation or spur of Kunchinjinga.

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No. 4.

*Route from Darjeeling to Choombi by the Yakla Passage of the Snowy Range.*

1. *Darjeeling to Sumoong.*—Viâ Lebong-Ging and the guard-house above the Rungeet. Cross the Rungeet at the cane bridge, and ascend in an easterly direction to the encamping-ground, which is about 1000 feet above the river.

2. *Chadam.*—Direction easterly, with a good deal of ascent; Chadam is about the same elevation as Namgialatchi, from which it is one day's journey.

3. *Namten.*—Direction northerly and easterly. The road skirts the base of Tendong, and there is little ascent or descent. The Ting, a small feeder of the Teesta, is crossed on this march.

4. *Took on the Teesta River or Changchoo.*—Descend all the way from Namten to the Teesta. The Rungbo river falls into it 2 cos below this ferry.

5. *Nadok.*—Cross the Teesta on a bamboo raft (Sa pan) and ascend in a northerly direction to this place, which is inhabited by Lepchas and Bhotiahs.

6. *Dikeeling.*—Ascend almost all the way in a northerly direction. Dikeeling is a permanent village of Bhotiahs, with a good deal of cultivation in wheat, barley, maize, rice, kodu, buckwheat, &c.

7. *La Ghep.*—This is not the "La Ghep" on the Tumloong and Chola route, but it is the same name for the same thing; it means, *the other side of the mountain*, and it is here so called by the Thibetians, and means the other side of Yakla or the Pass. It would be quite correct in a resident of this side of Chola to call Tangzoo, La Ghep.\* Ascend all the way from Dikeeling. There is snow here all the winter,

\* See route from Tumloong to Phari, Journal As. Soc. for April, 1848.



and no permanent habitations onward to Choombi. Yak herdsmen however frequent La Ghep and Yakla in the summer and rains.

8. *Bangrong*.—Direction west by north with very little ascent; cross the Bangrong Choo, a small stream which falls into the Rungbo.\* The forest continues to Bangrong and beyond it. The Doom Shing (yew) is abundant and so is the Kema, a large flowering tree which is peculiar to the snowy regions. It is common at Jongri.† “There are seven sorts of Kema distinguished by the colour of the flower.” The Kema is neither *Rhododendron* or *Magnolia*; flowers in May and June, is strongly scented.

9. *Yaten*.—Direction east by north; a gradual ascent. The forest ceases before reaching this place, which is bare and rocky. Snow in winter, no inhabitants. The pass of Yakla is close by; travellers put up in caves at Yaten.‡

10. *Charafook*.—Ascend about 100 feet to the Yakla passage, which is over a narrow ridge; cross it and descend all the way in the bed of the Yakla Choo to Charafook. From Yaten to Charafook is not more than 4 cos. Above the Yakla passage on the left is the peak of Gangri, not more than 600 feet high. It is not covered with snow during the rains, is visible from Darjeeling, and is a peak of some note, and venerated by the Lepchas; it is second however in this respect to Kunchinjinga, but annual sacrifices are made to it, and a festival held in honor of it. To the right of the Yakla passage there is no peak or elevation of the ridge. The Yakla Choo falls into the Chola Choo (Tangzoo Nuddi, of printed Itinerary to Phari§) a cos from Gangajong, at which place their united streams fall into the Machoo. The course of the Machoo is east and into Bhootan. Gangajong is 3 or 4 cos to the east of Charafook.

11. *Choombi*.—Direction north; a short way from Charafook you leave the Yakla Choo, and at 2 cos you cross the Chola Choo;—about a cos further on and beyond E-tok you fall into the Chola road from Tumloong. There is forest at Charafook and onwards to Choombi, principally of pines and yews.

\* The Rungbo divides Sikim from Bhootan to the east of the Teesta; its course to the Teesta is westerly.

† See route to Digarchi viâ Kanglachema.

‡ There are two lakes to the east of the road near Yaten.

§ Journal As. Soc. for April, 1848.

## No. 5.

*Route from Darjeeling to Digarchi by Lachoong and the Donkialah passage of the Snowy Range*

The stages from Darjeeling to the Teesta are the same as those noted in the route to Tumloong, viz. by Namgialatchi and Temi to the Samphoo or Sanadong Ghat, whence keeping the west bank of the river the next stage is

*Kedong*.—The road is difficult and runs for the most part parallel to the river, and about 500 feet above it. General direction north by west.

*Garrh*.—West of the Teesta, ascend from Kedong to Singdam, which is a Lepcha village, thence descend to Garrh. Road difficult.

*Balla Samdong, on the Teesta*.—Direction due north; descent all the way to the Teesta.

*Rungoon*.—Cross the Teesta at the Balla Ghat\* by a cane suspension bridge, and ascend to the encamping-ground; direction north, road good, and habitations along it.

*Singtam*.—Ascend a short way, cross the Singtam ridge, then descend to this stage, at which there is a village; there is a small stream which runs west to the Teesta.

*Miangh*.—Ascend the Miangh hill, cross it, and descend to the encamping-ground, direction north-west. The united streams of the Lachen and Lachoong fall into the Teesta below Miangh.

*Namgah*.—A good road, north by west, moderate ascent to Namgah.

*Tongh*.—About half way from Namgah you come to the Lachen Lachoong Choo, along the east bank of which lies this place. The Lachen choo rises from a lake beyond the snowy range, and after running west, penetrates the range at Latong, where there is a passage into Thibet, to be presently described. It unites with the Lachoong Choo at Choongtan, one day's journey above Tongh, and forms the Lachen-Lachoong feeder of the Teesta. The Teesta proper rises from the east of Kunchinjinga. The Lachoong rises from the Donkia mountain and runs down the passage that bears that name and to which this present route appertains.

\* Sandong is Thibetian for ferry. Samphoo, the Lepcha word. Changchoo is the Bhotiah name of the Teesta; Lepcha, Runew; Limboo, Toongwama.

*Choongtan.*—At and just above the junction of the Lachen and Lachoong. There is a Goompa here, and a few houses of Lepchas; rice grows at the riverside.

*Lachoong.*—The road, which is pretty good, lies all the way along the riverside, west bank. The river is as large as the little Rungeet.

*Yeumtang.*—All the way on the west bank of the Lachoong, and close to it; direction north, road good, no inhabitants, and forest heavy.

*Momay Samdong.*—Still along the west bank of the Lachoong. There is a warm spring here; no forest, some Juniper bushes only.

*Cholamoo.*—Leave the Lachoong at Momay, and after proceeding some distance ascend the Donkia Lah for about 300 feet, when you cross the ridge through a pass or depression in it, flanked by two high peaks, which are not snowed before September. The pass itself is not snowed before November, and may generally be crossed till December, if the winter is not severe. The Lachoong is formed at Momay, by numerous small rills from the Donkia mountain.

From the pass to Cholamoo the descent is very steep and may be about 800 feet. Here begins the plain of Thibet. No inhabitants at Cholamoo.

*Geeroo.*—Direction west, road good and all the way over level land, which is quite bare of vegetation, and generally stony. The Lachen road over the Latong pass falls in at Geeroo.

*Kambajong.*—Direction west, road good and over level land, which has occasional hillocks rising from it. A village of Bhotiahs here, and some cultivation. The station of a Soobah.

The road from Choombi to Dobtah and this place is by Phari, which is three journeys to the east.\*

*Uchee.*—Direction west and over level ground. Hot springs here of some celebrity, they deposit a white salt, called Peu, which is I believe carbonate of soda. No inhabitants here, country very bare and barren.

*Koorma.*—Direction north, cross the Tagilah, a ridge of 3 or 400 feet high, within a short distance of Uchee, then along a sandy plain to Koorma, which has 100 houses or so. The people are pastoral and traders, no cultivation.

\* The stages are Dokshala, Mendingbooding, Phari; the road is easy and over the plateau of Thibet.

*Potheet*.—Direction north, road good and over level ground, no houses, a “Dennkang” or rest-house.

*Rhejong*.—Cross the Kiongola, a range of 300 feet or so. Direction north. Here you fall into the road from Dabtah to Digarchi. The Rhe Choo, which runs to the west, flows by the village.

*Lassoom*, and thence to Digarchi, as by the Kanglachema route.



*Report on the Salt Range, and on its Coal and other Minerals.*

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On approaching the salt range from the Jhelum opposite Jelal-pore, a traveller is at once struck with the brick-red tint and barren appearance which the strata forming the principal part of its steep southern escarpment present to view, and with the peculiar white color of the rock, which particularly to the westward, seems to cap the range, resting on the inferior red strata, with which it forms a striking contrast.

*Height and course of salt range*.—Its height as stated in Malte Brun and Balbi’s Gazetteer is 2100 feet above the level of the sea, and from Jelal-pore the hills stretch W. S. W. until within about 20 miles of the Indus, when they take a turn to the north, crossing that river at Maree and Kalibag in a N. W. direction, from which latter place they divide into two or three branches.

The part of the salt range which first came under our observation was in the neighbourhood of Pind Dadud Khan, where we arrived on the 19th March 1848. From thence, after examining a locality 10 miles to the eastward called Baghanawalla Davee, we crossed the hills to Choe and Kutass, marched down along the foot of their northern declivity to Noorpoor, crossed over the low hilly district towards Mok-hudd, on the Indus, came down that river by water to Kalibag, which we reached on the 14th April, and from whence we returned along the south side of the range to Pind Dadud Khan, where our labors closed on the 28th of that month.

By adopting the above route, we were enabled to obtain a general idea of the structure of both sides of the range, and though, on account

of the lateness of the season, the extreme heat of the weather and the shortness of the time allotted for our researches, we were unable to examine in detail the whole extent of the hills, yet from the uniformity of character which, with one or two exceptions, these present at the different points visited, we feel assured that little of practical importance has been overlooked, and that the conclusions we have arrived at will generally be found correct.\*

*Foot of salt range.*—Intervening between the Jhelum and the acclivity of the salt range in its eastern part, there exists a level plain which extends west towards the Indus and stretches down between the two rivers. In their immediate neighbourhood cultivation is pretty extensive, but towards the foot of the hills, the soil becomes extremely barren and is covered with a thick saline incrustation of sulphate and muriate of soda, which to most plants appears to be highly injurious.

*Water.*—The water in this plain becomes more and more brackish as one approaches the hills, that which issues from their base being a perfect brine and quite unfit for culinary purposes, the inhabitants being entirely dependent for the supply of this necessary, on rain water, or water brought from the Jhelum or upper point of the range, and which is collected in tanks. These are generally kutchas except in the neighbourhood of Pind Dadud Khan, where through the exertions of Misser Rulla Ram, the intelligent Superintendent of the salt mines, good sized pukka tanks have been constructed and yield an abundant supply of sweet water to the miners and natives around.

*Rolled Boulders.*—The commencement of the acclivity of the range is marked by a succession of small hills of a reddish sand, in which rolled boulders of rock become more and more numerous as one ascends, and at last cover the base of the hills. These are of all sizes, from a filbert up to a ton in weight, and consist of granite, gneiss, mica slate, porphyry quartz, limestone and red sienite closely resembling what is known in Scotland under the name of Peterhead granite.

\* Since writing the present report we have had the pleasure of perusing a paper by Dr. Jameson of Saharunpore, which was reprinted from the Asiatic Society's Journal for 1843, in a late number of the 'Bombay Times,' and contains an account of his observations made during a trip to the salt range, which generally coincide with our own, although in some of the details we will be found to differ. We regret extremely not having been aware of the existence of this interesting article, until we found it in the pages of the Bombay paper.

*Red sandstone conglomerate.*—These boulders have resulted from the disintegration of the rocks superior to them, and particularly of a coarse red conglomerate on which the other strata of the range appear to rest, and which only here and there crops out under a coarse rusty red sandstone. The conglomerate is best seen on the Indus below Kalibag, where the imbedded boulders are numerous and of the same character as those to the eastward. In this, as also in the sandstone superior to it, no organic remains could be discovered.

*Red sandstone.*—*Red saliferous marl with Gypsum and rock salt.*—Succeeding to the sandstone, which varies in the thickness of its strata at different points, is a red ferruginous marl including beds of gypsum, both earthy and saccharine angular masses of which stand out in bold relief on the sides of the hills, the softer matrix having been washed away by the rains. The marl contains large crystals of Selenite or crystallized Gypsum, known to the natives under the name of *Aberach*, but they seem neither acquainted with its valuable properties when burned or of that of the Gypsum, which can be had in any quantity and with a very trifling amount of labor. The saccharine variety is generally of a light grey color with a shade of blue, translucent on the edges and yields a plaster of Paris by calcination, of good quality.

But of far greater importance are the deposits of rock salt that the red marl includes, and which we will merely allude to here as characterizing it, which though irregular in the depth of its deposit, seems to attain its greatest thickness in the neighbourhood of Pind Dadud Khan, thinning out towards Baghanawalla to the east, where no salt is excavated, but yielding that mineral in abundance in all the western course of the range, with the exception of one or two localities, where the hills are of small altitude.

*Variiegated sandstones.*—Above the marl, a breccia of masses of gypsum, sandstone and limestone cemented in a red calcareous matrix is occasionally to be noticed, lying unconformably on the marl, and to this succeeds a series of arenaceous and argillaceous beds, the prevailing color of which is blood red and presenting all the characters of the usual variegated strata of the saliferous formation. In the lower part of this series at Baghanawalla there occurs a succession of blue slaty soft argillaceous sandstones of considerable thickness, becoming highly calcareous towards their upper part, and above these is a light fawn

colored limestone on which rest the variegated sandstones and conglomerates interlaminated, with their beds of a bluish green indurated clay, nodules of the same being abundantly diffused throughout the strata. This limestone, though in appearance resembling magnesian ore, does not contain a trace of that earth, and is, as far as we could ascertain, devoid of organic remains.

*Saline efflorescence.*—Up to the highest point to which the variegated strata extend, their surface, as well as that of the rocks inferior to them, are incrustated with a saline efflorescence, which by solution in the water which flows down the valleys, renders it a perfect brine.

*Absence of Organic Remains.*—Ripple marks are by no means uncommon in the sandstones which, with the exception of what probably may be Fuci, are particularly free of fossils, a fact quite in conformity with what is usually observed in other countries in the red strata of the variegated sandstones. Whether these originally contained organic remains is a question which it is impossible to solve, but the same action, probably igneous in its origin, which has caused the peroxidation of so much iron in the strata, and to which they owe their color, may have destroyed any traces of organisms which at the period of their deposition they may have contained. That the rocks composing the salt range have been exposed to violent disturbing agencies is evident from the contorted and confused appearance which in many places they present, and from the general dip of the strata to the N. at angles varying from 40 to 50 degrees. What the elevating power may have been which has raised these to the position they are now in we will not presume to offer a conjecture, but the absence of Plutonic rocks in situ among those of the salt range, might lead us to seek for an explanation different from the usual one which these afford of the elevated position of strata. Much of the disturbed appearance which the red marl and sandstones present, is the result of ordinary causes, the most important of which are the periodic rains which in tropical climates produce such extraordinary effects, and in the salt range by undermining the rocks, cause immense slips, which give rise to a state of confusion among the strata often most embarrassing to the observer.

*Calcareous strata with Fossils.*—Above the variegated sandstones are others of a lighter tint alternating with light yellow sandstones, calcareous conglomerates and coarse limestones. These are well seen in

the neighbourhood of Pind Dadud Khan, at Noorpoor to the westward, and are much developed at Kalibag. To the east of Pind Dadud Khan they are very deficient, and do not exceed a few feet in thickness, being represented by a soft yellow fine grained friable calcareous sandstone and yellow marl.

In these strata organic remains, exclusively of marine origin, are found in considerable abundance, particularly at Kalibag, Musakhail and Noorpoor. Nummulites and other Foraminifera abound, becoming more and more plentiful at a higher position in the series of rocks forming the range.

At Kalibag Belemnites associated with Ammonites, species of Echinodermata corals, &c. occur, their color being light brown. The former have never been found in strata inferior to the Lias formation, and this circumstance, together with the fact stated by Professor Ansted in his excellent work on Geology, that Echinidæ for the first time in an ascending order appear in rocks of the Oolitic Æra, induce us to believe that the variegated strata of the salt range are succeeded by others of a different formation, which in all probability belong to an age more recent than the Lias. At Musakhail, about 10 miles E. of the Indus, the fossils found in the limestone differ considerably from those of other localities, and will be noticed hereafter.

*Lower Yellow Marl.*—We have alluded to a yellow marl as occurring above the calcareous strata. This is seen along the whole of the range, presents a strikingly uniform appearance and is full of marine shells, some of which do not occur in the strata inferior to it.

*Bituminous Shales including Seams of Coal.*—The marl forms the basis of a series of bituminous shales interlaminated with beds of blue clay and full of iron pyrites and large crystals of gypsum. These shales differ much in thickness at various points, and include seams of coal. A few shells are occasionally to be found in the shales similar to those of the marl on which they rest, and in a marl of the same character which is superimposed and passes into a very compact limestone of a light grey color, sometimes however separated from it by strata of a yellow calcareous sandstone of no great thickness.

*Upper yellow Marl.*—The upper marl is in some places so compact and composed of the comminuted remains of shells and a few corals, as almost to entitle it to the name of shell limestone. From it we obtained



two species of Echinidæ and a single tooth resembling that of a shark, which is the only trace of the remains of vertebrata, we had the fortune to discover.

*Compact Nummulite Limestone with Flints.*—The compact limestone, from its light grey, almost white color, and the great abundance of flint nodules deposited in it in regular layers, together with the appearance of its fossils, which are sometimes incrustated with a white chalk, has a certain resemblance to some of the older members of the cretaceous formation.

*Chemical character of Limestone.*—Its fine grained, almost flinty appearance, at first sight induced us to believe it was highly saliceous; but this is not the case, it being a very pure limestone, rapidly dissolving in diluted acids and leaving a mere trace of clay or mud. Its weathered surfaces have a glazed appearance, and present occasionally an oolitic structure, which is caused by the numerous nummulites and other foraminifera which frequently form the rock. The influence of these and of the more minute but not less wonderful class of infusorial animals in building up the crust of the earth is well illustrated in the strata of the salt range, all of which appear to be of marine origin, the sea at the time of the formation of the upper deposits having been highly charged with calcareous and saliceous matter, which through the agency of these minute organisms has been separated from their solutions and deposited in the masses we now behold. This limestone, which for the sake of distinction we will call *nummulite limestone*, forms the ridge of the hills presenting a steep southern escarpment from 150 to 200 feet high and giving to the range the peculiar white color before alluded to. It presents indistinct marks of stratification, except in its lower part, but reposes conformably, as far as we could ascertain, on the rocks inferior to it. Its surface, as exposed in the precipices on the southern escarpment of the range, weathers into large cubical masses, which give it the appearance of a wall built of loose fragments of rock, which by their gradual disintegration have fallen down and cover the declivity of the hills over a considerable surface, rendering their ascent a matter of no ordinary labour.

On surmounting the saliferous strata the saline efflorescence before noticed, as occurring on their surface and on the banks of the small streams which flow down the ravines, entirely disappears, and the water

which issues, but in small quantity on the south side of the range from the strata above, is sweet and pleasant to drink.

*General appearance of vegetation.*—The difference in the character of vegetation in the two districts is also striking in the extreme. Where the salt prevails, the few plants which occur are, with one or two exceptions, diminutive and unhealthy, but on reaching the limestone their appearance changes to a lively green, grasses and ferns are to be seen along the sides of the rivulets; and an Acanthaceous shrub which abounds generally throughout the range, becomes of at least twice the size. But the contrast is even more striking when the summit of the range is reached.

From this the limestone dips to the N., presenting on the northern declivity of the range a series of valleys separated by rounded hills. By its disintegration, it yields a soil which in the valleys is productive of excellent crops of wheat and barley, where the loose stones have been removed. These are generally piled up around the fields into low walls and remind one of the peculiar fences so common in the counties of Kincardine and Aberdeen in the north of Scotland, and known under the name of consumption dykes.

*Calcareous Tufa, used as a source of fine Lime.*—In some places, but particularly in the neighbourhood of Dundhote, Choe and Kutass, the surface of the limestone is covered with a deposit of calcareous Tufa, passing here and there into Travertine, and frequently containing impressions of leaves and fragments of wood. This Tufa is extensively burned by the natives and yields a lime of a perfectly white colour, admirably suited for a building cement. The nummulite limestone is also burned for chunam, but as the Tufa is soft and easily excavated, it is generally preferred. It has apparently been deposited from springs, the waters of which were charged with calcareous matter, held in solution by carbonic acid, but none of these appear now to exist.

*Springs.*—Springs are generally abundant in the limestone district on the N. side of the salt range, but no hot ones occur as far as we could discover. The natives assert that such do exist, but those pointed out to us as hot, were at the time we visited them, cooler than the atmosphere, being on account of the depth from which they spring, unaffected by the ordinary changes of atmospheric temperature. Such

springs usually indicate the mean annual temperature of the district, and hence appear to be hot in winter and cold in summer.

*Tank of Kutass.*—At Choe several streams of water issuing from the limestone hills unite to form a good-sized clear stream, along the grassy banks of which a road leads to Kutass, famous for its tank of water, a sacred resort of the Hindoos, and around which numerous faqueers have taken up their abode in fine mansions built by different Sirdars who have made them over to the holy men. This tank is supplied by the stream above mentioned, and has no apparent outlet from the limestone rock which surrounds it. Its depth is declared to be unfathomable by the faqueers and natives of the place, who informed us that Runjeet Sing, Burnes and several others had tried to ascertain it, but without success. A faqueer too, it is said, was engaged for two years manufacturing a rope, but in this period could not make one of sufficient length to fathom its abysses.

Being anxious to ascertain the truth of the statement, we got a charpoy tightly bound on four inverted gurrachs, and having seated a man on this frail craft, directed him to navigate it about the tank, taking soundings in our presence, at the different points, stated by the Faqueers and others as those of greatest depth. To their great disgust however, the deepest part was found not to exceed 23 feet, and as the soundings were repeated in so many different places within the area of the tank, we are inclined to believe that its depth is entirely fabulous, and that the story has been invented and perpetuated by the cunning faqueers, with the view of conferring greater sanctity on their pleasant residence. Probably the water escapes to a lower level through some crack or fissure in the limestone, and we suspect that a considerable stream of water which we observed to the westward at a place called Nurwa near Kuhar, is the drainage of the above tank. At the time we visited it, thousands of pilgrims were bathing in its clear waters, and a fair was being held in the town, giving the place quite an air of bustle and importance.

*Soft Sandstone strata with Conglomerates, &c.*—All along the north side of the salt range from Kutass to Noorpoor, the nummulite limestone occurs full of flints, rising up by a series of rounded hills with intervening valleys to the ridge of the range. To the north of Kutass and extending east and west along the foot of the hills, strata of a

much more recent date occur, resting on the limestone and gradually covering it from view. These consists of calcareous conglomerates, including small boulders of primitive rocks, sandstones and limestones, identical with those found in situ in the range, and gradually passing into highly calcareous friable grey sandstones interlaminated with beds of blue and red clay, occasionally inclosing patches of conglomerate, which towards the Indus at Mokhudd become very abundant. The dip of these strata diminishes regularly as one descends from the range into the plain, stretching north to the Hazara country and westward to the Indus, where they are nearly horizontal and are covered with a very thin soil on which but little vegetation exists. On the banks of nullahs and neighbourhood of wells which are but thinly scattered the water being at a great depth from the surface, fair crops of barley, wheat and grain are raised, but the culture of the two former is rather precarious from the great droughts to which the district is liable.

*Gold.*—Gold is obtained in considerable quantity in this district, being washed from the sands, which have resulted from the disintegration of the soft strata in the beds of the numerous nullahs which intersect the country and during the rains pour their waters into the Jhelum and Indus.

With the exception of some indistinct vegetable organisms associated with masses of jet near Kuhar to be afterwards noticed, and still more indistinct traces of amulidæ in a fine indurated clay, we did not observe any organic remains in these strata. The large amount of calcareous matter which the soft sandstones contain and which by solution in a weak acid, leaves the sand in its original state, has doubtless been derived from the calcareous waters which seem to have existed at the time of their formation. At no point does the lime appear to have been more extensively diffused through the strata, than at Mokhudd, where the Indus, about 300 yards wide, rushes with considerable force between two walls of conglomerate, presenting the appearance of a hardened mortar into which, in a soft state, rounded boulders of all kinds of rocks had been indiscriminately thrown.

From Mokhudd downwards to Kalibag in the course of the Indus, admirable sections are seen of these more recent strata on both sides of the river, which from a position of comparative horizontality, gradually ascend towards the central ridge of the range, and at Dundhote, about

2 miles above Kalibag, dip to the N. at an angle of  $35^{\circ}$ , forming rugged precipices of considerable height, which overhang the river.

The sandstones become more and more compact as the central ridge of the range is approached, have a dirty red colour and are seen to rest on the nummulite limestone, beneath which the usual deposit of bituminous shales, strata of variegated sandstones and saliferous marls occur, and are well seen at Kalibag, where the Indus escapes from its rocky channel into the wide plains of Esaukhail and Kutcha.

*Coal of the salt range.*—From the remarks which we have made in the course of our report, it will appear that the oldest formation noticed in the salt range, and that on which the others are based, is a number of what is commonly known under the name of the new red sandstone formation—a formation, which as far as the observation of geologists have yet extended, invariably occupies a position superior to the true coal measures in the crust of the earth, and has never yet yielded a coal of any commercial value. The neglect of this fact has on too many occasions been the cause of the outlay of large sums of money by individuals who, had they possessed but a slight amount of geological knowledge might have saved themselves from much disappointment.

The remark of Sir H. De la Beche, on this subject, is so true, that we give it in his own words. He says, “a little black shale or piece of lignite is often sufficient to cause the expenditure of £2 or 3000 in localities where there is not the slightest probability of success.”

“Good bituminous coal,” says Ansted, “fit to be worked extensively for economical purposes, does not occur out of the carboniferous group of rocks in Great Britain,” and the same rule applies to the continent of Europe. To declare however, that no good bituminous coal will ever be found on the surface of the globe except in the position above stated, would be rash in the extreme, and the researches of Professor Rogers in Eastern Virginia, in the United States of America, would seem to render it extremely probable, that the thick beds of coal, which there occur, do not belong to the true coal measures, but represent on a large scale, the coal fields of Brora in Sutherlandshire, which has been worked from time to time since the close of the 16th century, and which by the researches of Mr. Lyell and Sir Roderick Murchison, have been clearly proved to belong to the oolitic formation. Similar deposits of coal occur and have been worked at Scarborough, &c., but

these, as well as the lignites of the tertiary strata of the Rhine, &c. present characters so totally different from those of true bituminous coal, and usually contain such a large amount of earthy matter intimately mingled with their component structure, that they are incapable of giving out a continued heat, and have only been worked, in the absence of other fuel or in localities where they occur near the surface and are easy of extraction.

We have already mentioned the bituminous shale, or in other words, the carboniferous deposit of the salt range, and its geological position among the other strata. That it is more recent than the saliferous formation we entertain no doubt, and are inclined to refer it to the oolitic era, believing that the coal in general character will be found to bear a close resemblance to those coals above alluded to as occurring in that formation.

*General character of the Coal.*—In general appearance the more compact specimens of the coal of the salt range, procured from parts of the seam out of the reach of atmospheric influence, resemble that variety known under the name of splint coal. It is however much softer and more brittle, and its relationship to the more imperfect class of coals, known under the name of lignites, is established by the fact of the occurrence of patches of brown half-decomposed vegetable matter associated with it, and at times to be found included in its most compact portions.

To the natives of the district its properties, as a fuel, are unknown, but under the name of *Sangee Momiai*, it is used by them as a medicine, given internally in powder along with milk, in all bruises or wounds both of men and animals, the cure of which it is said greatly to facilitate.

The coal is somewhat difficult to ignite, and at first emits a large quantity of smoke. When combustion however is once established, it burns without caking, gives out a considerable amount of flame and heat, and leaves a large quantity of ash.

It is particularly free of iron pyrites, which abounds in the bituminous shales, with which it is invariably surrounded, and hence in burning gives out no sulphurous smell, an objection to which lignites in general are liable.

For the purposes of steam navigation, or when flame with a moderate

amount of heat is desirable, we believe this coal would answer well, but it is certainly not adapted, from the small amount of coke it yields, for the smelting of ores, where a high and continued heat is so urgently demanded.

The point of the salt range where the coal appears to be best developed, is in the neighbourhood of Pind Dadun Khan and to its eastward, while towards the Indus, and particularly at Kalibag, it does not occur in a seam of any size, but is spread through an immense deposit of bituminous shales, in thin films, rendering them admirably adapted for the purposes of alum manufacture.

All the localities which we had an opportunity of examining, where the coal crops out, are on the southern escarpment of the range. It is best seen at Baghanawalla, Keurah, Dundhote, Ruttipind and Noorpoor, where the coal is of pretty good quality and in considerable quantity. At Mukrass, and Numbhul, or Bukkh, the same coal occurs but it is of inferior quality and in but small quantity.

We shall notice these different localities as they are situated, proceeding from E. to W., and here we may state that it appears to be the same seam or seams, which run along the whole extent of the carboniferous deposit.

*Baghanawalla Coal.*—This coal was first brought to the notice of Sir H. Lawrence by Lieut. Robinson of the Engineers, who forwarded samples of it to Lahore in the autumn of 1847. From these we made an analysis, the results of which, along with a few remarks on the general character of the coal, were laid before the Asiatic Society in February, 1848.

Baghanawalla Davee is a small village about 10 miles E. of Pind Dadun Khan and about the same distance from Jelalpore. The coal seam occurs in a ravine about 3 miles N. E. of the village among the hills. The access to it is very difficult and steep, and no beast of burden can at present approach it. It is included in shales and yellow marl resting on the variegated sandstone strata, above which is a shell limestone passing into cherty limestone, which apparently is the representative of the calcareous deposit so abundant to the W. but which at this point is but little developed. This is not more than a few feet thick, and on it rests a grey friable sandstone, which is succeeded by a series of soft arenaceous strata forming a range of low hills running

N. N. E. towards mount Doomeyala, and between the village of Futti-poor and Mount Tilleh. In some places, and particularly where it crops out in the ravine, the coal appears of good quality in a seam 5 feet thick, and on each side of this can be traced for at least  $\frac{1}{2}$  a mile, in some places appearing to degenerate into highly bituminous shales. The seam dips conformably with the strata above and below to the N. N. W. at an angle of  $45^{\circ}$  or  $50^{\circ}$  which would render the sinking of a shaft through the strata superior to the coal, in such a locality, a matter of considerable difficulty and expense.

*Keurah Coal.*—This occurs above the salt mine village of Keurah near Pind Dadun Khan, and about a mile to its N. E. It is seen cropping out on the side of a ravine, the access to which is as difficult as to the locality last described. The coal is found in the same geological position, above the variegated sandstones, and is included in a series of thin laminated sandstone marls and bituminous shales, the latter of which are charged with aluminous earth and iron pyrites, and are here and there incrustated with an efflorescence of sulphate of iron and alumina. The seam is about 2 feet thick and rests on a blue clay inclosing septaria, into which we dug 6 feet without getting through it. In this as well as in the shales large crystals of gypsum are abundant. The coal appears to dip with the other strata to the N. W. at an angle of from  $40^{\circ}$  to  $50^{\circ}$  and may be traced across the ravine for about 30 yards, where it seems to thin out among the blue clay on which it rests. Where exposed to the atmosphere it is very brittle and covered with a yellow crust of iron alum, but on digging into the seam it is of good quality, pretty hard and compact, but here, as in other places, affording abundant evidence of its imperfect mineralization. Above the coal shales the same yellow marl occurs, and is succeeded by a considerable deposit of the nummulite limestone, on which repose a series of soft sandstone strata, that have evidently been much disturbed.

*Ruttipind Coal.*—This locality is to the W. of the road to Kutass, and about 3 miles from Keurah. The coal occurs among shales from 30 to 40 feet thick, full of large crystals of gypsum and pyrites and interlaminated with their films of yellow clay. Two seams occur, the lower one two feet thick, and separated from the upper, by shales of about a foot in thickness. This measures 4 ft. and along with the other may be traced down a deep ravine for 50 or 60 yards. The coal does



not appear so good as that of Keurah, being very brittle and containing a quantity of earthy matter. The dip of the strata is here to the N. at an angle of  $35^{\circ}$  to  $40^{\circ}$ . Above the shales is seen the yellow marl and then a bold escarpment of nummulite limestone, on reaching the top of which the village of Ruttipind is seen in a valley on the northern declivity of the range.

*Dundhote Coal.*—This seam is only about 2 feet thick, occurs in a similar position and is of much the same quality as the last. The only access to the locality is by a footpath very difficult to ascend, and above the coal seam the nummulite limestone with flints rises to the top of the range on which the Fort of Dundhote is built.

*Mukrass Coal.*—Coal also was found at this locality by some of Misser Rulla Ram's men, who brought me specimens, on my return from the Indus. It is of inferior quality, but evidently part of the same seam as noticed above.

With the exception of Baghanawalla the localities mentioned are included in a circle of 4 or 5 miles, in the neighbourhood of Pind Dadun Khan, and though these were all we had an opportunity of examining, yet doubtless at numerous other points both E. and W. the same seam will be found to crop out if due search be made.

*Noorpoor or Nilawan Coal.*—We are satisfied on this point, as at Noorpoor, 15 miles west of Pind Dadun Khan, we found a coal of a character identical with what occurs to the eastward. It is to be seen above the Nilawan salt mines, in two small 8 inch seams, included in shales on which a steep escarpment of the nummulite limestone rests at least 150 feet high. The coal seam dips to the N. W. at an angle of from  $25^{\circ}$  to  $30^{\circ}$ .

*Numbhul or Bukkh Coal.*—Between Noorpoor and the Indus only one locality came to our notice, where coal occurs. This was in the neighbourhood of Musakhail, about 3 miles from Numbhul, at a place called Bukkh. The position of the coal appears identical with that to the E. being included in shales beneath the nummulite limestone forming the ridge of the range. It is best seen in a deep ravine formed by a stream which escapes from the hills into the plain near Musakhail, presents a charred appearance, and patches of it occur in a calcareous white sandstone which is in relation with the shales at their inferior part. This appearance is no doubt the result of the shales charged

with pyrites, having during the oxidation of the latter undergone spontaneous combustion, a phenomenon of frequent occurrence, and one which has produced much mischief in some of the British collieries. From the shales downwards to the base of the hills on the S. W. side, there is a development of calcareous strata evidently superior in geological position to the red saliferous marl, and which we have observed nowhere in the range to the same extent.

In contact with the shales is a calcareous sandstone which gradually passes into strata of limestone of a light bluish-grey color, containing abundance of nummulites, and towards the base of the hills enclosing layers of flints. These latter have a brownish tint, derived from peroxide of iron, with which they are frequently incrustated, but in none could we detect organic remains, which abound in the limestone, and particularly in its lower strata, which are of a much darker tint, and coarser character, than the upper beds. From the former we obtained several specimens of shells of the genera *Productus*, *Terebratula*, and probably one *Spirifer*, associated with *Ammonites*, *Belemmites*, &c. The appearance of these fossils, as well as of the limestone in which they are imbedded, is more ancient than that of any of the other fossiliferous strata we have noticed. Shales of the genera *Productus* and *Spirifer* are generally considered characteristic of strata inferior to the Lias, and abound in the magnesian limestone. There are however exceptions to this, and at least 3 species of *Spirifera*, and we think one or two *Producti* have been found in the Lias itself. *Terebratulæ* are by far the most abundant of all the fossils we noticed in the limestone, and this genus has been found to occur through all the strata from the chalk formation downwards.

At first sight we were inclined to believe that we were dealing with magnesian limestone, but on subjecting a portion of it to chemical analysis, we failed to detect any magnesia in its composition, which earth does not, as far as we can ascertain, exist in any limestone of the salt range.

We regretted much that our time did not permit us to examine this interesting deposit more thoroughly, as we are satisfied that from it a very fine collection of Fossil shells could be made, by which the true age of the calcareous strata might be established. In the ravine where the coal is seen beautiful sections of the strata are exposed to view, which

from the top to the hollow of the range seem to dip to the N. E. at an angle of  $45^{\circ}$ .

From the preceding details of the character of the coal seams, it will be apparent, that a very considerable quantity of fuel could be obtained from the various localities mentioned. At present however no beasts of burden could reach the places where the coal crops out, these being near the top of the range, and hence, until a road or path could be made, a work in these rugged hills of some difficulty, the mineral would have to be carried by coolies to a depôt, from whence it could be removed by bullocks, mules or camels, to the banks of the Indus or Jhelum.

By working the coal from the surface when it crops out, and parallel with the seam, it could be easily obtained, although considerable annoyance would be experienced from the falling in of the soft strata and loose boulders of rock which cover it. Until some locality is found where the coal seam appears of regular thickness and not developed in nests or patches, as we are inclined to believe is the case in the salt range generally, we could not recommend to government the propriety of attempting mining operations, except on a small scale, and by way of experiment. Perhaps Baghanawalla Davee and Keurah would be the most favorable positions for such attempts, which could be made at a moderate expense, labour being so cheap in the district and the inhabitants experienced in mining.

*Jet Coal.*—Besides the coal seams we have noticed, we met with a variety of coal at Kuhar, on the north side of the salt range, and at Kalibag, on the Indus, totally different both as to the geological position in which it is found, and in its physical characters, but in a commercial point of view, likely to be much less valuable than that we have previously described. It is what is known to geologists and mineralogists under the name of Jet, and never occurs in quantity sufficient to render its mining a work of any practical importance.

*Kuhar Jet Coal.*—This coal occurs among the soft calcareous sandstones which skirt the base of the hills. It is best seen at a place called Nurwa, a little to the N. of Kuhar, where a clear stream of fresh water has cut its way, to the depth of at least 200 feet, through soft sandstones interlaminated with beds of red and blue indurated clays, which dip to the N. N. W. at an angle of  $25^{\circ}$ . The coal occurs in flattened masses resembling the compressed trunks of trees, is of a glistening

black color, with a brown streak, and sectile when first removed from the rock. Its broken surfaces present a distinct woody structure, and brown patches of imperfectly carbonized wood, resembling peat, are frequently to be found in it. The Jet occurs but in small quantity, and would never be worth working.

*Kalibag Jet Coal.*—This coal, though in external appearance the same as the last, occurs in a totally different position, being found in strata inferior to the regular carboniferous deposit, and separated from it by a series of calcareous sandstones of a light yellow color, which are highly fossiliferous. Beneath these follow a succession of conglomerates of the older rocks and variegated sandstones and clays, towards the lower part of which occurs an extensive development of highly bituminous shales, in some places closely resembling coal, and interlaminated with strata of a white fine-grained sandstone, in which, as also in the shales, detached masses of jet occur, occupying a horizontal position, and may be picked out in considerable quantity. About 40 or 50 maunds of this coal and about the same quantity of bituminous shale supposed to be coal, were taken as fuel by Capt. Christopher in his return trip down the Indus in the “Conqueror” steamer. The results of his experiments with the jet coal, have, as was to be expected, been very favorable, and it is only to be regretted that the coal exists in small masses, evidently the remains of trunks of trees and no regular seam. In almost any portion of it which we excavated the woody structure was apparent, and in numerous specimens which we have preserved, nests of peat are to be observed in their interior, showing the imperfect mineralization of the coal, which presents even a less close approximation to the character of true coal than that which occurs in the regular carboniferous deposit.

The very short time we had at our disposal while at Kalibag, and the extreme heat of the weather, prevented us from examining the locality with the care we could have wished; for though our short search for coal was unsuccessful, the extensive development of bituminous shales in the strata around afford a hope that a seam of coal (though not of the true coal measures) may be found, which will yield a fuel suitable for the purposes of steam navigation.

In no part of the salt range have we seen a locality so fraught with interest, as at Kalibag, where strata are developed in many respects

different from those to the eastward, and from the careful examination of which much geological and probably practically useful knowledge may be obtained.\*

*Iron Ore.*—The frequent occurrence of the most valuable of the British iron ores, known under the name of Black Band Ironstone, in the true coal measures, induced us particularly to search for this mineral and other iron ores, which might be found in relation with the carboniferous deposit of the salt ranges, but we regret to record that we met with but little success. Veins and nodules of hæmatite or red peroxide of iron, are abundantly diffused through all the strata of these hills, but the want of suitable fuel to reduce the ores to a metallic state, will, we fear, prove an obstacle to its being turned to much account. At Kamgoorum, 30 miles to the W. of Kalibag, iron is manufactured, probably from this ore, wood charcoal being used for its reduction. It is brought to Kalibag in the form of lumps of pig iron, which appear to be of inferior quality.

*Petroleum.*—This mineral is of frequent occurrence in the hills around Kalibag, and is obtained in considerable quantity at Jabba, S. of the Indus, and about 7 coss from Kalibag. It exudes from the rocks and floats on the surface of water. It is known to the natives under the name of *Gunduk ka tel*, who use it in place of oil in their lamps. We had not time to visit the locality where it is found, but from the enquiries made we are satisfied that it exudes from the neighbourhood of bituminous alum shales, and is probably one of the results of their destructive distillation, when undergoing the process of spontaneous combustion. The petroleum is of the consistence of tar, has a dark brown color, most penetrating smell, and burns with a yellow smoky flame. Its medicinal properties do not seem to be known to the natives, who use it only as a source of light.

*Sulphur.*—Associated with the petroleum, sulphur is also found in small quantity, and its origin is probably identical with the former.

*Lead Ore.*—The only other mineral which we shall notice is the galena ore or sulphuret of lead. This occurs in grains or small cubical

\* We regret extremely our not being able to append a series of analysis of the coals from the different localities mentioned in the preceding pages, in consequence of the loss of the greater part of a small stock of chemical apparatus which we possessed, and which for a time we will be unable to replace.

crystals in a limestone near the Keurah salt mine, and in a similar rock on the N. side of the range, on a hill called Kuringuli, 2 miles N. W. of Choe. The natives give it the name of *Soorma*, believing it to be sulphuret of antimony, of very fine quality, and is consequently in much repute among them as a cosmetic. It however contains no antimony, its only impurity being a trace of silver, which is generally present in galena, and sometimes in such quantity as to render its extraction a work of commercial importance. In the localities above mentioned the mineral occurs in such small quantity as to be of no value.

*On the Salt Mines.*—The mines from which the principal supply of salt is obtained, are those of Keurah, in the vicinity of Pind Dadun Khan, of Surdi, near Kuhar, and of Maree and Kalibag, on the Indus.

The general superintendence of these is entrusted to an agent of the Lahore state, Misser Gyan Chund, who, with his son Misser Rula Ram, reside at Pind Dadun Khan, where the largest salt depôt in the district exists.

*Salt mine village of Keurah.*—The mineral is brought in greatest quantity to the depôt, from a village called Keurah, about 4 miles distant, and around which no fewer than 10 shafts are sunk into the red marl for the purpose of extracting the salt. From the foot of the hills a narrow path, strewed with boulders and masses of rock, which have fallen from the height above, leads through a deep ravine to the salt mine village, which is built in terraces on its east side, and is inhabited by the miners and their families during the dry season. In the rains, on account of the heat and musquitoes, they desert Keurah and take refuge in the small village of Tobu, which is built on the opposite side of the ravine, but at a considerable height above the salt mines, and where they enjoy a cool breeze and an immunity from the attacks of their winged tormentors.

The inhabitants of these villages amount to about 650, four hundred of whom are employed in the salt mines, an occupation which, if we may judge from their appearance, does not seem to be particularly prejudicial to health.

Of the mines around Keurah two particularly deserve notice, and receive the names of the Keurah and Sujoowalla mines.

*Keurah Salt Mine.*—This is a little to the E. of the village, and on a higher level, the path leading to it passing over red marl containing

angular masses of gypsum. The entrance to the mine is by an opening cut in the marl about 7 feet high, and leading into a passage which preserves throughout a height of 6 feet and a width sufficient to allow two individuals to pass.

From the entrance to the end of the workings, the distance is 640 feet, where a chamber has been excavated entirely out of the rock salt 40 feet long by 30 feet broad, and about the same height, in which at the time we visited it men, women and children, were busily engaged quarrying the mineral by the light of small oil lamps, formed of the salt and hung by iron hooks on its walls the crystalline surface of which, reflected the light on a deep pool of brine situated in one corner of the chamber, and which is said to communicate with several of the neighbouring shafts.

In the interior of the mine, which was remarkably dry, the heat was most oppressive, and the thermometer hung on the rock salt stood at 85°, while in the shade at the mouth of the shaft it indicated 75°.

The appearance of the miners as seen in the dim light which illuminated the mine, was highly striking, their faces and bodies being covered with a saline incrustation. Their dress is of the lightest description, the men wearing nothing but a bit of cloth wound round their loins, and a pad of numdah or thick woollen cloth tied over their skins to protect them from injuries from the sharp angles of the salt or blows from their instruments. These are but few, the one of most importance being a hammer sharpened at one end into a highly tempered point, combining advantages of a pick and chisel. With this and a small crowbar, almost all the salt is excavated, large hammers being occasionally requisite to fracture the larger masses of the rock.

The salt is generally removed from the mine in square lumps of such a size, that two will form a good load for a camel, by which animals it is conveyed, after being weighed at the mouth of the shaft, to Pind Dadun Khan, where it is sold at the rate of Rs. 2 per maund, the miners receiving from two rupees to two rupees eight annas per 100 maunds, according to the quality of the salt turned out.

*Varieties of the rock salt.*—The mineral occurs in three varieties, the pink, the white and the transparent, but the former is preferred by the natives for culinary purposes, from its containing, it is said, less *Reshuh*, a term the exact meaning of which we could not discover. The pink

color is generally supposed to be derived from organic matter, and is not the result of the admixture of a minute portion of iron or manganese which the color might have led one to suppose.

*Chemical characters.*—When submitted to a chemical examination, all the three varieties of the salt are equally pure, and contain neither sulphate of lime nor chloride of magnesium, the common impurities of the mineral. In consequence of the absence of the latter, it is very slightly deliquescent, an advantage which it possesses over common bay salt, which if exposed to a moist atmosphere, rapidly attracts water.

What the thickness of the deposits of salt may be it is impossible to ascertain, but certainly that of the principal bed, in which the chamber is excavated, cannot be less than 150 or 200 feet. It does not seem to occur in regular strata, but rather in masses of irregular thickness, in which a stratified structure is observable, the general dip being to the N. at an angle of from 30° to 40°. These masses are separated from each other by portions of marl, including beds of gypsum, and are seen all along the sides of the passage, where they are occasionally worked. By the passing and repassing of the miners, portions of gypsum and salt have become highly polished in some places, and in the floor of the passage, where very imperfect steps exist, are extremely slippery.

Great annoyance is experienced particularly during the rains when all mining operations are suspended, from the falling in of the roof and sides of the various workings, which might in a great degree be prevented and many lives saved, if proper means were adopted to support the marl and soft rock, as the salt is removed from beneath. At present this is done in a most careless manner, and hence the frequency of accidents to the unfortunate miners, whose life is one of ill-remunerated labour.

According to the Superintendent of the salt mines, from 48 to 50,000 maunds are annually obtained from the mines around Keurah, the one just noticed yielding alone about 15,000 maunds.

*Sugoowalla mine.*—This mine yields a very large quantity of salt of the best quality, and is very easily worked. The entrance to it, is about  $\frac{1}{2}$  a mile to the E. of the Keurah one, and on a much higher level. From the surface, one descends the passage by a series of imperfect steps cut out of the marl, in which beds of salt occur close to the mouth of the shaft.



In the interior of the mine, enormous masses of the mineral are to be seen, which have become detached from the roof and sides, and under which the various passages lead to an immense distance in the interior of the hills.

The temperature of this mine was much lower than that of Keurah, but having accidentally broken our thermometer we were unable to make any accurate observations. The amount of moisture which exists, and which is seen trickling in a small stream down the steps in the passage, may possibly be the cause of the comparative coolness of the mine, the roof of which was in several places covered with stalactites of salt upwards of a foot in length.

We were warned against entering this mine, which is considered unsafe, its roof and sides being rent and cracked in all directions. However any risk run was well repaid by the magnificent spectacle which the resplendent walls of salt afforded, dimly illumined by the twinkling lights of the miners.

*Surdi Salt mines.*—The salt mines of Surdi, about 10 miles to the W. of Pind Dadun Khan, have been more recently opened than those around Keurah, and appear to be constructed on a better plan, good flights of steps being cut out of the salt, which occurs in quantity close to the surface, and the roof of the passages well supported by strong beams of wood. The salt is of excellent quality, and remarkably compact. As it is raised from the mine it is conveyed on camels to a *dépôt* about 2 miles from Kuhar, on the road to Kutass, none of it being sent to Pind Dadun Khan, but yielding a supply to Cashmír, and the districts to the N. of the salt range.

*Kalibag Salt.*—The salt is worked on both sides of the Indus above Kalibag, which village is built on the side of a hill of red marl, which extends along the N. bank of the river about a mile, and in which a vast deposit of rock salt exists.

The mineral is very near the surface, frequently cropping out and behind the terraced houses of Kalibag, forming a wall which overhangs the village. It is chiefly worked in the bed of a nullah called the *Loon*, a name derived no doubt from the character of its water, and which enters the Indus on its north bank opposite the village of Maree, where a large quantity of salt is also obtained.

No shafts are sunk in the marl as at other places, the rock salt hav-

ing fallen down in immense masses from the heights above the nullah, requiring only to be broken into portions fit for removal. On the east side of the marl hill the salt is of excellent quality, the transparent variety occurring in great abundance, but on the west side towards Kalibag, it is mixed with a great deal of marl and hence is little worked. The stratification of the salt is more apparent here than in any of the mines to the eastward, and the strata appear to dip to the N. W. at an angle of  $40^{\circ}$ .

The marl abounds in gypsum, which generally is of an earthy character, the saccharine variety being less abundant than in the other localities we have noticed.

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## APPENDIX.

### *On the Alum Manufactories of Kalibag.*

*Alum Shales.*—Next in importance to the rock salt which the strata of the salt range afford, are the *Bituminous shales*, which abound in all its extent, in connection with the coal seams, and from which, at Kalibag, Alum is extensively prepared.

These, as before mentioned, contain clay, abundance of iron pyrites, and their seams of coal, by the mutual reaction of which on each other, especially during combustion, an alum is formed.

The shale or rol, as it is technically called by the natives, is brought from several localities in the neighbourhood of Kalibag, the principal workings of it being at a place named Chatah, where the shales, corresponding to those in which the coal occurs to the E. of the Indus, are about 200 feet thick.

Regular shafts are sunk for the purpose of excavating the shale, and one of those we measured, extended 207 feet from the entrance. From the soft character of the strata accidents to the miners are of very frequent occurrence, the risk of which, as in the salt mines, might be considerably diminished were proper means taken for the support of the roof and sides of the shafts. In one of these, the shales spontaneously took fire, five or six years ago, and from its mouth a column of smoke resembling that from the funnel of a steamer is constantly issuing, no means being taken to extinguish the chemical action going on in the interior.

The rol or shale, as it is brought to the mouth of the pit, is placed in bags made of kummul or country blanket, two of which are loaded on bullocks, a narrow path having been made to enable them to ascend and descend the rocky side of the hill to the bed of the Loon nullah, from whence a road leads by the side of the Indus to Kalibag.

*Price of the Alum Shale at Kalibag.*—In this way the shale is landed at the alum kilns at prices varying from 14 to 17 maunds for the rupee, the workmen being supplied with mining instruments, but obliged to provide bullocks at their own expense.

*Alum Kilns.*—The kilns form the most striking feature of Kalibag, their red mounds rising up here and there in the middle of the village, and the smoke which issues from them tainting the air to a considerable distance around.

*Injurious effect of Alum Kilns on the health of the inhabitants of Kalibag.*—The injurious effect of impure air on the workmen employed about these kilns, is abundantly manifested in their sickly, emaciated appearance, many of whom labor under chronic affections of the lungs. Goitre prevails to a considerable extent among the inhabitants of Kalibag, but whether this is attributable to the pollution of the atmosphere by carbonic and sulphureous gasses, to the highly calcareous waters of the Indus, or to other more obscure causes, we will not venture to offer an opinion. In other parts of the salt range, we did not notice particularly the prevalence of goitre, whereas at Kalibag it is very common, some of the tumours being of large size.

*Number of Kilns in Kalibag.*—In the village there are no fewer than 14 kilns, to each of which the necessary arrangements for the preparation of alum are attached, but at the time we visited Kalibag only 12 were efficient.

*Formation of the Kiln.*—In preparing the kiln, a thin layer of brushwood (generally Tamarisk jungle, which abounds on the banks of all the Punjaub rivers) is spread on the ground to an extent varying according to the size of the one about to be constructed. On this a layer of the rol or shale in fragments is deposited to the depth of about a foot, to which succeeds a second layer of brushwood and then another of shale. When several of these have been arranged, the kiln is set fire to from below, care being taken that the combustion is not too rapid, which from time to time is moderated by sprinkling water

on the shales. The kiln being well lighted, fresh layers of shale and brushwood are added, and when the whole has attained the height of 30 or 40 feet, it is left to burn, 6 or 8 months being generally sufficient to effect the thorough decomposition of the mass, which when completed has a brick-red color from peroxidated iron, its surface being covered with an efflorescence of alum, containing a large proportion of sulphate of iron or green vitriol.

*Preparation of the Alum.*—Close to the kiln, and on a level a little below its base, there is a baked earthen vat 12 ft. square by 1 ft. 5 in. deep. Into this a portion of the burned shale is thrown and lixiviated with water for several hours, which rapidly acquires a dark brown color. When a saturated solution of the soluble matter in the shale is obtained, it is drawn off from the vat by an aperture in its side (which during the lixiviation is stopped by a plug), into another vat of similar size, but on a lower level. Here the crude alum liquor is allowed to deposit any mud which it may contain, and is then run off into a third but smaller vat on a still lower level, where it is again allowed to deposit any remaining impurities. From this it is transferred into an iron evaporating pan, where it is rapidly boiled and mixed with a brownish impure salt called *Jumsan*, from which it derives alkali necessary to convert the crude alum into an alum of commerce. When a proper quantity of this has been added, which is judged of from the appearance of the liquid, the whole is allowed to settle, and the clear brown alum solution removed into vats, 8 ft. 8 in. long, 5 ft. 5 in. broad and 1 ft. 5 in. deep, a series of which are arranged beneath a shed, close to the evaporating pan. In these the solution, which is concentrated to a point a little short of that of crystallization, is allowed slowly to crystallize for several days. During that time small alum crystals are formed of a slightly pink color, derived no doubt from the impure mother liquor which contains a quantity of muriate and sulphate of iron. When a considerable crop of alum has separated, the crystals are removed from the vat, slightly washed with cold water on a sirkee frame and allowed to dry. These are afterwards fused in an iron pan, in their own water of crystallization, and when in a fluid state, are removed into large conical earthen jars or gurrahs, 1 ft. 8 in. deep, the same breadth at the shoulder, and 6 inches wide at the mouth, where for eight or ten days they are allowed to crystallize. At the end of this period a hole is made in the mass

of alum, which is generally hollow in its interior, the gurrah inverted and the uncrystallized alum liquor, should any remain, allowed to escape. The gurrah is then broken and the alum moulded to the form of the vessel, and removed to the depôt for sale and exportation.

By acting on successive portions of the kiln in the manner above described, the whole is by degrees exhausted of the alum which it contains.

*Quantity manufactured.*—The average daily expenditure in all the Alum works at Kalibag was stated to us to be only Rs. 12, while the amount of alum annually prepared is about 12,000 maunds, which at Rs. 3 per maund, the price of the article at the manufactory, will yield a return of Rs. 36,000 per annum.

It is indeed singular that a process almost identical to that employed in European alum works, should have been discovered and adopted by the natives of India, and practised by them for several hundred years. We could not ascertain how long alum has been manufactured at Kalibag, but the proprietor or Malik of the place, by name Ullah Yar Khan, a remarkably obliging and intelligent old man, informed us that his ancestors for eight generations had carried on the trade.

*Alkaline base of Alum.*—We have stated that the substance from which the alkali of the Kalibag alum is derived, is a brown salt called Jumsan. This seems identical with the saline efflorescence so abundant throughout the N. W. provinces, and particularly so in all the grass jungles and waste ground in the neighbourhood of Lahore, and which is chiefly composed of sulphate of soda, with a little common salt and a trace of carbonate of soda giving it an alkaline reaction.

For the supply of the alum manufactories the efflorescence is scraped from the soil in the jungle E. of the Indus, and is particularly abundant in the plain which skirts the S. side of the salt range at the villages of Gurree and Tuttee, 8 or 9 miles from the Indus. The efflorescence is denominated *Kullur*, and from it Jumsan is obtained by treating the former with water and drying up the solution of its saline matter in gurrahs exposed to the sun.

This on analysis turns out to be nothing but a mixture of sulphate of soda and common salt, with varying proportions of carbonate of soda, its quality depending chiefly on the amount of sulphate of soda which it yields.

In all the commercial European alums, as far as we can ascertain, the alkaline base is Potash or Ammonia—the former alkali being characteristic of British alums, while the latter occurs in those of France. In the alum of Kalibag however, and in another sample of alum of a different external appearance, which we obtained in the Jullundur bazaar, soda forms the alkaline base, a fact which the addition of Jumsan to the crude alum liquor first led us to suspect, and which a chemical analysis of the alum has subsequently confirmed. A soda alum, as far as we can ascertain from the chemical or pharmaceutical works we have at present access to, is only known as an interesting chemical preparation; but we are not aware that such has been noticed as a staple article of commerce in the N. W. provinces, and probably throughout British India.

*Purity of the Alum.*—Considering the coarse apparatus in which the alum is prepared, its purity is astonishing. It effloresces considerably on exposure to the air, has a slight pink color, arising from the presence of a little iron which strikes a blue color with yellow prussiate of potash, and only contains a trace of muriate and sulphate of soda.

Besides the alum we have just noticed, another kind is prepared, from a light grey shale, containing silky crystals of what appears to be subsulphate of alumina. It is found associated with the other alum shales around, but in small quantity. To prepare the alum, the shale in coarse powder is mixed up with the impure liquid, from which the alum crystals have separated. The mixture is then dried in the sun, in irregular shaped masses of about a seer in weight, and which are of a brownish color. When dry they get a second dip in the same alum liquor, and are again dried, becoming of a tawny yellow color, in which state, under the designation of *Kaee*, they are sold to dyers at 8 annas per maund. This alum is a mixture of sulphate of alumina and sulphate of iron, and when mixed with the infusion of pomegranate rind yields a good black dye.

Although alum is only manufactured at Kalibag, yet as the same shales occur in quantity to the eastward, similar manufactories might be established with advantage in other parts of the salt range—the only obstacle being the difficulty of access to the shale deposits, which, as well as the coal, might be brought to the foot of the range on bullocks, were paths made similar to the one which leads to the Kalibag alum shale pits before noticed.

*Explanation of the Elevations of places between Almorah and Gangri, given in Lieut. STRACHEY'S Map and Journal.*

The elevations of places on my route to the lakes of Gangri, additional to the few that were already determined by the Trigonometric and Barometric operations of Captain Webb, have been deduced, in the way common with ill-equipped private travellers, from the observed temperature of boiling water.

My thermometer was small and bad, unfurnished with proper boiling apparatus (which is essential to correct observations), and lastly, it was broken before any comparisons could be obtained with a standard instrument to ascertain its error, for which purpose I had sent it to the Simla Observatory. The deduced heights are therefore liable to a wide range of uncertainty, for which I have been obliged to make arbitrary allowances, assisted only by a few boiling observations at or near places of known elevation on my route, which are inserted in the accompanying table. As my instrument was not readable to less than half degrees,—that is, when boiling in a common kettle over a smoky wood-fire,—the elevations cannot pretend to any precision within 250 feet, and I have, in most cases, therefore, made them up to the nearest quarter thousand; but the other causes of error, affecting measurements of this sort, will at least double that range of uncertainty, and the results cannot be considered anything better than rough approximations within 500 feet or so.

I have made the calculations by Prinsep's Tables (given in the Asiatic Society's Journal), which, though not strictly correct or complete, suffice for such rough observations. The mean temperature of the stratum of air under measurement (which materially affects the resulting elevation), is calculated as is done by Herbert in his Survey of the Alpine Sutluj (vide Asiatic Researches), by assuming the rate of refrigeration of the atmosphere to be  $1^{\circ}$  Fahrenheit for every 300 feet of elevation, and by deducing, according to this supposition, the temperature of the air at the level of the sea from the *observed temperature and the approximate height*.

I have reduced one or two Barometric observations by Manson, recorded in the Asiatic Society's Journal, for a few places about Rálam and upper Jwár, the mean temperature of the column of air being calculated as just explained, and neglecting the minor corrections, for temperature of instrument and decrease of gravity, as likely to be compensated, more or less, by the capillarity of the tube, regarding which no information is forthcoming.

Table of Elevations of places between Almorah and Gangri, to accompany Lieut. H. Strachey's Journal and Map.

| No. | Name of place.                                                                                                                | Nature of observation for determining the Altitude. |            |               |         |                                                   |               |                    |    |      |     | Elevation above the Sea in feet. |                 |      |
|-----|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------|---------------|---------|---------------------------------------------------|---------------|--------------------|----|------|-----|----------------------------------|-----------------|------|
|     |                                                                                                                               | Trigonometrical by Webb.                            |            | Barometrical. |         | From Temperature of boiling water by H. Strachey. |               |                    |    |      |     |                                  | Presumed Error. |      |
|     |                                                                                                                               | Deduced Height.                                     | Authority. | Date.         | Hour.   | Temp. of Boiling Water.                           | Temp. of Air. | Elevation deduced. |    |      |     |                                  |                 |      |
|     |                                                                                                                               |                                                     |            |               |         |                                                   |               |                    |    |      |     |                                  |                 |      |
| 1   | J. Strachey's hut on Binsar, near Almorah (estimated to be nearly 600 feet below top of hill, 7969 feet, T.)                  | ..                                                  | ..         | 1846.         |         |                                                   |               |                    | 0  | 0    |     |                                  |                 | 7400 |
| 2   | Khazánci's house, near St. Mark's Tower, Almorah, 50 feet below Tower (5488 B.)                                               | ..                                                  | ..         | 21 Nov.       | ..      | ..                                                | 3 P. M.       | 199½               | 57 | 7007 | 393 | 5438                             |                 |      |
| 3   | Dol Bungalow,                                                                                                                 | ..                                                  | ..         | 7 "           | ..      | ..                                                | 10 A. M.      | 202½               | 59 | 5280 | 158 | 6100                             |                 |      |
| 4   | Dew Dhura (vulgo Dee) Bungalow,                                                                                               | ..                                                  | ..         | 4 "           | ..      | ..                                                | sunset        | 201                | 52 | 6065 | 35  | 6867                             |                 |      |
| 5   | Pharka Bungalow,                                                                                                              | ..                                                  | ..         | 3 "           | 6867 W. | ..                                                | "             | 199½               | 53 | 6948 | 81  | 5914                             |                 |      |
| 6   | Lohughát (Mr. Ramsay's house),                                                                                                | ..                                                  | ..         | 1 "           | 5914 W. | ..                                                | "             | 201½               | 61 | 5880 | 34  | 5649                             |                 |      |
| 7   | Dhargara Bungalow,                                                                                                            | ..                                                  | ..         | 31 Oct.       | 5649 W. | ..                                                | "             | 202                | 63 | 5630 | 19  | 4500                             |                 |      |
| 8   | Iron Bridge on the Sarju, 2 miles below confluence of Rám-ganga, estimated to be about the same height as Rámeswar, (1587 B.) | ..                                                  | ..         | 29 "          | ..      | ..                                                | "             | 204                | 65 | 4474 | 36  | 1600                             |                 |      |
| 9   | Kantagánw Bungalow,                                                                                                           | ..                                                  | ..         | 28 "          | ..      | ..                                                | "             | 205                | 64 | 3892 | ..  | 3900                             |                 |      |
| 10  | Petragarh (Major Drummond's house), estimated 25 ft. above fort (5549 B.)                                                     | ..                                                  | ..         | 27 "          | ..      | ..                                                | 5 P. M.       | 202½               | 64 | 5328 | 256 | 5574                             |                 |      |
| 11  | Saigarh (Major Drummond's hut), 100 feet below top of Pass,                                                                   | ..                                                  | ..         | 25 "          | ..      | ..                                                | sunset        | 201½               | 59 | 5859 | 41  | 5900                             |                 |      |
| 12  | Singhait khán, (50 feet below Pass),                                                                                          | ..                                                  | ..         | 24 "          | ..      | ..                                                | "             | 202                | 60 | 5579 | 21  | 5600                             |                 |      |
| 13  | Village of Askot, (camp, 50 feet above),                                                                                      | ..                                                  | ..         | 23 "          | ..      | ..                                                | 4½ P. M.      | 204                | 76 | 4519 | 570 | 5089                             |                 |      |
| 14  | Garjia Ghát, (estimated 35 feet below confluence of Gori and Káli, 2059 B.)                                                   | ..                                                  | ..         | 21 "          | ..      | ..                                                | 5 "           | 208½               | 63 | 1918 | 176 | 2094                             |                 |      |









*\*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  $81^{\circ}$ , 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  $3\frac{1}{2}^{\circ}$  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 forcibly 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  $81^{\circ}$ , 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 Aliquot 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.*

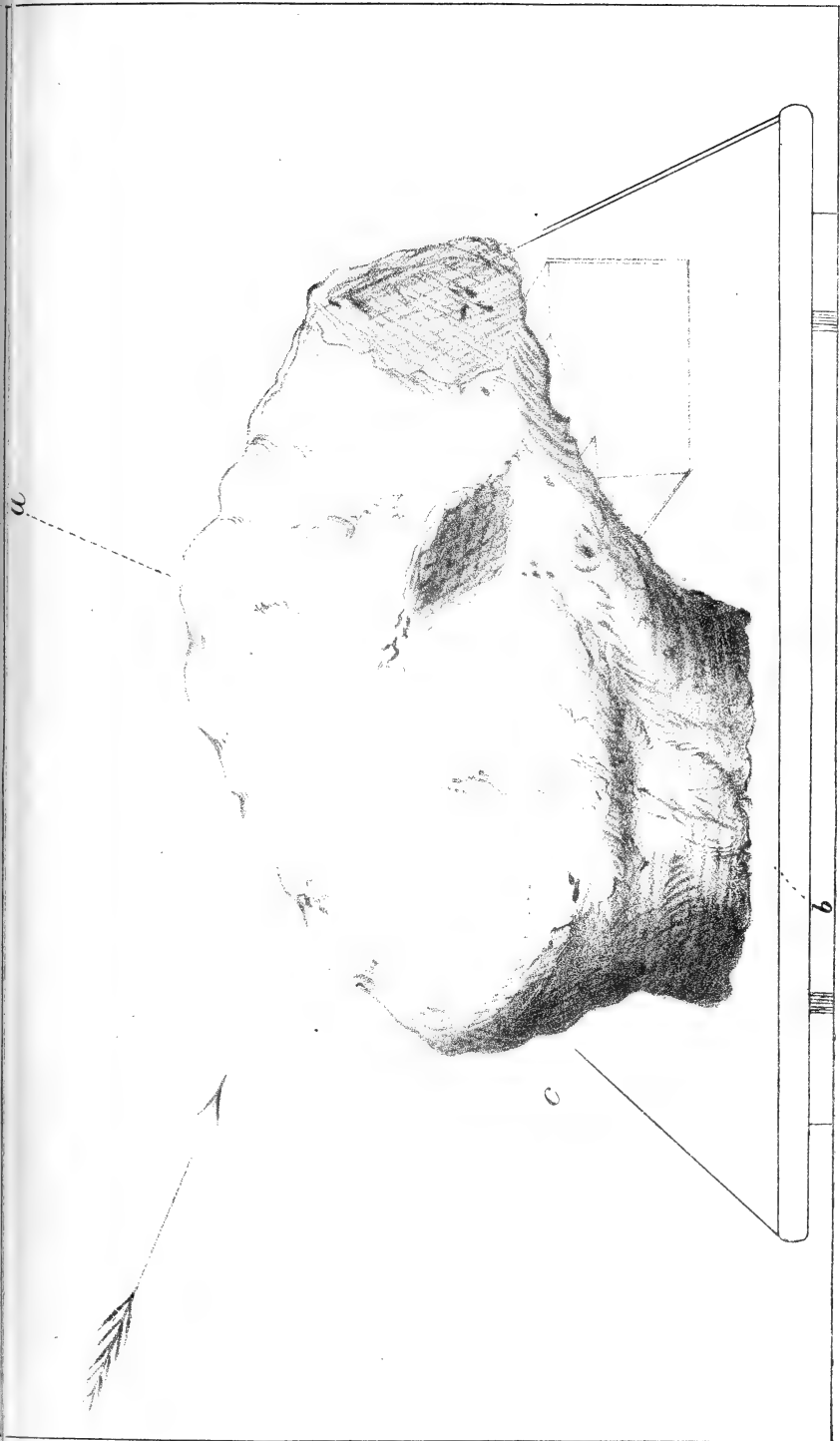
The Museum is indebted for this magnificent specimen to our valued member and active contributor, Captain W. S. Sherwill, of the Revenue Survey.

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.*

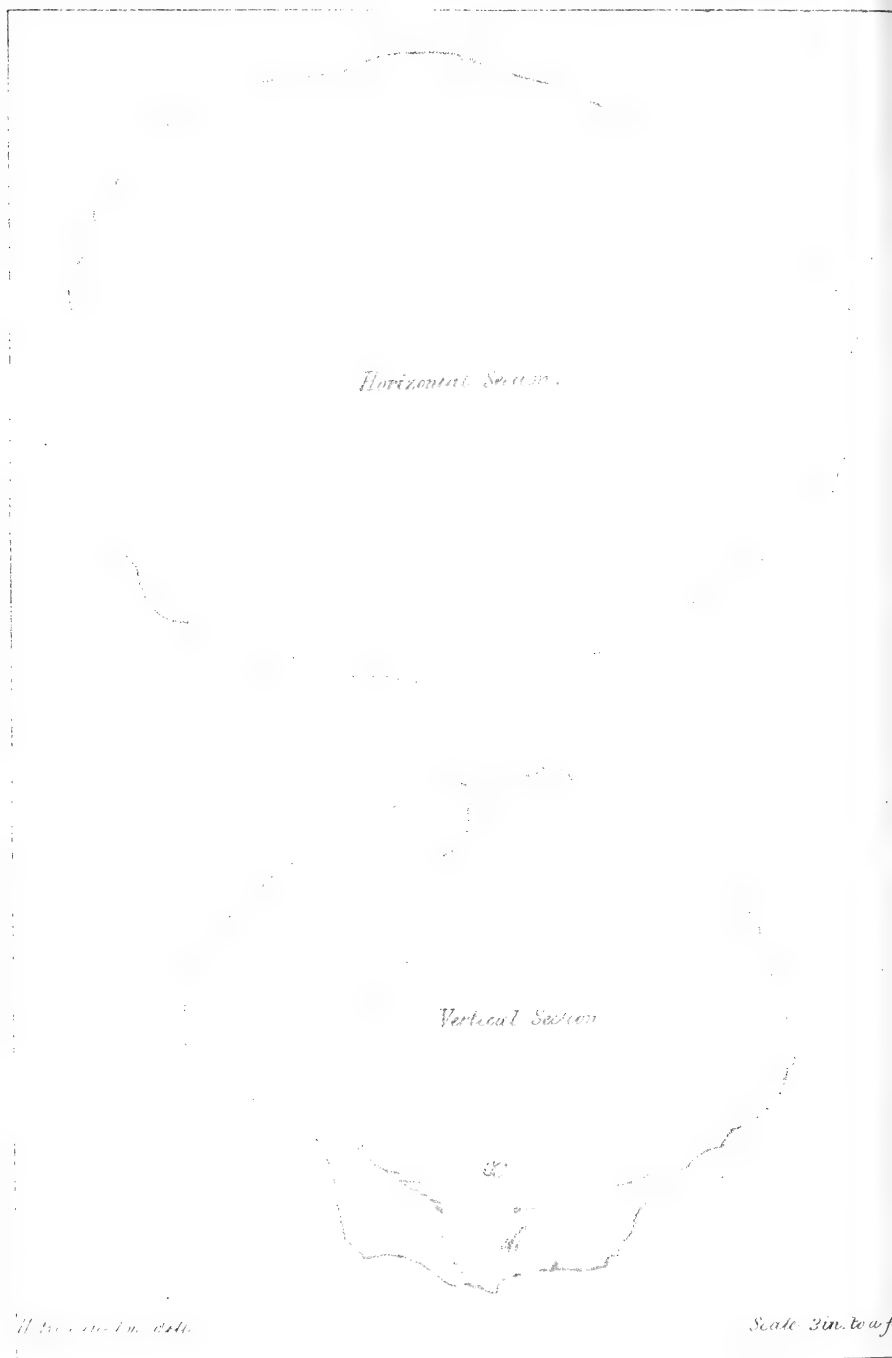
Captain Sherwill's note is as follows:

*"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."*



*Mass of Meteoric Iron from the Kurrukpore Hills Weight 160 lbs.  
Presented by Capt. W. S. Sherwill 66<sup>th</sup> B.N.I.*

*H. Padington del.*



Il. Des. et. in. 1846.

Scale 3in. long

*Horizontal and vertical Sections of Capt<sup>re</sup> Sherwill's.  
Mass of Meteoric Iron shewn in Plate XIX.*

He added in conversation that the gentleman who first obtained it was an Indigo planter, but omitting to note his name, I have not been able to make further enquiry as to any traditions about it. Captain Sherwill also mentioned that there are native forges in the vicinity, but he has sent us some of their ores, which are common brown iron ore, and of their smelted masses, which are quite different from the specimen, and this would not have been worshipped without some very special reason for it. Our mass is also, to say nothing of its physical and chemical properties, of a size and weight far beyond what any native forge could produce, at a cast, and moreover, is most certainly not cast iron. Nevertheless before submitting it to the scientific world as meteoric iron, we are bound to omit no proof direct or collateral, that it is really and truly such, and this will be, I trust, my excuse, if thought prolix.

I proceed now to describe our specimen, noting in parallel columns coincidences from Mr. Mornay's description of the great Brazilian mass, (*Mornay and Wollaston, in Phil. Trans. Vol. CVI. for 1816,*) Pallas' description of the mass of Siberian iron, which is now known to be meteoric, from the French edition of his voyages, (Vol. VI. p. 346, and following,) and from several descriptions and notes on meteoric iron, from various sources in the Quarterly Journal of Science, which I shall note as I proceed.

### I.—*External appearance.*

Our specimen is a block of a somewhat conical, oviform disk-shape, standing, as it were, on a sort of foot, as in the plates,\* but it must be supported by a block of wood not to fall forward. It is slightly truncated at both ends. Its colour is, in some parts, mostly at the more prominent knots and bosses, a chesnut brown, in others and in the numerous cellular cavities with which it is in many places honey-combed, it is more of a dark iron-slag colour. Generally it resembles in colour a mass of some of the more compact brown iron

The mass of upwards of 3000lbs. in weight from the banks of the Red River, Louisiana, and now in the New York Institution, is described as "shape irregular, inclining to oviform, much broader at bottom, where it has rested on the earth, than at the top, inclining somewhat in the manner of a cone," Quarterly Journal, Vol. IX. p. 193.

Mr. Mornay's description and drawing of the Brazilian mass gives also a sort of foot on which it stands as well as a tail behind. He says also that the foot is about six inches in height; colour of the

\* Plate XXIX. is a perspective view of it, Plate XXX. are vertical and horizontal sections to scale.

ores than anything I can liken it to ; but they are rarely or never honey-combed. Small water-worn specimens of this last named mineral sometimes are so, and one of these magnified, or a huge lump of dark coloured ferruginous *Kunkur*, gives one the best mineralogical notion of the appearance of our large specimen. If seen in the bed of a torrent it would indeed have been thought a mass of water-worn iron-stone, if no accidental friction had shown its bright metallic streak, which is apparent upon the slightest scratch ; except at the few scoriaceous parts.

When closely examined there are seen to be parts which are evidently more scoriaceous and cellular in appearance than others. In a very few places minute fragments or patches of a yellow and reddish or orange-coloured felspar or sandstone-like mineral, with a slight gold-coloured lustre in a strong light, are found imbedded and evidently fused in, with the scoriaceous part ; sometimes having a very little green glassy mineral like broken bottle glass fused around or close to them ; both are highly brittle, and in such minute quantities, and so imbedded in the mass that it is only by careful poring over it with a magnifier that they are detected ; and it is impossible to do more than to obtain minute blowpipe fragments, from which it however appears clearly that the glass is Olivine, being just fusible on the edges, and first discolouring, and then so far disintegrating as to fall to pieces when touched, after two or three days' digestion in muriatic acid ; which then gives the reaction of peroxide of iron.\* The

Brazilian specimen that of a chestnut, but with thick flakes of oxide below.

The glossy surfaces of his block are not smooth, but slightly indented all over, as if hammered with a rather large round-headed hammer.

The Siberian specimen, Pallas thinks, was originally covered with a rough ferruginous (oxidized?) crust which had been broken off to obtain pieces of it.

The brown colour of the surface of the block is merely a very thin coat of rust, for the slightest scratch with a knife produces a bright metallic streak.—PALLAS' VOYAGE.

\* The olivine of meteoric stones does not gelatinise like that of basalt and other volcanic specimens, (See Vol. XIII. of Journal, p. 884, Examination of the Kandeish Aerolite.) Specimens are too small and scarce for us to ascertain what this is owing to.

yellow sandstone-looking mineral when digested in muriatic acid loses its colour, and the acid gives traces of iron. The mineral is then a compact dead white-coloured mass, like milk-quartz, and before the blowpipe it proves to be quartz without any trace of alumina or magnesia.

The lower or foot part of the specimen is much more corroded than the upper part (as if it had oxidated more rapidly by lying on the damp ground?) In some of the cavities a lining of a pitchy lustre is to be detected, but this does not appear to be the remains of nests of crystals, as in the Brazilian and Siberian specimens.

Our mass having laid apparently in an exposed situation in a bungalow, has yet many specks of white-wash upon it, which will not scrub off, and as to use an acid would I fear alter the fair appearance of the specimen, I have thus preferred to allow them to remain.

## II.—*Dimensions, Weight, &c.*

The dimensions of this mass of iron taken with callipers, are as follows :

|                                                                         | <i>Inches.</i>  |
|-------------------------------------------------------------------------|-----------------|
| Extreme length, . . . . .                                               | 15              |
| Extreme breadth, . . . . .                                              | $12\frac{5}{8}$ |
| Greatest thickness from the foot to the bosses at the vertex, . . . . . | $9\frac{7}{8}$  |
| Average thickness, excluding the foot, about. . . . .                   | $8\frac{4}{8}$  |
| Thickness at the small end; . . . . .                                   | $5\frac{1}{8}$  |
| Breadth at the small end, . . . . .                                     | $7\frac{4}{8}$  |
| Diameter of the foot, which is somewhat circular, . . . . .             | $7\frac{2}{8}$  |
| Diameter of the foot at the base, . . . . .                             | 6               |
| Foot projects from the lower part about . . . . .                       | $1\frac{4}{8}$  |

Its weight, carefully taken for me by Mr. Laidlay, in a good balance, is 1 factory maund, and 36 seers, or  $156\frac{1}{2}$  lbs. English. I have cut off a small piece, and Captain Sherwill told me he had taken a piece or two, besides the one he first sent down, so that altogether its original weight must have been close upon 160 lbs. English.

### III.—*Internal Structure and Appearance.*

I have not yet been able to detect in our specimen any decided crystals. On one splinter I certainly found a crystallized facet, and traces of them are to be seen frequently, but nothing sufficiently distinct for us to speak of it as being crystallised; however, this may exist, and be partially destroyed by the violent action of separating any fragments from the mass.

When a portion of the metallic part is broken or cut off, it is of a bright platina-white colour, and when polished and acted upon by a dilute acid, it exhibits the damask watering known to be a characteristic of meteoric iron. Its fracture may be called very sharply uneven, and cellular, exactly resembling that of a tough rod or bar, of iron which has been torn asunder; and it almost pricks the fingers upon handling it roughly. It is full of small cellular cavities, which give it almost a spongy appearance in some places.

The weight of the Elbogen mass of Meteoric Iron in the cabinet of the Emperor of Austria at Vienna, is 141 lbs. German, or 174 lbs. English.

Pallas, p. 350, says of the Siberian mass that,—

The crust being taken off, the rest of the mass is a soft iron, white at the fractures and full of holes like a coarse sponge, and he goes on to describe the olivine with which the cavities of it were filled.

The Santa Rosa and other masses are also described by Bossingault, (*Quarterly Journal Science*, Vol. 17, p. 395,) as cellular and without a vitreous coating—malleable, of a granular structure and easily giving way to the file; of a silvery aspect, and of Sp. Grav. 7.3. Another mass at Santa Rosa is described as cellular, very hard to the file, malleable, of a silvery aspect, and of a fracture resembling tilted cast steel. Another mass is said to have exhibited small facets in its fracture, malleable and of a silvery lustre.

The damasking appearance is stated in the *Quarterly Journ.* Vol. 5, p. 372, (upon what authority is not given) to have been first pointed out in Germany, and to have been found in all the well known specimens of meteoric iron, as well as in the grains found in meteoric stones, but as not to be found in some of doubtful origin.



IV.—*Magnetism.*

I have not been able to detect any thing approaching to polarity in our mass. It attracts like common iron both ends of the needle indifferently.

Dr. Wollaston failed also to find any polarity in Mr. Mornay's fragments.

V.—*Hardness, Toughness, &c.*

It is by no means hard, being readily indented or flattened at the bosses like any soft iron, and yielding easily to the file. It is however of extraordinary and almost incredible toughness, so that, while it yields to the cold chisel, or steel wedges, to a certain extent, it is half a day's work for a native carpenter with steel wedges to cut off a small piece from the metallic part. In the few scoriaceous parts pieces are much more easily detached, but when these are pulverised, the grains and minute portions of the metallic iron amongst them, are beaten into tough flat disks.

It has been found by Messrs. Jessop and Co. to forge easily at a moderate heat and a forged piece is exhibited.

I had provided myself with a sledge hammer, and tools for cutting off some specimens of the iron, but it was with the utmost difficulty, I could detach the few small pieces which you have seen.—*Mornay.*

Though Pallas in the preceding page, (that is, his French translator) has, as just quoted, called the iron soft (*doux*), he now says in the next page, 351, using the words *dur* and *compacte* to express tenacity and toughness, that, The iron is so hard and compact (*dur et compacte*),\* that three or four smiths have employed ten and twelve men with steel wedges, and sledge hammers to cut off a piece, which weighed at most two pounds. In one instance only did they succeed in cutting off a piece, which weighed about a pood, (36 lbs. English.)

*Remarks on the foregoing physical characters.*

Amongst these the shape of our Aerolite is certainly the most noticeable, and we are at first sight much puzzled to account for the foot-like appendage, which, as was naturally enough at that time supposed by Mr. Mornay in the Brazilian mass, we are inclined hastily to suppose a *ramus*, or branch attaching it formerly to some larger mass. Mr. Mornay however showed for his specimen by digging under it, that there was no mass or vein to which it could have been attached, and improved chemical research now satisfies us that there is no terrestrial native iron which contains Nickel and Chromium, and on this conclusion we rest in addition to other collateral evidence for the meteoric origin of our's.

But the foot still remains to puzzle us.

\* The proper words are *tenace, tenacite.*

We first attribute it to the more rapid oxidation of the part in contact with the soil, but the legend says it was *dug out* of the ground ; so that while it was interred, if it was altogether so, the whole would have been equally subject to oxidation. When dug out and placed as an object of worship it probably was kept under cover ; but the expression and the account are altogether too vague to serve us as data from which to deduce conclusions. It is doubtless possible (though but remotely so) that the foot may have been formed by the gradual oxidation of the lower part, yet this we should think—supposing the mass to have been originally an egg-shaped lens, and as compact below as above—would have gone on equally over *the whole* of the lower surface, instead of one part of it, and also at the large end (at *c* in Plate I.) but it has not done this at all, and so, unless we also suppose unequal tendency to oxidation, this process does not satisfactorily account for its present shape, and this moreover, we cannot fairly suppose, because at present the foot is as hard and as metallic as any other part. One supposition only remains, i. e. that there might have been more of the scoriaceous or earthy parts below, which have separated in time from the mass, and the traces of these parts *are*, it is true, more frequent below and at the rim of the disk than on the upper part. Yet this is very poor aid to prove that there ever was so much more of it, as this supposition demands, and it seems now as little liable to oxidation and decomposition as any other part, and if we admit this fully, still we have *the* question of why the metallic nucleus (for such it would then be) has assumed this shape ? which is in fact coming back to our original enquiry.

I think one way of accounting for it may be this—

If we suppose a ball of semi-fluid matter (whether rendered so from heat or otherwise) to fall vertically to the earth's surface without breaking into fragments, such a mass would, it is clear, form a circular and lenticular disk, which would be more or less flattened at the lower surface ; for the motion of the mass would be then derived from a single force, the earth's attraction, and the resistance would meet it in a line directly opposed to that motion.

But if we supposed our semi-fluid mass to fall in any line deviating from the vertical, as in one for example like that of the arrow in Plate XXIX, we have then altogether anew state of things ; for here are first two forces in the mass, the vertical (from attraction) and the projectile force,

and then the resistance of the earth, which no longer meets the other forces in their direct path. If we next suppose the mass to fall diagonally upon a tolerably soft soil—and our mass, if semi-fluid, must have done this, for if it had fallen upon a hard one it would have been broken to pieces, unless indeed it fell in a solid state from the heavens, which we do not assume\*—we can suppose it also to be *driven* into the earth for a certain distance till the vertical part of the force was exhausted, but during this process the projectile force would, particularly for the part above ground, be urging forward the remainder of the mass, so as upon its final cooling to produce a disk somewhat like what we see in our specimen, and place the centre of gravity somewhere in a line about that which I have marked at *a. b.* in Plate XXIX.

In the course of this cooling we might also find that one part of the mass, being more rapidly cooled by the contact of the earth, would be more porous, which our mass is ; and that the lower and front part of it (the front part in relation to its supposed motion) might be drawn out into a ridge-like prominence, which *is* the case with our specimen also ; and I have marked this ridge, which however is sharper and better defined than there shown, in the vertical section at *x.* in Plate XXX.

With means at command it might perhaps be possible, as by projecting a ball or mass of softened fusible metal on a yielding soil at various angles, to test the truth of all this, which I beg to be understood as submitting as a mere theory, but even if we were to obtain a solid somewhat in the form of our specimen, we should merely thereby increase the probabilities that this was really the cause of its assuming this shape ; for, after all, its original form may have been nearly what we see it, and upon the hypothesis of these bodies being originally projected from the Lunar Volcanoes, we may suppose it to be a huge lava-drop† detached from some mass of botryoidal concretions, and blown into the sphere of the earth's attraction. The coincidence of our mass with the Brazilian one in having a foot (though it wants the *tail* which Mr. Mornay delineates) is too remarkable to be passed over. I have been unable to

\* There are instances of stony Aerolites being found in a soft state immediately after their fall, but I do not recollect any of the metallic ones being so found. Nevertheless we may fairly assume that, as less heat is required, the probabilities are that they also fall in a semi-fluid state.

† A French writer would have a better word, "*une larme de lave,*" or *lava tear.*

find a copy of Bongainville's voyage, and to consult Boussingault's work, if they give any description of the forms of the masses noticed by them; and it is one of the great difficulties which all colonial research labours under, that we are either wholly deprived of references or can find only the brief and abridged notices to which scientific periodicals are necessarily limited, and which for some part of the matter in hand are wholly insufficient for our purpose.

Since this was written I find in the Quarterly Journal of Science, Vol. 12 for 1822, p. 330, an account of some meteoric stones, one of which fell in Courland, on the banks of the Kolupschen Lake in the presence of some labourers, and was hot enough to burn their hands when they touched it. It is said to have penetrated a foot and a half into a dense dry clayey loam, and that its shape when entire *resembled a rounded anvil, of which the narrow end was undermost*. This is not very explicit, but it serves to show that there may be a tendency to these elongated anvil-like forms either with or without a foot. The Chinese give all manner of fantastic names to the stones recorded in their annals to have fallen from the heavens, of which some it is known are iron, such as "anvils, hammers, nails, hatchets, &c." and our own name of *thunderbolt* and the German *Donneraxt* (Thunder-axe) seem related to this sort of popular record of these phenomena.

I put any classical conjecture with diffidence, but a curious question arises here. Is this falling of *anvil*-shaped masses from heaven (in the case of our Indian specimen, and the Brazilian and Courland ones too, they are of iron) the parent source of the myth of the Lemnian Vulcan's being hurled from heaven by Jupiter on the island of Lemnos? where the anvil-God was "received" by the Sintians? as described by Homer, Book I. l. 593.

Κάππεσον ἐν Λημνῷ ὀλίγος δέτι θυμὸς ἐνήν.

Ἐνθα μὲ Σιντίες ἄνδρες ἄφαρ κομίσαντο, πεισόντα.

Literally,

"Till upon Lemnos I fell, and but little of breath was remaining,  
When of the Sintian men I was received, at my falling."

The paraphrase of Pope being inexact I do not quote it. The little of breath (*θυμὸς* life, soul, ardour, &c.) may well be understood as the mythic amplification of the original fact that the Vulcan (the meteorolite) was nearly cold when he reached the ground and was approached;

and *certes*, our Indian Sintians of the Kurruckpore hills, “received” and comforted their Godling, in the worship they paid to him, and perhaps also have their legend and myth respecting him, if we could only obtain it? More than one of these wonderful bodies were worshipped by the ancients and have been even held to be personifications of the heathen divinities. The thunderstone in Crete, regarded as the symbol of Cybele; the Ancylo or sacred shield of Numa, and “the mother of the Gods” at Pessinus, are all cases which will readily occur as fortifying my conjecture (see Art. Meteorolites, Ure’s Dict. &c.) Cicero (*De Natura Deorum*, Lib. III. par. XXIII.) describes four well known Vulcans; the Athenian, Egyptian, Lemnian and Menalian or Liparian Vulcans.

*Chemical Examination.*

The examination of the siliceous specks and olivine I have already described.

|                                                                                                                  |       |
|------------------------------------------------------------------------------------------------------------------|-------|
| The specific gravity of a small specimen of the metallic part,<br>carefully chosen to avoid cavities, was, ..... | 6. 76 |
| The specific gravity of the forged bit is, .....                                                                 | 7. 31 |
| Scoriaceous part, .....                                                                                          | 4. 03 |

I have satisfied myself by repeated and careful examination that our specimen contains

Iron,  
Nickel,  
Cobalt,  
Chromium,  
Silica,  
Alumina,

and traces of Arsenic and Selenium.

But these again are most variable in their presence and amount, so that no two assays will give like results, and thus the whole contradicting each other, as it were, renders it impossible to give a quantitative analysis either of the metallic or the scoriaceous parts in any degree satisfactory.

*I estimate* therefore from several trials that the metallic part contains about

|                         |       |    |
|-------------------------|-------|----|
| Metallic iron, .....    | 87.   | 00 |
| Silex, .....            | 11.   | 50 |
| Alumina and Loss, ..... | 1.    | 50 |
|                         | <hr/> |    |
|                         | 100.  | 00 |

With traces of Arsenic.

The Scoriaceous part

|                             |     |         |
|-----------------------------|-----|---------|
| Metallic iron, .....        | 77. | 00      |
| Silica, .....               | 17. |         |
| Aluminium, .....            | 1.  | 50      |
| Cobalt, .....               | 3.  | 20      |
| Nickel, .....               | 1.  |         |
| Chromium, .....             |     | 50      |
| Arsenic and Selenium, ..... |     | Traces. |

It seems at first sight to be treating the subject loosely to give only these approximate quantities, but it was only after long and repeated and most careful work that I could be satisfied of what I have above announced, and that it was wholly impossible to take any one analysis as representing the average constituent parts of the specimen; but I do not regret my labour, for it enables us to explain how it is that chemist after chemist in Europe, and these men of the first talent, have successively differed in their results, or have found new products, such as the Chromium, in the same specimen in which others had failed to detect it. It is evident to me that they obtained assays from different parts of the specimen\* and have thus differed, as I again and again found I did from myself, to my no small surprise and perplexity.

And philosophically considered this is what (so to speak) *should* really occur, for if we admit these meteorites to be revolving round us as their primary, and thus to be, for us, a sort of satellites, we might imagine that if the earth, when *it* too was an incandescent asteroid had fallen, like our specimen, in upon some huge siderial primary, and had been there "examined and reported upon" that a chip from about the

\* And indeed this is a matter almost of course. The small specimens brought from foreign countries and the minute fragments obtained from great museums as special favours must all have been very imperfect averages of the whole of any large mass.

Cape of Good Hope might have given different results from a splinter off Cape Comorin ; and a knob from one of the Andes, with a vein of silver in it, might differ widely from a fragment of Madagascar or Siberia or Sussex. When our specimen was an incandescent spheroid (assuming it to have once been so), the scoriaceous and purely metallic parts may have made spots and districts on the nucleus as marked as the various formations of our globe.

In the examination of both I find a minute portion of the insoluble residuum described by Boussingault, (*Journal of Science*, Vol. 17. p. 395,) which is in the form of a black dense granular powder,\* and in ours is wholly insoluble in nitro-muriatic acid, and even fusion in caustic potass alone has very little effect upon it. The only menstruum which will properly act upon it, being a mixture of caustic and nitrate of potass, which by long fusion dissolves out the chromium as a chromate of potass, when the powder is first carefully pulverised, and the heat kept very high. By the blowpipe the chromium is readily detected by microcosmic salt on the platina wire, the iron separating as a metallic bead, and the assay bead remaining dull from the silica in the compound. It appears to be a silico-chromate of iron, but with such minute assays it is impossible to say more at present of such a refractory compound than that it contains silica, iron and chromium, the silica and iron being in large proportions and the chromium in a very small one. It may possibly be a siliceous sub-chromate of iron ?

With reference to the presence of the arsenic (which was distinctly ascertained by Marsh's process), and to what I have said above as to the successive oversights of first-rate chemists, the following extract from a notice of M. Walchner entitled "Observations on the general distribution of copper and arsenic" in the *Comptes Rendus Septembre*, 1846, which I take from the Quarterly Journal of the Geological Society may not be out of place.

After affirming the presence of copper and arsenic in many iron ores, mineral springs, soils, rocks, &c. the author goes on to say,—

"It now remained to demonstrate that these metals were equally

\* I think also so described by some other chemist, but I cannot now find the reference.

contained in meteoric iron ores,\* my first experiments were made on the meteoric iron of Pallas, well known and repeatedly analysed by distinguished chemists, and in reality I have found in it both copper and arsenic, also in the Mexican meteoric iron of Yuanhuitlan, near to Oaxaca, brought home by my colleague M. Sommerschu principal engineer of mines; in a meteoric iron from Tennessee described by M. Troost in Silliman's Journal; and finally in a fragment of the great mass of meteoric iron, deposited in the museum of Natural History of Yale College in Connecticut. Consequently it is not only at the surface of the earth that iron is mixed with copper and arsenic, but also in the solid portions of other celestial bodies."

Copper I have as yet failed to detect in our meteorite, but I should be far from affirming that it does not exist in it.

H. PIDDINGTON.

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*The Aborigines of Central India.*—By B. H. HODGSON, Esq.

At the close of last year I had the honour to submit to the Society a summary view of the affinities of the sub-Himálayan aborigines. I have now the honour to submit a similar view of the affinities of the aborigines of Central India. The extra copies of the former paper which were sent to me by the Society I forwarded to Colonels Ouseley, and Sleeman, to Major Napleton, Mr. Elliot of Madras, and other gentlemen, with a request that they would get the vocabulary filled up from the languages of the several aborigines of their respective neighbourhoods. The three former gentlemen have obligingly attended to my wishes, and I am assured that Mr. Elliot also is busy with the work. Of the seven languages which I now forward the comparative vocabulary of, the three first came from Chyebossa, where Colonel Ouseley's Assistant, Capt. Haughton prepared them; the 4th and 5th direct from Col. Ouseley himself at Chota Nagpur; the 6th from Bhaugalpur pre-

\* M. Rammler of Vienna has found the arsenious acid in the peridot of the meteoric iron of Pallas (Pogg. Annal, 1840, No. 4.)



pared by the Rev. Mr. Hurder; and the 7th from Jabbalpur where Colonel Sleeman's principal assistant drew it up for me.

The affinities of these tongues are very striking, so much so that the five first may be safely denominated dialects of the great Kól language; and through the Uraón speech we trace without difficulty the further connexion of the language of the Kóles with that of the "hill men" of the Rajmahal and Bhaugalpur ranges. Nor are there wanting obvious links between the several tongues above enumerated—all which we may class under the head Kól—and that of the Gónds of the Vindhia whose speech again has been lately shown by Mr. Elliot to have much resemblance both in vocables and structure to the cultivated tongues of the Deccan. Thus we are already rapidly approaching to the realization of the hypothesis put forth in my essay on the Koch, Bodo and Dhimál, to wit, that all the Tamulians of India have a common fountain and origin, like all the Arians; and that the innumerable diversities of spoken language characterising the former race are but the more or less superficial effects of their long and utter dispersion, and segregation, owing to the savage tyranny of the latter race in days when the rights of conquest were synonymous with a license to destroy, spoil and enslave. That the Arian population of India descended into it about 3000 years ago from the north-west, as conquerors, and that they completely subdued all the open and cultivated parts of Hindostan, Bengal and the most adjacent tracts of the Deccan\* but failed to extend their effective sway and colonization further south, are quasi historical deductions† confirmed daily more and more by the results of ethnological research. And we thus find an easy, and natural explanation of the facts that in the Deccan, where the original tenants of the soil have been able to hold together in possession of it, the aboriginal languages exhibit a deal of integrity and refinement, whilst in the north, where the pristine population has been hunted into jungly and malarious recesses, the aboriginal tongues are broken into innumerable rude and shapeless fragments. Nevertheless those fragments may yet be brought together by large and careful induction; for modern ethnology has actually accomplished

\* Telingána, Gajerat and Maharáshtira, or the Maratta country.

† Brachmanes nomen gentis diffusissimæ cujus maximapars in montibus (Ariana Cabul) degit, reliqui circa Gangem. Cell Geogr.

elsewhere yet more brilliant feats than this, throwing upon the great antihistoric movements of nations a light as splendid as useful. But, if I hold forth, before hand, the probable result of this investigation in the shape of a striking hypothesis in order to stimulate the pains-taking accumulator of facts, and even intimate that our present materials already offer the most encouraging earnest of success, I trust that the whole tenour and substance of my essay on the Kóch, Bódo and Dhi-mál will suffice to assure all candid persons that I am no advocate for sweeping conclusions from insufficient premises, and that I desire to see the ethnology of India conducted upon the most extended scale, with careful weighing of every available item of evidence that is calculated to demonstrate the unity,\* or otherwise, of the Tamulian race.

\* This unity can of course only touch the grander classifications of language, and be analogous to that which aggregates, for example, Sanscrit, Greek, Teutonic and Celtic.

## Comparative Vocabulary of the Aboriginal languages of Central India.

| English. | 1. <i>Sinhbhám Kól.</i> | 2. <i>Sóntál.</i> | 3. <i>Bhámj.</i> | 4. <i>Uráoz.</i> | 5. <i>Móndata.</i> | 6. <i>Rájmahali.</i> | 7. <i>Góndi.</i> |
|----------|-------------------------|-------------------|------------------|------------------|--------------------|----------------------|------------------|
| Air      | Hoiyo                   | Hóyé              | Hóyó             | Tháká            | Hóyóh              | Táké. Taphé          | Bárbá itá        |
| Ant      | Mú                      | Múni              | Mué              | Póh              | Munj               | Pók                  | Patté            |
| Arrow    | Sarh                    | Sarh              | Sarh             | Chár             | Sáár               | Chár                 | Jiyatúr          |
| Bird     | O'é                     | Chéné             | Chéné            | O'rák            | Úré                | Púj                  | Itté             |
| Blood    | Myún                    | Myún              | Myún             | Khéns            | Myún               | Késú                 | Nattúr           |
| Boat     | Dúngá                   | Dúngá             | Dúngá            | Dóngá            | Dóngá              | Návé H               | Dóngó            |
| Bone     | Jáng                    | Jáng              | Jáng             | Khóchal          | Jáng               | Kochal               | Hára             |
| Buffaloe | Kérá                    | Kérá              | Kérá             | Mánkhá           | Mánkhil            | Mángé                | Háliya           |
| Cat      | Bilai H                 | Púsi              | Bilai H          | Bírkha           | Pússi              | Bérgé                | Bílal            |
| Cow      | Gúndi                   | Gai H             | Gai H            | Údú              | Úri                | Oi                   | Dhóriyal         |
| Crow     | Ká                      | Kahú              | Kóvá             | Khakhá           | Kóvá               | Káké                 | Káwá             |
| Day      | Súgi, Má                | Sing. Má          | Din. H           | Úllah            | Sing               | Diné H               | Patti            |
| Dog      | Séta                    | Séta              | Séta             | Alla             | Séta               | Allay                | Nai              |
| Ear      | Lútúr                   | Lútúr             | Lútúr            | Khebda           | Lútúr              | Khetway              | Kavi             |
| Earth    | O'té                    | O'té              | O'té             | Khékéhl          | Wathé              | Kékal                | Dharti S         |
| Egg      | Billi                   | Billi             | Pito             | Bí               | Billi              | Kírpan               | Méj              |
| Elephant | Háthi H                 | Háthi H           | Háthi            | Háthi H          | Háthi H            | Ati H                | Yeje             |
| Eye      | Mét                     | Mét               | Mét              | Khán             | Méd                | Kané                 | Kank             |
| Father   | Apúng                   | Bábá              | Bábú             | Bábé             | Apúng              | Abá                  | Wáwó             |
| Fire     | Sengel                  | Sengel            | Sengel           | Chik             | Singil             | Chiché               | Kis              |
| Fish     | Hakú                    | Hakú              | Hái              | Injo             | Hákú               | Min                  | Min              |
| Flower   | Bowh                    | Búhá              | Baha             | Phúp             | Baha               | Púp                  | Phúl H           |
| Foot     | Kátá                    | Súptijánga        | Kata             | Dappé            | Kata               | Kév                  | Kalk             |
| Goat     | Méram                   | Méram             | Méram            | E'ra             | Méram              | Cré                  | Bókra H          |
| Hair     | Úb                      | Úb                | Úb               | Chúttí           | Úp                 | Tali                 | Róbáng           |
| Hand     | Thí                     | Thí               | Thí              | Khékháh          | Tibi               | Sésú                 | Kalk             |
| Head     | Bu                      | Buho              | Bu               | Kúk              | Bóhú               | Kúpé                 | Talla            |
| Hog      | Súkri                   | Súkri             | Súkri            | Kiss             | Súkri              | Kis                  | Paddi            |
| Horn     | Dring                   | Darring           | Derring          | Márag            | Daring             | Márg                 | Singh H          |
| Horse    | Sadham                  | Sadham            | Sadham           | Ghoro H          | Sadam              | Goro H               | Kóndand ?        |
| House    | O'á                     | O'rá              | O'rá             | Erpá             | Uráá               | Avá                  | Rón              |
| Iron     | Méth                    | Mérhad            | Mérhd            | Panná            | Marhan             | Lóhá H               | Kachchi          |
| Leaf     | Sákam                   | Sákam             | Sikkam           | Atkhá            | Sikam              | Afgé                 | Aki              |
| Light    | Maskal                  | Marsal            | Tetaytúrra       | Billi            | Marsa ?            | Avéli                | Bérachi          |

|                 |                        |                   |                   |                   |                    |                      |                  |
|-----------------|------------------------|-------------------|-------------------|-------------------|--------------------|----------------------|------------------|
| <i>English.</i> | <b>1. Simbhūm Kól.</b> | <b>2. Sontál.</b> | <b>3. Bhūmij.</b> | <b>4. U'ráoz.</b> | <b>5. Mándala.</b> | <b>6. Rájmahali.</b> | <b>7. Góndi.</b> |
| Man             | Hó                     | Hoh               | Horro             | Alla              | Horl               | Málé                 | Manébábá mawsal  |
| Monkey          | Sarrha, Gári           | Hanú, Gári        | Gari              | Bandra H          | Bandra H           | Bilpú                | Bandara H        |
| Moon            | Chandú H               | Chandó H          | Chandú H          | Chando H          | Chandú H           | Ayá                  | Chanda H         |
| Mother          | E'áng                  | I yo              | Mai H             | Ayyo              | E'ngan             | Toké                 | Aval             |
| Mountain        | Búrú                   | Búrú              | Búrú              | Partá             | Búrú               | Dongar               | Dongar           |
| Mouth           | A                      | Mochra            | Alang             | Bái               | Mocha              | Soro                 | U'di             |
| Moschito        | Sikí                   | Sikri             | Lútú              | Bhúséndi          | Bhúsúndi           | Minko                | Misi             |
| Name            | Nútum                  | Nútum             | Nútú              | Nám H             | Nátum              | Námi H               | Battí paról      |
| Night           | Níndhá*                | Níndhá            | Nídhá             | Mákhá             | Nidak              | Máké                 | Narkaát.         |
| Oil             | Súnúm                  | Súnúm             | Súnúm             | Issúm             | Súnám              | Isgné                | Ning             |
| Plantain        | Kodal                  | Kaira             | Kodal             | Kérá H            | Kéla H             | Kaivi                | Kérá H           |
| River           | Garra                  | Garra             | Garra             | Khár              | Garra              | Caret                | Dónda            |
| Road            | Horra                  | Hor               | Horren            | Dábári            | Hórah              | Sarké H              | Sarri            |
| Salt            | Búlung                 | Búlung            | Búlung            | Békh              | Búlang             | Béké                 | Sabbar           |
| Skin            | Úr                     | Harta             | Úr                | Chapta            | Harta              | Chámé S              | Tól              |
| Sky             | Sirma                  | Sirma             | Rimmil            | Mírkhá            | irma               | Sarángé              | Bádúr? H         |
| Snake           | Bing                   | Bing              | Bing              | Nir               | irna               | Nér                  | Tarás            |
| Star            | E'pil                  | Ipil.             | Ipil              | Bínká             | Ipil               | Bindéké              | Sukú             |
| Stone           | Dirri                  | Dirri             | Dirri             | Pakhná            | Diri               | Chalhé               | Tóngí            |
| Sun             | Singí                  | Sing marsal       | Singí             | Dharmít           | Singí              | Bér                  | Suráj H          |
| Tiger           | Garúmkúla              | Kúla              | Kúla              | Lakhrá            | Kúlah              | Sad                  | Pólli            |
| Tooth           | Dáthá H                | Dátha             | Dátta             | Páll              | Dátá H             | Páll                 | Palk             |
| Tree            | Dárú S                 | Daré              | Dárú              | Man               | Dárú S             | Man                  | Mará             |
| Village         | Hattú                  | Athú              | Hathújé           | Padda             | Hátú               | Kép                  | Nár              |
| Water           | Dáh                    | Dáh               | Dáh               | Úm, Chéip         | Dbá                | Am                   | Yér              |
| Yam             | Merúmtosang            | Dá sáng           | Sángá             | Alú H             | Arú H              | Caret                | Náska kángda     |
| I               | Aing                   | Ingé              | Ing               | Enan              | Ing                | En                   | Mánú             |
| Thou            | Um                     | Ungé              | Am                | Nien              | Am                 | Nin                  | Imma             |
| He, She, It     | Ini                    | U'ni              | Ini               | Asán              | Inni               | Ath                  | Caret            |
| We              | Caret                  | Caret             | Caret             | En                | Allégé             | Nam. Om              | Caret            |
| Ye              | Caret                  | Caret             | Caret             | Asú               | Inkoghí            | Nina                 | Úndé             |
| They            | Caret                  | Caret             | Caret             | Caret             | Ankó               | Asabar. Awar         | Caret            |
| Mine            | I yan                  | Ingréá            | Inya              | E'nghi            | Jhátaná            | Ongki                | Nává ángdo       |
| Thine           | U'mmá                  | Ami               | U'mmá             | Nienghi           | Amátaná            | Ningki               | Niávútriánd      |

\* A misapplication probably of the Hindi word for sleep or sleepy.

† Sanscrit? and implies that the Sun is worshipped.

|                 |                         |                  |                   |                  |                    |                      |                  |
|-----------------|-------------------------|------------------|-------------------|------------------|--------------------|----------------------|------------------|
| <i>English.</i> | <i>1. Sinhahám Kól.</i> | <i>2. Sónál.</i> | <i>3. Bhámij.</i> | <i>4. Uváon.</i> | <i>5. Múndala.</i> | <i>6. Rájmahali.</i> | <i>7. Góndi.</i> |
| His             | Ini                     | U'néá            | Aigé              | Asghi            | Annerá tana        | Ahiki                | Oná              |
| Our's           | Alléá                   | Alléá            | Abúsaban          | E'mhí            | Ahuá tana          | E'mki, Námki         | Mábaí            |
| Your's          | Appéá                   | Appé             | Caret             | Assghi           | Apiá tana          | Nimki                | Niá hillé        |
| Their's         | E'nkóá                  | Unkúré           | Caret             | Caret            | Ankóá tana         | Asá bérki            | Oná ánd          |
| One             | Mí                      | Midh             | Moy               | U'ntá            | Miá                | Ort. † Ondong        | U'nddí           |
| Two             | Barria                  | Barria           | Barria            | Enótan           | Baria              | Pándong, Kivong      | U'nddí           |
| Three           | Apiá                    | Piá              | Apiá              | Manótan          | Baria              | Twr. Mákis in-       | Ranú             |
| Four            | U'púnia                 | Ponía            | U'púnia           | Nákhótan         | Apiá               | dual                 | Múnú             |
| Five            | Moya                    | Moné gótang*     | Monaya            | Pánjé gotan H    | U'púniá            |                      | Nálú             |
| Six             | Túria                   | Túrú gótang      | Túrúyá            | Sé gotan H       | Moria              |                      | Saijhan          |
| Seven           | Iyá                     | Iair gótang      | Sáth H            | Sat gotan H      | Túriá              |                      | Sáiróng          |
| Eight           | Iilia                   | Iral gótang      | Ath H             | Até gotan H      | Sáth H             |                      | Yénu, Yétú       |
| Nine            | Aréá                    | Aré gótang       | Nou H             | Nó gotan H       | Ath H              |                      | Anamúr           |
| Ten             | Geléá                   | Gél gótang       | Das H             | Das gotan H      | Nókó H             |                      | Nó H             |
| Twenty          | Hissi                   | Caret            | Caret             | Bis H            | Dasgo H            |                      | Pada             |
| Thirty          | Hissi geléá             | Hissi géł gótang | Moy hissi dasti   | Dérh kori H      | Bís H              |                      | Bísa H           |
| Forty           | Bárhissi                | Bár hissi        | Bár hissi         | Bisénd           | Tís H              |                      | Tís H            |
| Fifty           | Moy hissigil            | Bár hissi géł    | Bár hissi dasti   | Dharilé kóri     | Bár hissi dasgo    |                      | Chálís H         |
| A hundred       | Moy hissi               | Monay hissi      | Sou H             | Sé H             | Bár hissi dasgo    |                      | Pachás H         |
| Of              | Caret                   | Caret            | Caret             | Ye               | Midso              |                      | Só H             |
| To              | Té                      | Té               | Caret             | Gai              | Kí H               |                      | Orá, Bará        |
| From            | Té                      | Té               | Caret             | Té               | Kó H               |                      | Baina            |
| By, instr.      | Tété                    | Tulé             | Caret             | Caret            | Sé H               |                      | Caret            |
| With, cum.      | Tóté                    | Túli             | Caret             | Caret            | Atam               |                      | Túrsé, Dúrsé     |
| Without, sine.  | Banóá                   | Banóá            | Caret             | Sang H           | Gatt, Minna        |                      | Sang             |
| In              | Ré                      | Ré               | Caret             | Ní               | Sámá               | Gúni                 | Bigúr            |
| On              | Ré Chitan               | Ré               | Caret             | U'lá             | Bhítar H           | Walo                 | I mitté          |
| Now             | Ná                      | Nítging          | Caret             | U'lá             | Caret              |                      | Inga             |
| Then            | En                      | Ena, U'ní        | Caret             | U'kú             | Náhá               |                      | Ada              |
| When ?          | Chúliá                  | Tis              | Caret             | Písá             | Inam               |                      | Vang pur         |
| To-day          | Ná                      | Teheng           | Tising            | E'ká héré        | Chiólo, Chimto     |                      | Naiu             |
| To-morrow       | Gúphá                   | Gúphá            | Gúphá             | Inam             | Tihin              |                      | Ningnai          |
|                 |                         |                  |                   | Nélá             | Gappá              |                      |                  |

Same as Hindi and Urdu.

As in Urdu

By affix to the noun.

By affix to the noun.

† Art to human beings. Others to diverse things.

\* Gótang is surplusage and Hindi.

|                  |                         |                  |                   |                  |                    |                      |                  |
|------------------|-------------------------|------------------|-------------------|------------------|--------------------|----------------------|------------------|
| <i>English.</i>  | <b>1. Sinkbhám Kól.</b> | <b>2. Sónál.</b> | <b>3. Bhómij.</b> | <b>4. Uváog.</b> | <b>5. Múndala.</b> | <b>6. Rájmahali.</b> | <b>7. Góndi.</b> |
| Yesterday        | Hólá                    | Hólánó           | Hólá              | Chéló            | Hólá               | Chéwr                | Nara khai        |
| Here             | Néhá                    | Noáthi           | Néhai             | Isan             | Nithi              | Ino                  | Ingabará         |
| There            | Entai                   | Hanati           | E'ta thái         | Háhá             | U'nthi             | Áno                  | Caret            |
| Where?           | Okotai                  | Okáti            | Oko thái          | E'ksan           | U'hai              | Ikéno                | Vagá             |
| Above            | Sirma                   | Sirma            | Sirma             | Méyah            | Chaitan            | Méché                | Parró            |
| Below            | Súbá                    | Pher             | Athé              | Kíyah            | Látúr              | Pissi                | Khálat mandar H  |
| Between          | Talaré                  | Taláré           | Talaré            | Majín            | Talar              | Máji H               | Bichte mandar H  |
| Without, outside | Racharé                 | Racharé          | Racharé           | Báhari H         | Báhari H           | Dwári                | Báhiro mandar H  |
| Within           | Bhtar H                 | Bhtar H          | Bhtar H           | U'lá             | Bhtar H            | U'lé                 | Núpá mandar      |
| Far              | Sangiuya                | Sangiuya         | Sangiuya          | Gécha            | Sangín             | Géchi                | Lángkak mandar   |
| Near             | Nia                     | Súgi             | Járeyá            | Hédi             | Nájk H             | Atgi                 | Múntosa mandar   |
| Little           | Húring                  | Húringi          | Húring            | Sani             | Húring             | Jóká                 | Jarásó mandar    |
| Much             | E'sú                    | Oriúttar         | Burra             | Dhér H           | Dhér H             | Gánrí                | Balé mandar      |
| How much?        | Chi miáng               | Tíná             | Chi miáng         | Yúng pagí        | Chimna             | Iná                  | Banchur          |
| As               |                         |                  |                   | Carent           | Nimnú              | Caret                | Inchur mandá     |
| So               |                         | Carent           |                   | Carent           | Sé                 | Caret                | Aróbara          |
| Thus             | Ynlíkaté                | Hunkaté          | Nékgia            | Yéli             | Nikemeh            | Caret                | Ihún             |
| How?             | Chi líka                | Chika líka       | Chi líka          | Yékassi          | Chilké             | Indéki               | Báhún            |
| Why?             | Chikan minté            | Chí líka         | Chí líka          | Indari           | Chikanlé           | Indri                | Bárad            |
| Yes              | Hán H                   | Hóé              | Hán H             | Háh              | Háh                | O'nón                | Ingé             |
| No               | Bano                    | Banga            | Bano              | Málá             | Bano               | Mállá                | Hillé            |
| (Do) not         | Alam                    | Alam             | Alapé             | Ampá             | Alú                | Caret                | Hillé bará       |
| And, also        | U'ndo                   |                  |                   | Our H            | Inní               | Inséki               | U'dé             |
| Or               | Nádo                    | Carent           |                   | Is               | Ani                | Malé                 | Idaré            |
| This             | Néá                     | Nóá              | Ní                | Edah             | Nia                | Ih                   | Caret            |
| That             | E'nó                    | Hono.            | Caret             | Húdah            | Aná                | Áh                   | Caret            |
| Which, jón       | Carent Omnino           |                  |                   | Ikrah            | O'kah              | Caret                | Caret            |
| Which, tón       | Oko                     | Hana             | Caret             |                  |                    | Caret                | Bará ánd         |
| Which? Kón       |                         |                  | Carent            | Carent           | Chikina            | Ik                   | Caret            |
| What?            | Carent                  |                  | Ekóá              | Indrári          | O'kówé             | Ik                   | Bittichij H      |
| Who?             |                         |                  | Okodhon           | Indara           | Jába, Nági         | Indarbadi            | Vónú ándi        |
| Any thing        | Oko bitté               | Oka dhon         | Okoji             | E'koarten        | Oko wáhi           | Né góté              | Báratit          |
| Any body         | Oko ho                  | Okúrén horh      | Júmiábo           | Mokháh           | Jamémi             | Lápá, Móká Mina      |                  |
| Eat              | Júmcéman                | Júmmén           |                   |                  |                    |                      |                  |

|                 |                        |                  |                   |                  |                    |                      |                  |
|-----------------|------------------------|------------------|-------------------|------------------|--------------------|----------------------|------------------|
| <b>English.</b> | <b>1. Sinkhém Kól.</b> | <b>2. Sónal.</b> | <b>3. Bhúmiy.</b> | <b>4. Úráoz.</b> | <b>5. Múndala.</b> | <b>6. Réymahali.</b> | <b>7. Góndi.</b> |
| Drink           | Núéman                 | Nayman           | Nayman            | Ú náh            | Noimi              | Oná                  | Yerú undkar      |
| Sleep           | Gitíman                | Gitikéman        | Gitijum           | Khándara         | Dúróng             | Kándrá               | Sángji           |
| Wake            | Biritman               | Biritman         | Rúáрман           | Amha khandara    | Adéya              | Ejra                 | Jagemám          |
| Laugh           | Landaiman              | Landman          | Landai            | Alíkah           | Caret              | Alká                 | Kavítóni         |
| Weep            | Raiman                 | Ragman           | Eyamman           | Chinkháh         | E'yamtémi          | Olga                 | Arató            |
| Be silent       | Hápauman               | Hapékomán        | Hápiakanman       | Amha kachnékrah  | Happá              | Aslúbehá             | Immakammeneman   |
| Speak           | Kájúman                | Rorhman          | Kájúman           | Kachnékrah       | Kajémi             | Auda                 | Báramanké        |
| Come            | Hájúman                | Hijúman          | Hijúman           | Báná             | Déla hájúm         | Bára                 | Báranígá         |
| Go              | Sánóman                | Chalahman        | Sánóman           | Kálá             | Dúsenámi           | Eká, Kálá            | Hannogámá        |
| Stand up        | Tingúnman              | Matingúnman      | Tingúakanman      | Illáhá           | Tengúnmi           | Choylá               | Tedánígá         |
| Sit down        | Dúbman                 | Dúrúpman         | Dúrúkanman        | Úkha             | Dúmi               | Oká                  | Uddánígá         |
| Move, walk      | Sánóman                | Dilangchalaman   | Dholáúsánóman     | Gúcha            | Sénámí             | Sakrá?               | Táká             |
| Run             | Niróman                | Dúrman           | Dúrman            | Bóngá            | Lírmi              | Bóngá                | Bittá            |
| Give            | Immáiman               | Immáiman         | Úmáiman           | Chhá             | Dá                 | Katá                 | Si               |
| Take            | Né                     | Né               | Né                | Óanda            | Né                 | Kinda                | Tará             |
| Strike          | Goiman                 | Dalmáin          | Magíman           | Khórah           | Dálí               | Bája                 | Jim              |
| Kill            | Margojokai             | Goidapolsmon     | Margogojiman      | Pítalchia        | Márgóji H          | Pítá                 | Jaksíva ústi     |
| Bring           | Dá                     | Dan              | Daigóguéman       | Ondrá            | Agómen             | Ondrá                | Taránígá         |
| Take away       | Yídman                 | Dúdíman          | Idimengo          | Hóná             | E'dímé             | Oiyá                 | Oumaníga         |
| Lift up, raise  | Rúkúbman               | Túrúkúbman       | Útháibaitman      | Chódá            | Rimémi             | Chivá                | Téhá             |
| Hear            | Jáimman                | Jyúmman          | Jyúmananego       | Mjinka           | Jyounémi           | Mená                 | Caret            |
| Understand      | Adáimman               | Únjúmkidda       | Etwanachigúm      | Bhújarka         | Samújhai H         | Bújá H               | Púté             |
| Tell, relate    | Kájúman                | Rorhman          | Kájúman           | Káchana          | Káji               | Tengá                | Kantáná manjé    |
| Good            | Búgi                   | Búgi             | Búgi              | Bésri            | Bógi               | Cru                  | Bésmanda H       |
| Bad             | Etka                   | Baréna           | Júdajanna         | Maldau           | Káhésá             | Báná                 | Búró manda H     |
| Cold            | Rabang                 | Rabang           | Rabang            | Ekh              | Réartana           | Paniá                | Múragta          |
| Hot             | Lóló                   | Lólo             | Gumár             | Bidáh            | Balhaltan          | Kúrní                | Kástai           |
| Raw             | Baral                  | Baralgia         | Baral             | Khéna, Arha      | Béral              | Kéné                 | Kachomanda H     |
| Ripe            | Biriéna                | Biliéna          | Ihsinjanna        | Panja            | Bilia              | Panjéte              | Pútá             |
| Sweet           | Sibíla                 | Haramgía         | Sibíla            | Tini             | Sihil              | E'mbé                | Mingatá          |
| Sour            | Jójó                   | Jójó             | Jójó              | Tissa            | Joju               | Tisé                 | Chóká manda      |
| Bitter          | Hárdá                  | Hawera           | Harrada           | Harkhá           | Harpan             | Karkeh               | Kadúta           |
| Handsome        | Búgi lika              | U'ní búgi        | Búgikúri          | Bésré H          | Bés H              | Crúgaré              | Assal H          |
| Ugly            | E'suétka lika          | Uni barigía      | Utea neloa        | Málá             | Kathés             | Caret                | Búrótá manda H   |

|                 |                                 |                         |                          |                         |                           |                             |                         |
|-----------------|---------------------------------|-------------------------|--------------------------|-------------------------|---------------------------|-----------------------------|-------------------------|
| <i>English.</i> | <b>1. <i>Sinbhātum Kól.</i></b> | <b>2. <i>Sónāl.</i></b> | <b>3. <i>Bhāmij.</i></b> | <b>4. <i>Urāng.</i></b> | <b>5. <i>Mundala.</i></b> | <b>6. <i>Rajmahali.</i></b> | <b>7. <i>Gondi.</i></b> |
| Straight        | Mūli                            | Būgisajia               | Būgi saj                 | U'jgo                   | Sóghia H                  | Jákró                       | Tukvá                   |
| Crooked         | Kochamocho                      | Ochúr                   | Hessú banka              | Béngko                  | Kékúndo                   | Séro                        | Tédhó                   |
| Black           | Héndé                           | Héndé                   | Héndé                    | Mokharo                 | Hendí                     | Márgo                       | Kariyal                 |
| White           | Pándí                           | U'ri púnda              | Hessú púnia              | Pándrú                  | Pándí                     | Jimpro                      | Panguró                 |
| Red             | *Hessú árá                      | *U'ri árá               | *Bararanga H             | Khénsó                  | Arrah                     | Késó                        | Lál H                   |
| Green           | Gácsosang                       | Hariyar H               | Gadé sosang              | Harría H                | Harríar H                 | Kénkajro                    | Haro H                  |
| Long            | Jilling                         | U'ri jilling            | Baroajilling             | Digha S                 | Jiling                    | Digaro                      | Lamba H                 |
| Short           | Dúnguya                         | Hárikatógia             | Kándia                   | Phúdá                   | Húding                    | Jokka                       | Chundur                 |
| Long            | Bátari salangi                  | U'di úsulai             | Baraisangaluma           | Micha                   | Jiling                    | Digaro                      | Jhangchomanda           |
| Tall            | Hessú imitingia                 | Bangorgaintia           | Bara bángarba            | Natúá H                 | Húding                    | Chapó                       | Chundurmanda            |
| Short           | Húring                          | Húringia                | Húringia, Káfo           | Sanka                   | Húring                    | Caret                       | Pataro H                |
| Small           | Márang                          | Márangia                | Hisso márang             | Kóhá                    | Márang                    | Bévo                        | Mótó H                  |
| Great           | Dingúrógia                      | Gúlándia                | Golandia, Gotagia        | Gólgól H                | Gótá                      | Golé H                      | Gola H                  |
| Round           | U'púnkocha                      | Púnkóna                 | U'pún kón                | Chár kóna H             | Chaptia                   | Caret                       | Nákhúnt [nur            |
| Square          | Mitaulógia                      | U'ri mirsang            | Mórsóm                   | Chapti H                | Mota H                    | Barábar H                   | Naphúral mandá-         |
| Flat            | Kiréná                          | U'ri móta               | Barai móta H             | Mota H                  | U'sú                      | Gandi tarvé                 | Caret                   |
| Fat             | Bátaria                         | Pátalia H               | Barai úsú                | Kháridkar               | Thakana H                 | Gandi walo                  | Sirsíhattúr             |
| Thin            | E'súblagiéná                    | Langiéna                | Laga Joualé              | Amún kala               | Titang                    | Dikmandatúr H               | Yétaksátúr              |
| Weariness       | Totáng tanna                    | Totang tanna            | Totang tanna             | Kéira                   | Ringat                    | Karúsátúr.                  | Karúsátúr.              |
| Thirst          | Réngé                           | Réngé                   | Réngé                    |                         |                           |                             |                         |
| Hunger          |                                 |                         |                          |                         |                           |                             |                         |

B. H. HODGSON.

*Dorjiling, Nov. 1848.*

N. B. The postfix H indicates a Hindi or Urdu etymon and the S a Sanscrit origin.

\* Hessú, U'di, Bara, Barai, mean 'very' 'extremely' and are mere expletives I suspect.



*Fragments of the history of Mooltan, the Deraját, and Buhawulpoor,  
from Persian MSS.\* By Lieut. R. MACLAGAN.*

1. *Account of the arrival at Mooltan of Mulik Sohrab, Dodáee Belóch, with Ismael Khan and Futteh Khan, his sons, and of Hájee Khan and Gházee Khan, from the country of Kéch Mekrán: and the foundation of the Deraját.*

It is related in the history called Huft Goolshun, that in the year 874 H. (A. D. 1469,) Sooltan Hoossein, son of Sooltan Kootub-ood-deen, upon the death of the latter, obtained the government of Mooltan. He held the forts of Shór and Chuneewut, Kot Kuror, and Deen Kót. Sheikh Yoosoof, who had been removed from the government of Mooltan on the appointment of Kootub-ood-deen, came to Sooltan Belól Lodee, governor of Delhi, and earnestly entreated his assistance. The Sooltan sent his eldest son, Bareek Shah, with a well appointed force. As soon as the Delhi troops appeared before Mooltan, Sooltan Hoossein issued to oppose them, and a battle ensued. Bareek Shah was discomfited and returned to Delhi.

It was at this time that Mulik Sohráb, of the tribe Dodáee, along with Ishmael Khan and Futteh Khan, his sons, and others of their tribe, arrived from Kech Mekrán,† and entered the service of Sooltan Hoossein. As the hill robbers were then becoming very troublesome in (the province of) Mooltan, Sultan Hoossein rejoiced in the opportune arrival of Mulik Sohrab, and assigned to him the tenure of the country from the fort of Kurór to Deen Kót. On this becoming known, many Beloches came from Kech Mekrán to the service of the Sooltan. The lands, cultivated and waste, along the banks of the Indus were assigned to the Beloches, and the royal revenue began to increase. The old inhabitants of Dera Gházee Khan and Mooltan relate that after Mulik

\* These MSS. were obtained at Buhawulpoor in January, 1846. I have only one of them in the original now with me. The other I translated at the time, and have no means now of revising.

† Sir J. Malcolm mentions (Centr. Ind. II. 175), that mercenaries used to come annually from Mekrán to Central India for service. Are there Beloches there now?

Sohrab's arrival, Hájee Khan with his son Gházee Khan, and many of their kindred and tribe, came from Kech Mekrán to enter the service of the Sooltan.

When the tracts along the Indus were in the hands of Mulik Sohráb and Hájee Khan, Mulik Sohráb founded a Déra named after Ishmael Khan, and Hájee Khan another with the name of Gházee Khan.

During the lax and indolent rule of Muhmood, the grandson of Sooltan Hoossein, Gházee Khan seized the greater part of the dependencies of Mooltan and assumed the government. On the death of Gházee Khan, his son Hájee Khan succeeded to the same extent of authority, and, taking advantage of the weakness of the government of Hindoostan,\* took possession of several districts on the Indus, towards the south, and became independent. His successors, each on the death of his father, took the name of his own grandfather,—being thus Gházee Khan and Hájee Khan alternately.

When Mohummud Hoomáyoon Badshah reigned at Delhi, and the countries of the Punjab, Mooltan and Sindh came into the hands of the Chooghutta princes, Gházee Khan the 5th, having come and presented himself before the above named Badshah, and made presents, obtained the Déra, (Gházee Khan) and its dependencies in jageer: the charge of these districts and of all their affairs being committed to him. In like manner throughout the Chóghtáee supremacy, the jageer above named was secured to his family in regular succession.

In the year 1152 H. (A. D. 1739,) Nadir Shah fought and conquered Mohummud Shah, emperor of Hindoostan. Mohummud Shah resigned to Nadir Shah the fort of Attok, and other places to the north and west; also Mooltan, the Deraját, the country of Sindh, and Cabul.† When, consequent on this, the Badshah, with the design of

\* Now under Ibrahim Lodee.

† The act of cession is thus given by Hauway in his history of Nadir Shah—after preface:—

“The ministers of the Sultan, who is merciful, and the emperor, who is august, formerly sent ambassadors to us to treat of certain demands with which it was our purpose to comply. The ambassador, Mahommed Khan Turkuman, not long since arrived here from Kandahar to remind us thereof; but our ministers having delayed the ambassador and postponed answering the letters of his sublime majesty, it at length produced such a misunderstanding between us, that his victorious army

marching upon Sindh, came from Déra Ismael Khan and arrived at came into Hindostan. We encountered in the fields of Karnal, where victory arose in the east of his undecending fortune.

\* \* \* \* \*

“ But in regard to the illustrious family of Jurghin,\* and the honor he professes for the original tree of Turkan, out of the greatness of his soul, and the overflowings of his humanity, he has been pleased to restore to us the crown and gem of Hindostan.

“ In consideration of this act of generosity, which no father has ever shown to a son, nor any brother to a brother, we make over to him all the countries to the west of the river Attok, and that of Scind, and Nala Sunkra, which is a branch of the Scind. That is to say Peishor with its territories; the principality of Cabul and Gasna; Hazarijât, the mountainous residences of the Afghans; with the castles of Buckhor, Sunkor,† and Khoudabad; the passes, territories and abodes of the Tchoukis and Ballouchees, with the whole province of Tata: also the castle of Ram; the towns of Chun, Sumawali, and Ketra, with all the castles, towns, ports, villages, and open country, from the first rise of the river Attok, with all the country comprehended within its branches, till it empties itself into the sea at Nala Sunkra.

“ These we freely give up to the dominion of the powerful sovereign of Persia, and from henceforward our officers and subjects shall evacuate the same and resign the property and government to the Persian king, to be disposed of at his pleasure. We renounce all our right to command, controul, or collect revenues in any of these dominions. But the castle and town of Lohre Bunder, with all the country to the eastward of the river Attok, and of the waters of the Scind and Nala Sunkra, shall, as before, belong to the empire of Hindostan. Dated at Shahjehanabad, the fourth of Mohorim, 1152.”—*Hist. of Nadir Shah, Chap. 11.*

There is no mention of Mooltan, which by the terms of the cession, as here given, is retained by the sovereign of Dehli. The meaning of the “ towns, &c. and open country from the first rise of the river Attok, with all the country comprehended within its branches, is shown by the last paragraph to be restricted to the country west of the Indus. (Mill, II. 457), says “ part of Mooltan” was included in the ceded territory, but he seems to reckon it among the “ provinces west of the Indus.” Col. Tod, alluding to this cession, says Mooltan was surrendered, (I. 419). It will be seen from the 4th paper here translated that the Sobahdars of Mooltan were appointed from Delhi until 1767, 28 years after Nadir Shah’s invasion. The “ Nala Sunkra, which is a branch of the Scind,” is generally considered to be the Goonee, which now falls into the Sindree lake, and the country to the west of which used to be called Sancara. May it not be the river now called Nala or Nara, which passes Alór, at one time an important branch, and perhaps the main channel of the Indus? Mr. Hanway has this note:—“ This is sometimes called Nale Sengure,

\* This word is sometimes wrote Gourgan.

† This is sometimes wrote Sekir.

Déra Gházee Khan,\* Gházee Khan the 10th, who lived at that time, having paid his respects to the Badshah, obtained the royal favor, and was confirmed in the tenure of the Déra and its dependencies. On the death of this same Gházee Khan without issue, in 1172, H., (A. D. 1758,) none of his kindred and country succeeding to the government, they became dispersed in various directions. The Déra and its dependencies accordingly lapsed to the sovereign of Cabul; and Maharajah Koura Mull† was appointed governor by Ahmed Shah. After this Meeán Gholam Shah obtained the government, which he held for 16 years.

which seems to be the island between the Indus and what De Lisle calls the river Drintade.”

\* The occasion and route of this march upon Sindh are thus given by the authority before quoted: “After passing the Indus, he directed his march to Peishor, where he halted for some days. \* \* \* \* From thence, continuing his route towards Cabul, he detached Abdul Baki Khan, with five thousand horse, to receive homage from Khudayar Khan, governor of Pekier. (This country is to the south of Cabul on the Indus bordering upon Multan: I do not find it laid down by De Lisle. There are several forts, and strong places in it, such as Lokheri, Sekier, and Tekier. The people in this country are partly Mahommedans and partly Pagans). This Khan had refused to pay homage to Nadir, now sovereign of that country; and collected a considerable body of forces to oppose the Persian army. \* \* \* \* Abdul Baki Khan soon arrived on the frontiers of this country, but was in no situation to reduce Khudayar Khan by force. \* \* \* \* Abdul Baki informed the Shah of the circumstances he was in. Nadir being now near Kandahar sent his treasures and heavy baggage under a numerous convoy into that strong fortress, and then directed his course south-east through the country of Hazarijât. \* \* \* \*

“As soon as Nadir arrived in the neighbourhood of Khudaabad, the Indian Chief retired with his riches to Emir Kiout, a strong fort on the opposite side of the river Hest-nud, &c. &c.”—*Hist. of Nadir Shah, by Jonas Hanway, p. 393.*

One would think Nadir could scarcely have been near Kandahar at that time, and if he had, his course thence would not probably take him viâ Déra Ismael Khan, as the MS. says.

If Hanway's note, given above in parenthesis, means that Roree was included in the country of which Nadir was “now sovereign” this would give grounds for supposing that the Nara is the boundary before alluded to. But no great importance is to be attached to his geographical notes of those regions. He is apparently quite unconscious that “Pekier” and “Sekier” are what he before gave as “Buckhor” and “Sunkur, sometimes wrote Sekir.”

† He had been governor of Mooltan since 1746, and now received charge of Déra Gházee Khan in addition.

In the reign of Tymoor Shah, first Zeman Khan Dooranee governed three years, then Mirza Khan Atukzye, 9 years; Sumundur Khan Badoozye, one year; Saadut Khan, son of Mirza Khan, one year.

In the reign of Zeman Shah, Asaad Khan, brother of Futteh Khan Barukzye, governed for two years;—Sumud Khan Populzye, two years; Sheikh Kumur-ood-deen, one year; Ibrahim Khan Populzye, one year; Sumud Khan, brother of Futteh Khan, three years; Nuwab Abd-ool-jubár Khan, three years; Hubeeb-oollah Khan Suddozye, two years; Mohummud Zeman Khan Barukzye, three years.\*

In the reign of the Shahzadah Muhmood, Sumundur Khan, two years.

Again, in the reign of his majesty Shoojá-ool-Moolk Mohummud Zeman Khan Barukzye was governor of the Déra, when in the year 1230 H., (A. D. 1814,) Maharaja Runjeet Singh took it from him, and conferred the tenure of that place, along with Hurund and Dájil, and the rest of its dependencies, on Mohummud Sadik Khan, (father of the present Nuwab of Buhawulpoor,) on an annual rental of 4 lakhs.

A. D. 1831, in 1247, Runjeet Singh took into his own hands the district of Déra Gházee Khan, and the rest of the country on that side of the river held by Nuwab Mohummud Buhawul Khan, and the administration was committed to General Ventura. He remained two years, and after him, Deewan Sanwun Mull was appointed Nazim.

Mohummud Ruheem Khan, and Mohummud Yar Khan, of the family of Gházee Khan, now live at Déra Gházee Khan (1845). Only two wells (land) are granted to them for their subsistence.

The Beloches having no royal house, have not been in the custom of making historical records from which details might be gathered, regarding the ancestors of Gházee Khan.

2.—*Account of the attack of Huree Singh, Chunda Singh, and Gunda Singh, called Bhungee,† on the estate of the Buhawulpoor*

\* This gives a total of 17 years, but the reign of Zeman Shah was only of 7 years' continuance. Timoor Shah died in 1793, and Zeman Shah was dethroned by Muhmood, his brother, in 1800. Perhaps some of the first of these names should be transferred to the previous reign, and part of the three years of the last named governor may have extended into the reign of Muhmood.

† Thus designated, I was informed, not from their being of the caste so named, but from a progenitor, a noted *bhang eater*.

*government; and the capture and occupation by these Sirdars, of Mooltan and its dependencies.*

From the 'Jawaheer Abbaseeh,' containing a history of the Abbasee Khalifs, ancestors of the Buhawulpoor rulers,\* and from well-informed aged individuals, we learn that in the year 1180 H., (A. D. 1766,) the above named Sirdars made a descent upon Kussoor, from the Gunghoora valley, and took much spoil, jewels, coin, gold and silver. Encouraged by their success, these chiefs looked to further conquest of country and plunder, and many pergunnahs and estates in the Punjab, fell into their hands. In the same year, having arrived with a large force, on the further side of the river (Sutlej) opposite the fort of Moobarikpoor, in the Buhawulpoor country, which is 7 coss from the bank of the Sutlej, they prepared to invade the Buhawulpoor territory. The Khan, Mohummud Moobarik Khan, (great grandfather of the present Nuwab,) ordered his nephew and heir, Mohummud Buhawul Khan the 2d, to cross and oppose the Sirdars on the other side. An agreement was made that the country beyond Pak Puttun, on that side of the river, should remain in the possession of the Sirdars, and the country on the left bank of the Sutlej, as much as belonged to Mohummud Moobarik Khan, and the other Dáoodpootra chiefs, should continue as before, in their possession.

In the year 1185, (A. D. 1771,) Chunda Singh and Gunda Singh went again against Kussoor, in consequence of the complaints of the bráhmans against the violence of the Afghans of that place. They destroyed Gurhee Abdoor Ruheem Khan, and took four lakhs of rupees fine from the zumeendars of Kussoor, Humeed Khan, and Othman Khan, Dowlutzye.

On hearing of the death of the victorious Ahmed Shah,—of the accession of Tymoore Shah, and the weakness of his rule, they hastened to subdue Mooltan; and ordered Mujja Singh, at the head of his forces to attack and pillage Kháee and Sadoollapoor, and the surrounding places on that side of the river subject to Mooltan, and held by the Bhawulpoor government, and other Dáoodpootra Khans. On this, Mohummud Moobarik Khan directed Mohummud Buháwul Khan, (afterwards his successor) to cross with the Dáoodpootra chiefs and a

\* See "Account of the origin of the Dáúd Putras, by Munshi Mohan Lál," in the 7th Vol. of Journ. As. Soc. Bengal.

select force, and oppose Mujja Singh on the other side. In this encounter several Dáoodpootra chiefs were killed. On the other side many Singhs were killed and wounded. Mujja Singh himself was shot, and the rest fled. Mohummud Buháwul Khan, after this victory, returned to Buhawulpoor.

In the year 1186 H. (June 1772,) in the month Rubbee 1., Mohummud Moobarik Khan died, without offspring, and Mohummud Buháwul Khan succeeded his uncle.

At this time Hájee Shereef Suddozye was appointed Soobahdar of Mooltan by Tymoor Shah. His predecessor, Nuwab Shooja Khan, on being removed, went to Shoojáabad, his own jageer; and having arranged his affairs there, came to Buhawulpoor, to consult Buhawul Khan about getting rid of Hájee Shereef Khan. The Nuwab after this returned to his own jageer.

But Hájee Shereef Khan became careless in his government of Mooltan, and did not remit the stipulated payments to the Badshah's treasury. Having disagreed with Mirza Shereef Beg, who was appointed Tuhseeldar, this Mirza went to the Durbar of Tymoor Shah, and, along with Lala Dhurm Dás, merchant, inhabitant of Mooltan, brought the required amount of revenue and obtained the tenure of Mooltan. Hájee Shereef Khan, being displaced, took up his abode at Buhawulpoor. After some days, a difference arose between the two renters; Dhurm Dás was shot by a servant of Shereef Beg, and the Mirza seized the effects of the murdered man. At length, having come to his senses, in dread of retaliation, and punishment by the Badsha, he secretly sent for Sirdars Chunda Singh and Gunda Singh, promising to deliver up to them the fort of Mooltan. The Sirdars, immediately on the receipt of the letter, perceiving the attainment of their object, marched with a large body of their forces from Umritsir, and came with the utmost expedition to Mooltan.

Mirza Shereef Beg, to save his name, made a show of resistance by matchlock firing, and then fled to Tuloomba, 40 coss north of Mooltan. Not considering himself safe there he came to Khyrpoor, in the Buhawulpoor territory, 24 coss eastward from Buhawulpoor. There he died. The Sirdars became masters of Mooltan and its dependencies, and oppressed and plundered the district of Shoojáabad.

In 1190. (A. D. 1776,) Nuwab Shooja Khan died at Shoojáabad,

and was succeeded by his son Nuwab Mozuffur Khan. At this time the Sirdars came from Mooltan with a design of plundering Shoojáabad : but their purpose being defeated, they returned to Mooltan. Their army however spoiled the Shoojáabad district. In consequence of this, Nuwab Mozuffur Khan, in 1191 H. (A. D. 1777) came to Buhawulpoor, desiring the aid of Mohummud Buhawul Khan. The Khan also received an order from Tymoore Shah to expel the Singhs from Mooltan ; accordingly, taking the Dáoodpootra chiefs and a select army, came with Nuwab Mozuffur Khan to Mooltan, and laid siege to the city. After 23 days they gained admittance within the city wall by the wicket of Sheikh Rájee Goordézee on the west, and began to slaughter the Singhs and plunder the residents of the city. At this time the Sirdars were staying at Umritsir. The Kiladar of Mooltan, who had been placed there by the Sirdars, with a force, being unable to offer opposition, retired into the citadel, and sent a swift messenger with an account of the state of things, to the Sirdars. The Dáoodpootra chiefs had taken much spoil, and without leave from the Khan had betaken themselves to their own homes, when Sirdar Gunda Singh, with a large force, came with all expedition from Umritsir, and engaging in battle, Buhawul Khan and Mozuffur Khan retired fighting to Shoojáabad. Thence, Buhawul Khan came to Buhawulpoor, and Mozuffur Khan remained in Shoojáabad, sending daily accounts to Tymoore Shah, of the disturbances, and the tyrannical behaviour of the followers of Nanuk. The Badshah, on hearing of the overbearing conduct of the Singhs, ordered Sirdar Behroo Khan, with a proper force, experienced in war, to proceed and expel the Singhs from Mooltan. In 1192 H. he came to Mooltan and besieged the fort. The fort was nearly being taken, but Tymoore having occasion to be engaged in hostilities at Tooran, (the Toorkomans having extended their conquests to the very gates of Khorasán), Behroo Khan was recalled, and, raising the siege, he returned to Cabul. Tymoore's operations at Tooran having ceased, Sirdar Ali Muddud Khan was sent with a large army to expel the Singhs from Mooltan. Tymoore himself, to afford a support to the Sirdar, came to Peshawur and encamped there. Ali Muddud Khan, coming with great speed to Mooltan laid siege to the fort, and reduced the inhabitants to great extremities. It happened that a party in the Badshah's army entertained a wicked design upon his life, on the discovery of which he recalled Ali Muddud Khan.



In 1193 H. (A. D. 1779,) the Badshah himself came with great celerity, with a conquering army, and having arrived at the Eedgah\* a cannon shot north of Mooltan, directed the city to be besieged. In a short time it fell into his hands. At this time, Sirdar Gunda Singh was at Umritsir, engaged in a controversy with his brethren, consequent on the death of Chunda Singh, so that he had not an opportunity of coming to Mooltan, to afford assistance and recover the place. The Kiladar of Mooltan, having no hopes of aid from the Sirdar, and fearing the fury of the Shah's army, surrendered, and quitted the Fort, having, through means of Abdool Kurreem Khan, an Afghan of the tribe Babur, whose family were in the fort, obtained protection from the Shah for himself and his comrades. The Shah, entering the fort, caused his sovereignty to be again proclaimed, and bestowed the Khelut of Soobahdree on Nawab Mozuffur Khan; with a lakh of rupees for the repair of the fort and city walls, and houses of the people, then marched towards Cabul.

Thus, the time these Sirdars held possession of Mooltan was from 1186 to 1193 H. (A. D. 1772 to 1779.)

3.—*Account of the country on the further side of the river (Sutlej) which continued to be held by the Buhawulpoor government, and other Doodpootra chiefs during the supremacy of the rulers of Khorasan in the Soobah of Mooltan. (The people of the Buhawulpoor Sircar and Doodpootra Khans yearly sent the regular payments to the Soobah of Mooltan, and constantly expended money in advances to the cultivators, and in the repair of forts and wells for their own benefit).*

From the 'Tuwareekh Abbaseuh,' and verbal information from old persons well acquainted with the circumstances, it appears that in 1159 H. (A. D. 1746,) Maharaja Koura Mull, who is well known by the erection of the fort in the Mooltan country, which bears his name,†

\* This appears to be the place which our two unfortunate political officers occupied on their recent mission to Mooltan. The description, 'a cannon shot north of Mooltan,' agrees remarkably with circumstances related to have occurred on that occasion. It is stated that after Mr. Vans Agnew was wounded, "Khan Singh conveyed him towards the Eedgah outside the town, which had been assigned as their residence. Directly they got into the Eedgah, the guns of the place opened on them, and continued firing the whole day. The range however was too long, and no damage was done, &c. &c."

*Delhi Gazette, May 3, 1848.*

† Gurh Maharaja, a fort about 28 miles from Mooltan, and 3 from the right bank of the Ravee.

was exalted to the Soobahdaree of Mooltan by Nuwab Moéen ood Dowlah, eldest son of the Nuwab Wuzeer Kumur-ood-deen Khan, one of the ministers of the throne of Delhi;\* and having killed in battle outside of Mooltan, the Nuwab Hyál-oollah Khan, entitled Shanuwáz Khan, entered on the government of Mooltan. In that year, (A. D. 1746) Nuwab Buhawul Khan, the 1st (great-great grandfather of the present Nuwab, Buhawul Khan the 3rd), founded the city of Buhawulpoor, and maintained a friendly correspondence with the Maharaja. At this time, Nuwab Ján-nisár Khan, at the instigation of Sheikh Mukhdoom Rajee Goordézee, withdrew his allegiance from the Shah. The Maharaja, having come, by desire of Nuwab Moéen-ood-dowlah from Lahore for the purpose of chastising Ján-nisár Khan, arrived by way of Kutchee, near Tanween, at the place where now stands Khyrpoor, in the Buhawulpoor territory. The Khan of Buhawulpoor, having in compliance with a summons, come to this place, had the satisfaction of meeting the Maharaja Koura Mull. Thence they went together to Tehr, called also Pooshtuk Wejranuh, near Khan Bela, in the district of Déra Gházee Khan. The fort of Khan Bela was taken in one day, and Ján-nisár Khan, coming down to the river, fought for three days. At length, during the night, he fled, leaving his camp standing on the bank of the river. After this victory, the Maharaja having settled the affairs of that neighbourhood, and bestowed goods and land on Buhawul Khan and the Dáoodpootras, turned towards Mooltan. He handed over also to Buhawul Khan, the village of Adum-wahu, on the other side of the water, opposite to, and four coss from Buhawalpoor, on a rental of 4000 rupees.

In 1163 H. (A. D. 1749,) Nuwab Mohummed Buhawul Khan died, and was succeeded by his brother Mohummed Moobarik Khan. He, in 1165 H. (A. D. 1751,) purchased the lands of Sheenee Bukhree and Mudwala, from the zumeendars of Tehr, also Bet (the island) and Donewala, from Mukhdoom Sheikh Rajee Goordezee, and brought them into cultivation. In 1174 H. (A. D. 1760,) he received the district of Loodun, as a friendly gift from Shaik Soobhan, the proprietor of Pak Puttun. In 1181 H. (A. D. 1767,) Nuwab Ali Mohummed Khan Khakwanee received the Soobahdaree of Mooltan from Ahmed Shah,

\* And from the first MS. we find he was subsequently appointed Governor of Dera Ghazee Khan by Ahmed Shah.

and Sirboolund Khan (Suddozye) was appointed by the Badsha to Dera Gházee Khan. Nuwab Ali Mohummud Khan having taken Dera Gházee Khan and the Kinjoor district with the aid of Mohummud Moobarik Khan, gave him lands according to agreement, in the southern part of Kutchee, in the districts of Kinjoor, and Dera Gházee Khan. After this, he assigned to the Khan, on a rental of 8000 rupees, the lands on the further side of the Sutlej, of Khanwah, Kuhlwan, Adumwahu, Sirdarwah, Buhawulwah, Futtehpoor, Emamood-deen-poor, and Sheikh-wahn, and he cultivated these districts. In the same year Nuwab Ali Mohummed Khan having taken the land of the zumeendars of the Mylsee tribe from the zumeendars of Futanee, gave the same to Mohummed Jam Khan Dáoodpootra of Khyrpoor, on a rental of 400 rupees. He built the fort there named Mylseean and cut canals for irrigation.

In 1181, when Ahmed Shah returned from his expedition to Hindostan, Nuwab Ali Mohummed Khan, with his son, paid his respects. The Shah being enraged against Ali Mohummed Khan on account of the disrespect he had been guilty of towards Nuwab Shoojá Khan, caused the Nuwab and his son to be slain, and sent both the bodies into Mooltan, as a warning to others—that no one in future might treat the Suddozyes with incivility. The Soobahdaree of Mooltan was conferred on Nuwab Shoojá Khan. In 1194 Buhawul Khan, the 2d, rented the Pergunnahs of Juttoe and Mudwala and others surrounding, from Mirza Khan, Nazim of Dera Gházee Khan, and brought them into cultivation.

In the year 1200 H. (A. D. 1785,) Tymoor Shah came down upon Buhawulpoor. Mohummud Buhawul Khan leaving his country, went into the desert, and the fort of Duráwur fell into the hands of the Shah. To the charge of this fort, and the Nizamut of Dera Gházee Khan, Shah Mohummud Khan of Mooltan was appointed, through the interest of Abdool Ghufár Khan. Mouladád, a Goojur, rented from the Badshah the Kinjoor district in the territory of Dera Gházee Khan, and the southern districts of Kutchee, which had been in the hands of the Buhawulpoor Government. In the meantime, Mohummud Moobarik Khan, eldest son of Mohummud Buhawul Khan, presented himself before the Badshah, and obtained favor. The Badshah moved towards Cabul. Buhawul Khan came back from the desert to Buhawulpoor. Shah Mohummed Khan and the other Afghans of Mooltan, having, on the capture of Durawur

fort, imprisoned and punished the Dáoodpootras who were inside, the Khan, now collecting a great number of boats at the ferry of Oochh, crossed to Seetpoor and captured the families of Shah Mohummed Khan and other Mooltanee Afghans in charge of Duráwur fort. He then brought them to the outside of the fort of Duráwur, and left them there. On this, Shah Mohummud Khan and the other Afghans, beholding the disgrace of their families, made a truce, quitted the fort, and went with their families towards Dera Gházee Khan. Thus the Khan came again into the possession of his country.

In 1222 H. (A. D. 1807,) Nuwab Moozuffur Khan went on a pilgrimage to Mecca, and his eldest son, Mohummud Sirafráz Khan, remained in Mooltan in his father's stead. As a mark of friendship he rented to Buhawul Khan the villages of Adumwahu, Khanpoor, Sheergurh, and Kháee, on that side of the river—and the Khan brought these districts into fine cultivation.

In 1225 H. (A. D. 1810,) Ahmed Khan Mooltanee and Dhoomun Singh, jemadars in the Buhawulpoor army, having rebelled against the Khan (Mohummud Sadik Khan), crossed to the Khan's rented lands on the other side of the river, and committed havoc upon them; Nuwab Sirafráz Khan, notwithstanding his father's injunctions, doing nothing to prevent this proceeding of the jemadars. The Khan's army with the Dáoodpootra chiefs crossed and fought with them. On both sides many were killed, Ahmed Khan among the number, and his comrades fled. The Khan sent 12,000 rupees to the heirs of Ahmed Khan. The Khan, in consequence of Sirafráz Khan's not having hindered the jemadars from raising this disturbance, reckoning also upon the feebleness of the Cabul government since 1213, discontinued making any payments for the districts he held on that side of the water.

In 1230 H. (A. D. 1814) the army of Maharaja Runjeet Singh arrived in the neighbourhood of Dera Gházee Khan, and along with the army of Mohummud Sadik Khan (of Buhawulpoor), seized the Dera, and its whole district from the hands of Mohummud Zeman Shah. At the Khan's desire, the Dera and its district were conferred by the Maharaja on him, on an annual rental of 4 lakhs of rupees.

In 1248 H. (A. D. 1831) Dera Gházee Khan, and all the lands on that side of the river cultivated by the Buhawulpoor government, whether rented or received in free gift, were taken by Maharaja Runjeet Singh into his own hands.

*List of Soobahdars of Mooltan.*

A. H. 1135, (A. D. 1722).—Hyát oollah Khan, (Shah-nuwáz Khan,) son of Zukureeah Khan,\* was appointed by Wuzeer Kumur-ood-deen Khan. In 1152, accompanied Nadir Shah to Sindh, and received the title of Shah-nuwáz Khan.

In 1159, having thrown off his allegiance to the Wuzeer, Maharaja Koura Mull was appointed. The Nuwab was killed outside of Mooltan.

A. H. 1159, (A. D. 1746).—Koura Mull (Maharaja) (Khutree, Tribe Zóod).—Obtained the appointment through Moéen-ood-dowlah, son of Wuzeer Kumur-ood-deen.

The Maharaja generally lived at Lahore. Was killed in battle with Ahmed Shah Badshah.

A. H. 1160, (A. D. 1767).—Ali Mohummud Khan, Khákwanee—(Nuwab.)—Appointed by Ahmed Shah. He ill-treated Shooja Khan Suddozye, and the Badshah, on his return from Hindoostan, hearing the circumstances, put to death him and his son.

A. H. 1182 (A. D. 1768).—Shooja Khan, Suddozye—(Nuwab.)—Was displaced, having displeased Tymoore Shah.

A. H. 1186, (A. D. 1772).—Hajee Shereef Khan, Suddozye—(Nuwab.)—Removed after six months.

A. H. 1186, (A. D. 1772).—Mirza Shereef Beg Moghul, (Názim,) and Dhurm Dás.—They disagreed and Dhurm Dás was killed. Mirza Shereef secretly invited Chundra Singh and Gunda Singh, and the Sikhs came into power.

A. H. 1187, (A. D. 1773).—Sirdars Chunda Singh and Gunda Singh—(Malik)—were expelled by Timor Shah, who appointed Nuwab Mozuffur Khan to be Soobahdar.

A. H. 1193, (A. D. 1779).—Nuwab Mozuffur Khan—(Nuwab.)—Maharaja Runjeet Singh attacked Mooltan. The Nuwab was killed, and Lala Sookh Dyal appointed.

A. H. 1232, and A. H. 1873 V. (A. D. 1816).—Sookh Dyal—(Soobahdar.)—Deficient in his remittances. Was imprisoned and displaced.

A. H. 1876 V. (A. D. 1819).—Sham Singh, Kashmeeree—(Kardar.)—Imprisoned and deposed after six months.

\* Zukureeah Khan, governor of Lahore at the time of Nadir Shah's invasion.

A. H. 1876 V. (A. D. 1819).—Budun, Huzáree—(Kardar.)—Failed in his accounts. Confined and removed.

A. H. 1878 V. (A. D. 1821).—Dewán Sawun Mull—(Nazim.)—Ruled well from the day of his appointment. Was shot by a robber in the month Kartik 1901, and was succeeded by his son Deewan Moolráj.

A. H. 1901 V. (A. D. 1844) Dewan Moolráj—(Nazim.)

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MISCELLANEOUS.

*Extract of a letter from DR. CAMPBELL, to the Hon'ble the PRESIDENT, Asiatic Society.*

I am sure that the members of the Asiatic Society will be greatly interested to learn something of the travels and proceedings in the Eastern Himalaya of our distinguished Honorary Member Dr. J. D. Hooker.

He started from Darjeeling on the 27th of last month, fully equipped and attended, for a trip to the Kanglachema pass of the snowy range: and with the purpose of returning by the western shoulder of Kunchinginga and Jongei to Darjeeling.

Circumstances prevented his commencing his journey through Sikim, the direct route. He was therefore very fortunate in being able to go through the Nipal territory, and is now journeying in a portion of that kingdom which has never before been trodden by any European traveller.

For the first week he was subjected to much annoyance from the quarrels and desertions of his Bhotia coolies, and other numerous mishaps inseparable from new venturers in new lands; but a light heart and enthusiastic spirit are matches for all the ills that travelling flesh is heir to, and so it has been with him. On the 4th, but after making seven journeys of a distance that might have been got over in 3, but for the above disasters, he was on the top of Nangbi—say 14 miles W. of Darjeeling, at an elevation of 10,000 feet above the sea, and the temperature at daylight down to 21° of Faht. This was a trial for his followers, which the lightly-clothed and chicken-hearted portion of them could not stand against: and after relieving him of some of his stores about a dozen of them left him to his fate without their assistance.

This compelled him to make more exertion for the purpose of getting into the road from Harnagachy to Walloongchoong, and on the 9th he was at Sakiagong, on a tributary of the Konke river, and ready to move northwards for the snowy range.

He was therefore at that date in a fair way to attain his object, for he says:—"I got a glorious round of angles yesterday, Phughlout, Nangbi, &c. which will do well to fix my position. This is a lovely country, and I am enjoying myself vastly, have a few new plants, lots of observations, and we go north to-morrow."

I shall not fail to report progress as I get it. This is a most important and interesting expedition, worthy of Dr. Hooker's powers, and of it. It will give materials for maps, climatology, botany, &c. &c. for a portion of the Himalaya altogether unexplored and unknown.

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*Addendum on the Anatomy of Ailurus, by B. H. HODGSON, Esq.*

I had scarcely despatched to you my description of the anatomy of *Ailurus*, deduced from two junior specimens, when my shooters killed a mature specimen in my own immediate vicinity, at an elevation of about 7300 feet. It proved to be a female, mature, but only just so, and was killed in a lofty tree. As this type is the sole representative of a family, and is one of the most anomalous of quadrupeds, I shall make no apology for troubling you with a few additional remarks on its anatomy, not however needlessly reiterating what has been already noted, and is free from doubt.

*Ailurus fulvens?* A female mature but not at all aged, 20½ inches from snout to vent. Has the deep ochreous red of the superior surface of the body, tipped largely with aureous; whence, and from the presently to be noted anatomical differences, I conjecture it may be *fulvens* and not *ochraceus*. Teats 8. No anal glands or pores. Lungs with 3 main divisions, about equal, and each composed of one large and one small lobe, 6 lobes in all. Liver also with a primary triple division; its right lobe largest and almost equally bifid; its left lobe next in size and also bifid, but less equally; its central lobe, smallest of all and trifid. Consequently 7 lobes in all. Gall-bladder empty, collapsed, a long ellipse, 1¾ inch long by ¾ inch wide, very freely suspended in the cleft of the central lobe of the liver. Its duct, large and distinct, 2

inches long, enters the intestine about that distance below the accessory stomach. Pancreas 2 inches by 1, parallelogramic, with the angles rounded off, its lower margin closely attached to the intestine, and throwing off a small short duct which discharges the pancreatic juice into the gut about  $\frac{1}{2}$  inch above the opening of biliary duct. Spleen 5 inches by less 1, shaped like a manis' tongue. Kidneys  $1\frac{1}{4}$  inch by  $\frac{3}{4}$ , and *not* lobulated internally as in the juniors. Uterus with very long horns, each  $2\frac{1}{4}$  inch in length, and small round dark ovaries, each  $\frac{3}{4}$  inch in diameter. Bladder  $2\frac{1}{4}$  inch, empty and collapsed. Intestines  $8\frac{1}{2}$  feet long, wide, gradually lessening in width from above downwards from plus  $\frac{7}{8}$  inch to minus  $\frac{5}{8}$  inch, excepting the last half foot which is 1 inch wide. This last named portion of the intestines has its coats remarkably thickened and furnished internally with longitudinal bands. Elsewhere the intestinal canal shows no trace of bands or other processes. Stomach empty and collapsed,  $8\frac{1}{2}$  inches along its greater, and  $2\frac{1}{2}$  along its lesser, arch, exclusive of the accessory stomach, which is 3 inches long and  $1\frac{1}{8}$  inch wide. The true stomach is a hemisphere in shape and is membranous, with thin equable coats and no internal bands or folds. The accessory stomach is very thick and firm coated, elastic, between muscle and gland, and has its inner surface marked with strong longitudinal bands. The orifices of the true stomach are quite terminal, and the false stomach commences at the pyloric or lower end of the true one.

Teeth  $\frac{6}{6}$ .  $\frac{1}{1}$ .  $\frac{1}{1}$ .  $\frac{5}{6}$ .  $\frac{5}{6}$ , the deciduous premolars of the lower jaw being forthcoming. Crowns of the molars *not* flattened, *nor* showing any crusta petrosa, as was the case in the two very perfect but older specimens from which my original description was taken. The crowns in this sample are covered with enamel and furnished with numerous conic tubercles, sufficiently salient but blunt. Cervical vertebræ 7, dorsal 14, lumbar 6, sacral 3, caudal 18, all very satisfactorily ascertained, and again compared with the skeleton of the juniors which shows beyond a doubt 15 dorsals and 5 lumbar. Ribs 14, whereof 8 are true and 6 false. Sternal bones 7, cylindric. Forward process of the keel of the scapula not cylindric as in the juniors, but flattened and having a subordinate process arising from its base. These may be the acromion and coracoid. At all events there are no other processes answering thereto. Considering the very free action of the arm in *Ailurus* it is



remarkable that the former process infringes considerably on the field of rotation of the humerus. There is not the least trace of a clavicle or pseudo clavicle. This I have very carefully ascertained. Lastly, it should be noted that the ribs are not much bulged, contrary to what was remarked in the juniors; and that the ossa pubis and the sacral vertibræ are, each of them, osseously united, as usual, the opposite characters of the precedent skeletons thus proving (as anticipated) the effects of nonage merely.

In comparing the above details with those priorly given one cannot but note with surprise the remarkable disparities of the teeth and of the spinal vertibræ. My former description of the teeth was taken from two very fine skulls which showed no signs of decay, though it would now appear that they must have belonged to aged subjects, the crowns of whose molars had been worn down greatly by use. *That very use, however, must have been a grinding or triturant one;* and, singularly as the character of the molars is now altered, the sheer fact of wearing in such mode and degree seems to demonstrate that extreme lateral action of the jaws for which I contended, but with which it is not so easy to reconcile the style of the dentition exhibited in the present subject.\* What is the normal state of the teeth? and how can we be justified in regarding that state of them as *abnormal* which is found in lusty and vigorous specimens of the animal? The intestinal canal of the present sample is 5 lengths, as before, not so remarkable, however, for width, but more so for the very singular and almost identical modification it undergoes at either extremity. It would seem as if both these peculiarly structured parts of the intestines should be regarded as quasi stomachs, and their effect in harmonising the alimentary canal with the dentition (whatever its normal character) must be material. The variation in the number of the dorsal and lumbar vertibræ is another remarkable peculiarity of *Ailurus*, as to which however I will only add that the fact is unquestionable, having been carefully and repeatedly seen to. As already hinted, it may be a mark of species.

\* The salient processes of the crowns of the molars are more marked than in *Ursus*: yet the relative narrowness of the lower jaw continues as noticeable as in prior specimens, so that any efficient action of the teeth must be by movements of the jaw, essentially lateral, notwithstanding the deep cylindric hinging!

*Letter from Dr. CAMPBELL, on the Elevation of Peaks in the Himalaya, &c.*

*To the Secretaries Asiatic Society, Calcutta.*

GENTLEMEN,—I am enabled, by the kindness of Colonel Waugh, the Surveyor General of India, to furnish the Society with the following results of the operations of the Great Trigonometrical Survey in this part of the Himalaya in 1847.

I have also the pleasure to forward a small and beautifully executed Chart of a portion of the Survey, received from Colonel Waugh some months ago.

It was sent to me after the publication in the Society's Journal of my Itinerary to Phari, to illustrate Colonel Waugh's views regarding the position of the celebrated "Chumalari" and of the "Chola" mountain of that Itinerary. When Colonel Waugh left this place in November last, after having satisfied himself in the course of his previous operations of the position of "Chumalari," by observations from Tonglo and Sinchal, I took some Lepchas and Bhotiahs who had travelled into Thibet by the Phari route, with me to the top of Sinchal, to point out Chumalari to them; as they were positive in stating their belief that it was not visible from any part of this neighbourhood, when I said "there is Chumalari," the whole party exclaimed—"No, it is Chola, and not Chumalari." I took pains to ascertain the reasons of their dissent, and afterwards wrote an epitome of them to Colonel Waugh, who thanked me for doing so, said he would file my note with the other documents, and while adhering to his former opinion said, as far as I recollect—"but you may rely upon it that I shall not finally decide the point until you are satisfied that I am right." Thus the matter rested until Colonel Waugh got a copy of my Itinerary to Phari, from the Journal for April last, when he informed me that the delay with respect to the results of the Darjeeling Trigonometrical operations, although greater than he had anticipated, could not then be considered a matter of regret, as it had put him in possession of evidence to prove the identity of his mountain with the great Chumalari of Thibet. "The evidence alluded to," he said, "is contained in your paper published in the Asiatic Society's Journal for April 1848. This valuable contribution to conjectural Geography, has arrived in good time

to be of service to precise Geography, and I am exceedingly obliged to you for the information it contains." He then very clearly and fully argued the whole question, and concluded by saying that the well-timed publication of the Phari Itinerary had enabled him to substantiate that the Peak seen from Sinchal is Chumalari, at the same time he satisfied himself that the "Chola" of that Itinerary is the "Chumanko" of his Survey. On these two points I am alike satisfied, and am very glad indeed that in communicating the dissent of my hill people from the conclusions of Colonel Waugh, I was the means of so soon shewing the triumphs of accurate science over the obstinacy of local ignorance. This is the history of the Chart now forwarded: and I doubt not that the Society will be glad to possess so correct a delineation of these exquisitely accurate observations, pending Colonel Waugh's own publication of the results of his important operations in this quarter. I have arranged the results of the Survey which most interest me under three heads.

*1st.—Elevations at and near Darjeeling.*

|                                          |        |
|------------------------------------------|--------|
| Darjeeling Hill above the sea, . . . . . | 7165   |
| Jilla Pahar—highest point, . . . . .     | 7452   |
| Rockville, . . . . .                     | 7134   |
| Birch Hill, . . . . .                    | 6880.8 |
| Dr. Campbell's House, . . . . .          | 6966   |
| Bryn Gwyn (Major Crommelin's), . . . . . | 6734.9 |
| Lebong, (Mr. Grant's house), . . . . .   | 6039.3 |
| Sinchal—highest point, . . . . .         | 8606.7 |

*2nd.—Elevations in Sikim—Sub-Himalaya.*

|                                  |         |
|----------------------------------|---------|
| Tendong—called Ararat, . . . . . | 8662.8  |
| Tougloo, . . . . .               | 10079.4 |
| Singalela, . . . . .             | 12329.2 |

*3rd.—Elevations of Peaks in the Himalayan Range, seen from Darjeeling.*

|                                       |          |
|---------------------------------------|----------|
| 1 Kunchinginga, West Peak,* . . . . . | 28,176.6 |
|---------------------------------------|----------|

\* This is, I believe, the highest spot on the surface of the globe. Distance from Darjeeling 45 miles. Elevation of the stations on the plains in the Chaet:—"Bundurjoola, 246 feet. Thakoogunj (summit of tower) 267.3; Doom Dangi (Do.) 312.8. These three stations are in the district of Purneah.

|    |                         |           |
|----|-------------------------|-----------|
| 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 Ky-unghing. 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.

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*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 Névár, 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.

*Extract of a letter from DR. PRICHARD,**dated, London, August 11th, 1848.*

“ I am much interested in your researches, and as you requested, I went on the first favourable opportunity to the British Museum and carefully examined your skulls ; I enclose the description of them. The impression I derived for the examination is that the Tibetans have the heads of the Chinese, Tartar or Mongolian type, but that the type is not quite constant among them—some of the Bhotia\* skulls have very little characteristic difference from Europeans. I suppose No. 8, may be considered as typical, and the rest as deviating from it. No. 8 is a strongly marked Tartar or Turánian head.

The Névárs† appear to have this type very much softened down, in every particular approximating to the European type. I take No. 4 to be typical of the Névárs. It is the most unlike an European, and the most like the Bhotia No. 8, but in every respect less barbarian and less like a Mongol.

The collection is a very valuable one.”

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*Skull marked No. 8, ticketed as that of a Hillman, probably a Cachár Bhotia, procured at Symbhúnáth.*

*Description.*—Skull large, apparently that of a tall and large man, not particularly heavy. Vertex high.—General aspect like that of a Chinese skull.

*Front view.*—Face broad and flat, particularly in the plane of the cheek bones. Zygomatic arches large and prominent forwards and outwards. Outer corner not rounded off as in the skulls of Esquimaux, but angular. Nasal bones flat—hence the breadth and flatness of the face.

Mouth rather prominent, the upper jaw being prognathous, and the lower jaw large. Supra-orbital ridges rather strongly marked. The outer part of the upper orbital edge, above outer angle of the eye, thick and prominent.

\* Bhotia is equivalent to Tibetan ; Bhót being the Hindu, and Tibet the Moslem, name of the country. My skulls belonged mostly to Cisnivean or Kachár Bhotias.

† The Névárs are the people of Nepal proper, or the great Valley.—B. H. H.

*Vertical view.*—Head oval (seen above) : oval figure rather long, viz. the longitudinal diameter is long in proportion to the transverse. The oval figure narrower in the anterior than in the posterior part. Occiput protuberant (not truncated as Retzius thinks it is in the Tartar races), vertical ridge or crest, strongly marked.

*Basis of the Skull.*—Basis broad (as the basis of the Esquimaux skull in the plate of 4 basis in my *Researches into Physical History*, vol. 1.)

Zygomatic areas (meaning the nearly oval spaces in the view of basis cranii, which are enclosed externally by the Zygomatic arches) large and open as in the figure of the Esquimaux skull above mentioned, but not so oval in shape, the anterior part being more square and angular. Foramen occipitale small.

No. 10, Cachár Bhotia—Symbhúnáth.—Skull a good deal like No. 8, but not so flat-faced. Maxilla superior, prognathous.—Alveolar process round, not so square as in No. 8. Nasal bones not so flat, but face broad in the plane of the cheek bones.—Margins of the orbits thick and prominent, both above and below the orbital cavity.

*Basis.*—Zygomatic areas large, open, square and angular *anteriorly*. This is the most characteristic trait, and gives rise to the breadth of the face.

No. 2.—Hillman—Bhotia—Symbhúnáth.—Vertical section of the head (vertical figure) of an oval form. Face not broad or flat. Nasal bones prominent. Orbits square. Forehead high and well formed, having the prominences which Gall calls *organs of comparison* well developed. Whole form of skull approaching the European type, and wanting all Chinese and Mongolian characters, except one, viz., the cheek bones are square and angular, and the zygomatic areas in the basis cranii, large and square anteriorly.

No. 4.—Hillman, probably Nówár, procured at Sankmol.

Head large, nearly of the same size as No. 8, and in general shape resembling it, only with all its peculiarities softened.

Cheek bones rounder, not so square and angular. Zygomatic arches not nearly so large. Zygomatic areas viewed in the basis cranii, not nearly so large and open.

Nasal bones much more prominent. Face not nearly so wide and flat. Upper jaw equally prognathous, but the alveolar process not so



square, straight, or broad, anteriorly—more rounded. Head oval—Occiput prominent. Scarcely any vertical ridge or crest.

N. B. All the characters seem to be much softened and approaching the European type, as compared with the Bhotia heads.

No. 7.—Hillman, probably Névár, procured at Sankmol.

Face not so broad and flat as the Bhotia No. 8, more rounded and prominent in the profile. Head rounded with longitudinal diameter shorter.

Differences from European type as follows—Cheek bones a little more prominent laterally.

Zygomatic areas, seen in the basis cranii, much larger and more open than in an European, and square anteriorly like those of the Bhotia No. 8.

Upper maxilla somewhat prognathous.

No. 16.—Man of the Névár tribe and Bandy division. Like No. 4 but more European. Face not flat. Cheek bones not laterally projecting—Alveolar process of the upper jaw prominent—Vertical ridge strongly marked, Zygomatic areas and orbital cavities like European.

Lower jaw small.

No. 15.—Another Névár Bandy.

Head round, oval, with longitudinal diameter short.

Face rather broad and flat, but not so much so as in the Bhotia No. 8. Nasal bones more elevated.

N. B. The chief characters different from the European type are in the shape and size of the zygomatic arches viewed in the basis cranii. Areas more open and their anterior edge angular and square.

No. 20.—Skull from the plains, near the Ganges. Head nearly European ; a bad European head.

(Signed)

J. C. PRICHARD.

*Notes on the Eastern Desert of Egypt, from Gebel Afrit, by the ancient Porphyry quarries of Gebel Dukhan, near to the old station of Gebel Gir; with a brief account of the ruins at Gebel Dukhan, by HEKEKYAN BEY.—(Communicated by Capt. NEWBOLD.)*

These rough but interesting notes, on a part of Egypt so seldom visited by travellers as its Eastern Desert, were written by my friend, the Bey, in English; and I have adhered as closely as possible to the original, with but trifling alteration. The notes would have been more valuable had a map been laid down of the route, with a list of bearings and distances, and more detailed observations on the general nature of the country traversed. The porphyry quarries of *Gebel Dukhán*, (Mons Porphyritis) are probably coeval with the celebrated breccia quarries of *Wádi Keneh*, and worked in the time of the first Osirtasen, the supposed Pharaoh, who ruled over Egypt in the time of Joseph. The beautifully coloured porphyries, green, purple, and red, and much of the basalt used in ancient Egyptian sculpture, were derived in great measure from *Gebel Dukhán*, and its vicinity; whence they were probably conveyed to Coptos on the Nile, and thence easily distributed to various parts of Egypt. The *Wádi* from *Gebel Dukhán* to *Keneh*, the ancient Koinipolis, a little N. of Coptos, is to this day called the *Sikket el Arabiyeh*, the high-road of the Carts.

It is not very clear why the Arabs should give the name *Dukhán* دخان, which literally signifies smoke, to this mountain. We have no evidence of any volcanic eruptive activity within the historic period. It has probably got the name from its colour, particularly when viewed from a distance under a deep blue sky, or from the smoke of the town and huts of the workmen.

The remains of the inscription copied by the Bey from the frieze of the temple near *Gebel Dukhán*, bear the name of the emperor Adrian, with the surname of Trajan, whose son by adoption he was. The temple is dedicated to Sarapis the great, [with his titles of Pluto and the Sun, ΔΙΙ ΗΑΙΩΙ ΜΕΤΑΛΩΙ ΣΑΡΑΠΗΔΙ] and to the other gods in the same temple. Small temples to Sarapis are very common in the vicinity of mines and quarries. As Pluto he is supposed to preside over demons and the evil genii, who the orientals imagine, watch over the treasures of

the earth. *Gebel Dukhán* lies in about latitude N.  $27^{\circ} 16'$  and longitude E.  $33^{\circ}$ . There is an ancient road leading from it to Myos Hormus, an old port on the Red Sea, from which it is distant about 32 miles as the crow flies.

*Hekekyan Bey's Journal.*

*April 17th, 1844.*—Sandstone is the prevalent rock for the first half hour, succeeded by granite, gneiss, black and red basalt, to *Wádi Keneh*.

*April 18th.*—Granite and porphyry were the prevalent rocks during this, and the two following days' march.

*April 21st.*—Granite and basalt. The road from *Dukhán* to *Keneh* is called the *Sikket el Arabíyeh* (the road of the chariots) to this day. There are the foundations of a station at *Wádi Billi*.

*April 22nd.*—Up *Wádi úm Yesúr*, granite and basalt.

*April 23rd.*—Fort of *Gebel Dukhán*. Here is a temple of white-spotted granite with four Ionic columns; the altar still standing in its original place. On the frieze is a Greek inscription of which the following is a copy:—

ΥΠΕΡ ΣΩΤΗΡΙΑΣ ΚΑΙ ΑΙΩΝΙΟΥ ΝΙΚΗΣ ΤΟΥ ΚΥΡΙΟΥ ΗΜΩΝ  
ΑΥΤΟΚΡΑΤΟΡΟΣ ΚΑΙΣΑΡΟΣ ΤΡΑΙΑΝΟΥ ΣΕΒΑΣΤΟΥ ΚΑΙ ΤΟΥ  
ΠΑΝΤΟΣ ΑΥΤΟΥ ΟΙΚΟΥ ΔΙΙ ΗΛΙΩΙ ΜΕΓΑΛΩΙ ΣΑΡΑΠΙΔΙ ΚΑΙ  
ΤΟΙΣ ΣΥΝΝΑΟΙΣ ΘΕΟΙΣ ΤΟΝ ΝΑΟΝ ΙΚΑΙ ΤΑ ΠΕΡΙ ΤΟΝ ΝΑΟΝ  
ΕΠΑ ΡΟΙΤΟΣ ΚΑΙΣΑΡΟΣ ΕΓΗΡΙΑΝΟΣ ΕΠΙΡΑΝΝΙΩ ΜΑΡ-  
ΤΙΑΛΙ ΕΠΑΡΧΩ ΑΕΥΙΡΤΟΥ ΜΑΡΚΟΥ ΟΥΔΗΠΙΟΥ ΧΡΗΣΙΜΟΥ  
ΕΠΙΤΡΟΠΕΥΟΝΤΟΣ ΤΩΝ ΜΕΤΑΛΛΩΝ ΕΠΙ Π ΠΡΟΚΟΥΔΗΙΑΝΟΥ.

Above the *Nakábah*, on the left side of the valley, is a *Tellaah*, up which there is a well of sweet water, probably a spring. The *Tellaah* contains green plants. The *Nakábah* below it is composed of some ten tortuously branched spreading trees, giving an agreeable shade. There is a well close by them, and ruins adjoining, whose remains indicate the site of a regularly laid out plan of buildings, and show that water must formerly have abounded here, and that gardens were kept up.

The *Wádi* here expands into an amphitheatre. The clear purple cross of *Gebel Dukhán* (W. by N. W.) under a dark blue sky, crown the more sombre and gloomy mountains of porphyry, amidst which the *Wádi* serpentines. Tufted shrubs and plants of every shade of

green, each with its blossom of varied colours, grow among the masses of purple, green, red, and black porphyries, under shady archways formed by the bending branches, and foliage of the *Nebkh*,\* whose fruit was as yet green.

We took water of the *Maitha*, and, debouching out of the valley, struck down into *Wádi Billi*, and ascended it as far as the *Silloa*, when we halted. This part of *Wádi Billi* is full of *Persica* and *Seyaleh*, (*Acacia seyaleh*), and numerous kinds of plants; the Arabs say that the lower part of the *Wádi* contains *forests* of *Seyaleh*. The inferior granites here are more friable, and whiter; they have rounded surfaces and summits,† and are free from dykes of felspar. The upper granites on the contrary are more rugged and perpendicular as the height increases.

There are in *Wádi Billi* signal-posts, mile-stones, guard-houses, forts, wells and stations. Near *Ain Abu Markhah* are quarries, and traces of buildings, *Sakiyas*,‡ gardens, a citadel, magazines, brothels, sacred groves, temples, priest's residence, baths, forum, villages, grottos, pottery, green sarcophagus, troughs, blocks of green, purple porphyry, and of black grey-veined breccia. Many *Tarantulas* (*Abu Shebbath*).§

*Wádi Guttar* runs in the direction of the crags of *Gebel Dukhán*, but after passing the well in the middle of the *Wádi* it sweeps southerly towards *Gebel Altarásh*, runs into *Wádi Keneh*, receiving along its course *Wádi's Altarásh*, *Gerzoo*, *Kohel*, and others.

The well station in the middle of *Wádi Guttar* below the *Mazra*, is 150 feet square; it contains the remains of buildings, with strong walls, and there are the remains of buildings, stables and out-houses outside. A dyke with walls 6 feet thick runs across the *Wádi*, probably to retain the water for cultivation.

*April 26th.*—Left for *Keneh*, and reached *Tellaat el Úm Gesher*, on the summit of which we found rain-water. Here is a Roman station of unburnt brick, with an area of a fort with towers at the angles (bears S. S. W. by S. from *Gebel Dukhán*.) A large gateway in the centre opens upon the valley. The enclosure, which is about 300 feet long by 200 feet, contains a saki, and a cistern of cement 20 feet by 15, now both filled with sand. Outside, towards the N. and close

\* *Nebkh*, *Rhamnus nabeca*. T. N.

† Probably felspathic gneiss. T. N.

‡ A watering place, a canal. T. N.

§ *Lit.* Father of the Spiders. T. N.

to the cistern, are the traces of an extensive village, apparently regularly laid out. This and the body of the place, and its interior buildings, are of blocks of dark green felspar, serpentine, &c. from the neighbouring mountains. Fragments of silicified nummulitic limestone, porphyries, granite, and pottery are scattered about.

*April 27th.*—In  $\frac{3}{4}$ th of an hour we emerged from the *Múkhayeneh*, and left the granite behind. We now crossed a vast *Farsh*,\* even and hard as if Macadamized. We were four hours in crossing it to *Gebel Gír*. The *Farsh* is called *Gaá† Tiúr*. The old station of *Gebel Gír* stands on a hill. Here are the remains of a reservoir and a lake 300 feet in diameter and 20 feet deep. They are now filled up almost, and plants grow at the bottom. There are the remains also of several cisterns and three aqueducts all dry. Attached to the station in the valley are the traces of regularly laid out stables and lodgings built of limestone, and two excavations; the smaller of which is near the N. of the outer station: the excavated matter is thrown out in the form of a dyke.

The formation is of argillaceous sandstone, in alternate layers, with carboniferous plastic clays; under which are the ferruginous clays and sandstones.

Immediately over them is the silicious limestone, capped by nummulitic limestone. The argillaceous sandstone contains layers of shales, bivalves, &c.

\* *Fersh* فرش, signifies a wide field or plain, also a bed, spread out. T. N.

† قاع طیور more properly the G of *Gáa* should be the guttural káf. T. N.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR NOVEMBER, 1848.

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The usual monthly meeting of the Society was held on the evening of Wednesday, the 1st Nov. 1848.

The Hon'ble Mr. Justice COLVILLE, President, in the chair.

The accounts and vouchers for September and October were presented.

The following gentlemen having been duly proposed and seconded at the September meeting, were balloted for and elected members of the Society :—

*Capt. Pakenham*, Body Guard.

*Capt. Powel*, Steamer 'Precursor.'

*Capt. Banks*, Assistant Sec'y to Govt. of India, Mily. Department.

*Lieut. Stubbs*, Bengal Artillery.

*T. A. Anstruther, Esq.* Madras C. S. was named as a candidate for ballot at next meeting, proposed by Walter Elliott, Esq. seconded by J. W. Laidlay, Esq.

The *Rev. J. Richards*, Chaplain, Madras Establishment, proposed by Rev. J. Long, seconded by Rev. Mr. Keane.

Notes were received from the following members, requesting their names to be withdrawn :—

*W. Storm, Esq.* Calcutta.

*W. Thornhill, Esq.* Nainee Tál.

Read letters—

From G. A. Bushby, Esq. Sec'y. to Government of India, forwarding for deposit in the Society's Museum, 30 pieces of ancient sculpture collected by Capt. Kittoe.

From the Hon'ble Mr. Thomason, enclosing extract of a letter from Lieut. R. Strachey, Engineers, announcing his return from the lake Manasarowar.

From the Academy of Natural Sciences, Philadelphia, returning thanks for the Society's gift of 28 volumes of Oriental works, published by the Society.

From Lieut. Col. Goodwyn, Engineers, communicating a paper, with plates, on Taper Chain Suspension Bridges.

From Col. Low, giving cover to copy of inscription, and announcing despatch of a further portion of the Singapore rock inscription.

From Rev. Mr. Mason, sending a notice and drawing of a Tenasserim Pine.

From Captain Hutton, a second article on the nidification of Indian Birds.

From Captain Newbold, forwarding notes by His Highness Hekekyan Bey, Honorary Member of the Asiatic Society, on his visit to the Porphyry quarries of Gebel Dukhan.

From Dr. Hooker, Honorary Member of the Asiatic Society, (communicated by the President,) a narrative of his visit to Parusnath, Rotas and the table-land of Behar.

From H. M. Smith, Esq. communicated by Capt. Sanders, giving an account of the supposed efficacy of the leaves of *Aristolochia Indica* in the treatment of a case of snake bite.

From the Editor of the "Revue des deux Mondes," Paris, soliciting contributions of papers for that Journal.

Resolved, that the Society subscribe for a copy of the *Revue*.

From the Librarian, proposing a reduction in the scale of prices of the Oriental publications of the Society.

Referred to Oriental Section.

From H. M. Elliot, Esq. presenting for the Library a copy of la Mezeraye's History of France, and for the Museum an Egyptian vase taken from a Mummy case.

Dr. O'Shaughnessy presented a copy of Mr. Laidlay's version of, and Notes on the Pilgrimage of Fa Hian, and proposed the following resolution, which was seconded by Mr. Heatley, and unanimously adopted:—

That Mr. Laidlay's version of the travels of Fa Hian be forwarded to the Oriental Section for their examination and report, and with the suggestion that it appears highly deserving of adoption by the Society.

An apology was read from Mr. Piddington, for his absence on ac-

count of illness, and Mr. Blyth made his usual monthly report on the Zoological Department.

**LIBRARY.**

The following books have been added to the Library since the last meeting.

*Presented.*

Histoire de France, par François de Mezeraye. Paris, 1643; 3 volumes folio.—BY H. M. ELLIOT, Esq.

Prosodie des langues de l'Orient Musulman, spécialement de l'Arabic, du Persan, du Turc et de l'Hindustani; par M. Garcin de Tassy, Paris, 1848, 8vo.—BY THE AUTHOR.

The Report of the British Association for the advancement of Science, for 1847, London, 1848, 8vo.—BY THE ASSOCIATION.

The Journal of the Indian Archipelago, for Augt. and Sept. 1848, (two copies.)—BY THE BENGAL GOVERNMENT.

Ditto ditto for Sept. 1848.—BY THE EDITOR.

The whole works of the most Rev. James Usher, D. D., Vol. XV.—BY THE BOARD AND FELLOWS OF TRINITY COLLEGE, DUBLIN.

The Journal of the Royal Geographical Society of London, Vol. XVIII. part I.—BY THE SOCIETY.

The Calcutta Christian Observer, for Oct. 1848.—BY THE EDITORS.

The Oriental Christian Spectator, Vol. IX. No. 9.—BY THE EDITOR.

The Oriental Baptist, Nos. 22, 23.—BY THE EDITOR.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the months of Augt. and Sept. 1848.—BY THE DEPUTY SURVEYOR GENERAL.

Statistics of Sugar produced within the Presidencies of Bengal, Fort St. George, and Bombay. Calcutta, 1848. (Pamphlet).—BY THE GOVERNMENT OF BENGAL.

Plans of the Captured Sikh Trophies, Folio.—BY THE MILITARY BOARD.

Inscriptions on the Captured Sikh Trophies, 4to.—BY THE SAME.

Proceedings of the Twenty-fifth Anniversary Meeting of the Royal Asiatic Society, (Pamphlet).—BY THE SOCIETY.

Upadeshaka, Nos. 21, 22, 23.—BY THE EDITOR.

Tatwabodhini Patricá, Nos. 62, 63.—BY THE TATWABODHINI SOBHA.

*Exchanged.*

Journal Asiatique, No. 54.

Journal of the Agricultural and Horticultural Society, Vol. VI. Part III.

Jameson's Journal, No. 89.

The Athenæum, Nos. 1082—5.

*Purchased.*

Alison's History of Europe, Vols. XVIII. XIX. and XX.

Atlas to the above, 16 Nos.

The Kalpa Sútra, and Nava Tatwa: two works illustrative of the Jain Religion and Philosophy, translated from the Magadhi, by the Rev. J. Stevenson, London, 1848, 8vo.

The Edinburgh Review, No. 177.

The North British Review, No. 18.

The Annals and Magazine of Natural History, Nos. 7, 8.

The London, Edinburgh and Dublin Philosophical Magazine, No. 219.

Journal des Savants; April and July, 1848.

Comptes Rendu Hebdomadaires des Seances de l'Academie des Sciences, Nos. 21 and 25, Vol. XXVI. and Nos. 1 to 4, Vol. XXVII.

The Calcutta Review, No. XIX.

(A correct Report) W. B. O'SHAUGHNESSY, Secry.



# Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Nov., 1848.

Lat. 22° 33' 28". 33 N. Long. 88° 23' 42". 84 East. Mag. Variation 2° 28' 36" East. Mag. Dip. 27° 45'.

| Days of the Month. | Observations made at sunrise.        |                 |             |          |                    | Maximum Pressure observed at 9h. 50m. |                 |             |          |                    | Observations made at apparent noon.  |                 |             |          |                    | Observations made at 2h. 40m. p. m.  |                 |             |          |                    | Minimum Pressure observed at 4 p. m. |                 |             |          |                    | Observations made at sunset. |          |          |          |             | Maximum and Minimum Thermometer, Barometer, &c. |             |                 |             |                 |             |                 |             |                 |             |
|--------------------|--------------------------------------|-----------------|-------------|----------|--------------------|---------------------------------------|-----------------|-------------|----------|--------------------|--------------------------------------|-----------------|-------------|----------|--------------------|--------------------------------------|-----------------|-------------|----------|--------------------|--------------------------------------|-----------------|-------------|----------|--------------------|------------------------------|----------|----------|----------|-------------|-------------------------------------------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|
|                    | Barometer reduced to 32° Fahrenheit. | Temperature.    |             | Wind.    | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit.  | Temperature.    |             | Wind.    | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature.    |             | Wind.    | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature.    |             | Wind.    | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature.    |             | Wind.    | Aspect of the Sky. | Maximum.                     | Minimum. | Maximum. | Minimum. | Elevations. |                                                 |             |                 |             |                 |             |                 |             |                 |             |
|                    |                                      | Of the Mercury. | Of the Air. |          |                    |                                       | Of the Mercury. | Of the Air. |          |                    |                                      | Of the Mercury. | Of the Air. |          |                    |                                      | Of the Mercury. | Of the Air. |          |                    |                                      | Of the Mercury. | Of the Air. |          |                    |                              |          |          |          |             | Of the Mercury.                                 | Of the Air. | Of the Mercury. | Of the Air. | Of the Mercury. | Of the Air. | Of the Mercury. | Of the Air. | Of the Mercury. | Of the Air. |
| 1                  | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                 | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                        | 71.4     | 71.4     | N. N. W. | Cloudy.     | 30.07                                           | 71.4        | 71.4            | N. N. W.    | Cloudy.         | 30.07       | 71.4            | 71.4        | N. N. W.        | Cloudy.     |
| 30                 | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                 | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                        | 71.4     | 71.4     | N. N. W. | Cloudy.     | 30.07                                           | 71.4        | 71.4            | N. N. W.    | Cloudy.         | 30.07       | 71.4            | 71.4        | N. N. W.        | Cloudy.     |
| Mean               | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                 | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                                | 71.4            | 71.4        | N. N. W. | Cloudy.            | 30.07                        | 71.4     | 71.4     | N. N. W. | Cloudy.     | 30.07                                           | 71.4        | 71.4            | N. N. W.    | Cloudy.         | 30.07       | 71.4            | 71.4        | N. N. W.        | Cloudy.     |

Mean of the corresponding months of last year  
29.955 67.2 67.8 60.5

These Observations have been made for the most part, with a supply of new and first rate Instruments received into the Observatory, by orders of the Bengal Government, a brief description of the Instruments seems necessary.

1st.—The Barometer is a standard Instrument by Newman, diameter of the tube .5794 inches. The following is the comparative showing of this Instrument and some other Barometers which were in use at the Observatory prior to 1st of June, 1844.

2nd.—The Thermometer is a Standard Instrument by Newman, on metal Scale and graduated to 1/2 of a degree.

3rd.—Wet Bulb Hygrometer by Newman, graduated to 1/2 degree, diameter of the tube .5794 inches. Standard Thermometer and dry Thermometer of this Instrument + 0.2 the Temperature of the Dry Bulb taken for the Standard Thermometer + 0.7 for the former and 0.23 for the latter.

4th.—Maximum and Minimum Thermometer by Newman. The difference between these instruments, and the Standard Thermometer is + 0.7 for the former and 0.23 for the latter.

5th.—The Temperature shown on 41 of the Thermometer is corrected by means of a Newman's Maximum and Minimum thermometer, the only Instrument, excepting the Thermometer, used in this observatory, being that of a vertical barometer, the results recorded for general information.

The height of the Surface of the Mercury in the Cistern of the Standard Barometer in the Observatory situated to the Surveyor General's Office above the Mean Level of the Sea, having been deduced from a Series of Tide Observations taken from a Register kept at Kyd's Dock Yard, the results recorded for general information.

|                                                                                                                                       |       |
|---------------------------------------------------------------------------------------------------------------------------------------|-------|
| Lowest Monthly Average of Mean Tides in the Months of February and March, above the Zero of Gauge at Kyd's Dock Yard, Calcutta, ..... | 8.79  |
| Difference of Level between the Zero of Tide Gauge at Kyd's Dock Yard, and the Standard Barometer at the Observatory, .....           | 2.51  |
| Height of Standard Barometer above the Level of the Sea, .....                                                                        | 11.30 |

H. L. THULLIER, CAPTAIN,  
Officiating Deputy Surveyor General,  
In charge Surveyor General's Office.



JOURNAL  
OF THE  
ASIATIC SOCIETY.

DECEMBER, 1848.

*A few Gleanings in Buddhism, by Lieut.-Col. Low.*

The following are some of the memoranda, most of which I made long ago while looking over Bali and Siamese books, in presence of Siamese Buddhist priests. I do not profess an acquaintance with the Pali language, but I had in my service until his death a Siamese, but not a priest, of Bangkok, who was, for his country at least, a proficient in it. I had not, unfortunately, leisure to avail myself of what he did know of the language for acquiring a competent acquaintance with it, and anyhow the want of a Pali grammar and dictionary would have been a serious obstacle.

Some of the Siamese contend that the present Buddha had no right to enter Nirvána or Nirbritti, as *his* period had not arrived, and that he attained to this dignity by practising a deception upon Yakaró Ariyá, his elder *brother*, he himself being the *fifth*. The deception is thus described. These two brothers proposed to justly determine which of them was best prepared for the divine condition of Nirvana, by a trial of superhuman skill or power. Two lotus buds were placed before them. Turning their persons from these, but in opposite directions, they repeated certain sacred formulæ, and on resuming their positions found that Ariyá's bud had blossomed, but that his brother's had not. Buddha, pretending some informality, required another trial; and during this he deceitfully changed the buds, and thus appeared the victor. Ariyá, by his intuitive knowledge was aware of the trick; but being of a humane disposition he said nothing, and permitted Buddha to enter Nirvana.

This must, I should think, have been some heretical doctrine ; for it can hardly be believed that a religion so based on morality as Buddhism is, would at the threshold of its original temples, have tolerated such a breach of it. I feel convinced, that the comparatively pure Buddhism, which was carried from Ceylon to Cambodia by Buddha Ghósá, and thence by others to Siam, perhaps through Laos, was greatly adulterated, and assumed more of a polytheistic character than its hitherto rather theomachistic dogmas had permitted ; about the time when the bráhmans had fully achieved the superiority in India over the Buddhists, and had spread themselves as religionists to the eastward ; and when the heretical Buddhist sects, let loose from all restraint, disseminated their own doctrines far and wide.

Much learning and ingenuity has been expended in the West in the endeavour to trace Western Buddhism to the east, but perhaps the prevalent impression on the mind of the eastern orientalist is that it originated in the west and was there the parent of Indian Buddhism, if not indigenous to India. Hinduism too, under the form and impress in which we now find it, must have been brought to India from western regions, *if* it was really the religion of the *bráhmans* as a tribe of foreigners, and not in the main, as I cannot help considering it to be, a particoloured pantheon, tenanted by deities possessing most incongruous attributes, and jumbled up with monstrous and polluted imaginings, and chimeras dire ; and thus laboriously and cunningly erected, by the bráhmans, for the gratification of their lust for power, and of their hatred of the Buddhists, on whom they had for centuries kept fixed their basalisk eyes, and not with that expanded desire, which the Buddhists seem to have entertained for the amelioration of the moral condition of mankind.

In admitting that Buddha had a precursor in the same path as himself, we are by no means called upon at the same time to unreflectingly adopt the predecessors of the latter, although there would be nothing, morally, to prevent our even admitting them suppositively ; for we should in this case have only to discard the lengthened periods, astronomical or fanciful, which have been assigned to the three first Buddhas, and to bring them nearer to the *bills of mortality*, to render them manageable.

The Buddha of the present period, dating from his apotheosis in

B. C. 543, seems to have had no connexion personally with the nations of the west. But from his religious system, whose roots seem to penetrate to a greater depth than any one appears yet to have reached, or may perhaps be able to reach, and of the volumes, of which not perhaps more than a mere fractional portion has yet been classically examined, rays of light may hereafter emanate to brighten the path both of history and archaiology.

The fact that scarcely any of the names by which Buddha is known are patronymical, but mere titles, leaves open a wide field for their application, and might give rise to a belief that they, or some of them at the least, might have appertained to previous deified mortals.

Of the names, worldly titles, and parentage of the present Buddha, there is now I believe no doubt, and the principal ones may be found in the Mahawanso.

But if any of the names or appellatives now bestowed upon him as contained in the following list, could be proved to have been borrowed, a clue might possibly be found to their original application.

Sir W. Jones gave us a list of Buddha's names, but I believe they are Hindu ones, and most of them also used by Buddhists. But I apprehend that whatever we may receive from that source, relating to Buddhism, cannot, unless corroborated by Buddhist writings be depended upon. I would even look with suspicion upon Buddhist works composed in *Sanscrit*, for when this language superseded the Páli or Magadhi, a change was gradually advancing, the bráhmans were spreading their nets in secret, heresies were corroding the but lately purified doctrines of Buddhism; and the use of Sanscrit rendered it easy for both heretics and bráhmans to color, distort, eliminate or falsify all the Buddhist books which fell into their hands; and which they hoped at least to be able to dovetail into their own system, when they should find it convenient.

The rest, as it is suspected, or rather known, they destroyed.

The names of Buddha, in general, according to Sir W. Jones, are—  
1 Muní. 2 Sastri. 3 Muníndra. 4 Vinayaca. 5 Samanta. 6 Bhadra. 7 Dharma Rájá. 8 Sugata.

And his titles—

1 Sacyamuni. 2 Sacyasingha. 3 Sarvartha-siddha. 4 Sud'hodhani. 5 Gautama. 6 Arcaband'hu, or kinsman of the sun. 7 Máyá or child of Máyá, (delusion) or Máyádevisuta.

Buddha is a word, he adds, commonly used for a *mere* wise man, without supernatural powers.

Buddha, like Samana, seems to have been a name or title bestowed on priests, as well as on the Buddha of the period. Samana Khútama, or the man divested of passions, being the Samanakhodam of Siam.

When Budd'ha, or a Buddha, has nearly attained to perfection, he is termed in Siamese sacred Páli books Paramabódhisat [Bod'hisatwa].

I extract from the Siamese Páli work 'Milinda Rájá, the following titles expressive of nature's divinely favored :

- Sotá pattimaggá.
- Sakidagá mimaggá.
- Anágá mitto.
- Arahattá ditto.
- Sotá patti Phalá.
- Saki dágá mi Phalá.
- Anágá mi Phalá.
- Arahattá Phalá.

The periods assigned in the Milinda Raja to the five Buddhas are—

For the 1st, from the *consolidation* of the world, 12 antara Kalpas.

Ditto 2d, 10 antara Kalpas.

3d, 4th and 5th, also similar periods.

After Metraiyo a space of 12 antara Kalpas will occur, when Sampatti Mahá Meg will appear. Then a period will ensue of 6264 antara Kalpas, at the end of which the world will be consumed by fire, and a new world will be created or will arise, to be called Sangwatto. In the 'Ratana Kalápa Mettaiyo' is described as having been a Bódhi Satwa, of whom there are three classes,—

1. Ughati tango, supremely wise.
2. Wipachi, of great purity of mind, &c.
3. Néyo, possessed of great perseverance ; 'great mental power militates against purity of soul.

The other names and titles of a Buddha, but whether all are strictly Páli I shall not pretend to say, are :

- Sri Saraphet.
- Buddhí lakhaná.
- Budd'há baltabaróm.
- Chinnasí.

Saraphet charangsí  
 Chimarat.  
 Budd'há Rattaná.  
 Salsada chan.  
 Yanna Sappanyó.  
 Kassa P'halayan.  
 Samasam Budd'hó.  
 Barómmá.  
 Sri Sakhót.  
 Bárómmá Buddhí Satwa.  
 Bárómmaming.  
 Bárómmanát.  
 Barommayán.

These are titles of Buddhas who have already been and will again be :

|              |                  |
|--------------|------------------|
| Satthá.      | Samantachak'khú. |
| Dasabaló.    | Buripanyo.       |
| Sabbanyó.    | Maraji.          |
| Dipaduttamó. | Narasiho.        |
| Munindo.     | Narawaro.        |
| Náthó.       | Dewa Dewo.       |
| Chákkhúmá.   | Loká Gúru.       |
| Angirasó.    | D'hammasámi.     |
| Lókanáthó.   | Tathágato.       |
| Anadhiwaró.  | Sayambhú.        |
| Mahesi.      | Warápanyo.       |
| Wináyakó.    | Náyako.          |

In the Páli (Siamese) Ratana Kalápa it is stated that there are three Bódhi Satwa.

I find in it also a list of seven Buddhas ending with Gotama, which with Metteya, who is yet to come, will be eight in all. They are

1. Wipassi, his son Sawajakhandá, and his wife Súdano.
2. Sikk'hi, his son Attúla, and his wife Sabbakáma.
3. Wessabhú, his son Súppabúddhá and his wife Súchitá, (which is the name of one of Indra's wives).
4. Kakúsando, whose son was Anútáro, and wife Aparojini.
5. Kónágámanó, son Sattawáho, wife Súwattatí.
6. Kassapo, son Wjita Sena, wife Sunanda.
7. Gotama, son Rahula, wife Bímhá Bhagawati.

Wipassi and Kakúsando rode on horseback when they went to be ordained as priests.

Sikhi and Kónágamano went on elephants. Wessabhú was conveyed in a chariot. Kassapho in a moving palace (Q palankin) and Gotama rode on a horse.

“An account (observes the compiler of the *Ratana Kalápa*) is to be found of the ages of all of these Buddhas in the book called *Buddhánú Puriwatta*, Vol 3d.”

In Wipassi's time, it is further observed, a chetí or relic fane was built by Púnabbásúto náma Setthi.

In the time of Kakusando, a temple or dagoba was erected by Abhúta Setthi. (I cannot find the proper name of the place but it was doubtless Abhayapura where king Abhayo reigned).

In Konagamana's time a cheti was built by a rich man at Uggo Setthi. The city was Waddha, and Raja Samiddho reigned; a famine prevailed during this time. [Here the royal garden—the city—the prince Samiddho—and Adam's-peak are described as in the Ceylonese *Mahawanso*].

In Kassapa's time Súmangúla erected a chetí, which was named Yarama, (the Thúpárama of Ceylon perhaps was named after it.) This was in the country of Wesálipúré to the westward in Mandawip, and the Raja was Jaiwanto or Jaiyanto and Adam's-peak was called Subhakúta. The country was much disturbed during this time.

In Gotama's time, a temple was erected by Anata pindi maha Sėti.

The Maha Sammati Wangsa, or a genealogy of Buddha from the same work.

1. Rojo Wararojo.
2. Mahá Panátha who came after many ages had lapsed.
3. Mahá Dewa Rájá.
4. Kala Raja ka Raja.
5. Sanjaya.
6. Mahá Dipati Jayaséna had two sons.

1. Jaiyansena who lived in Lanká.

2. Dípakúmára.

Jayasena married into the family of Sákya Rájá of Kapila-Watthú. He slew his father (Q. in-law) and became king of that country.

Dípakúmára became king of Dewa Lanká and he had a son.

Jaiya Dipa and a daughter Kacháyana (or Yena).



Jaiyasena's son was Sihahanú and his daughter was Yasodrá.

Jaiyasena married Kachaiyana, and they had five sons.

Suddhod'hana.

Dod'hana.

Sa'lodhana.

Suk'kodhana.

Amítod'hana.

And two daughters Amíttá and Palítá.

Jaiyadipa married Yasódra who had

Janádhpati, son.

Kakayana, daughter.

Janadipatti married Súnanda Dewi, and they had for issue—

1. Maha Maya } Daughters, and  
2. Pajapati }

1. Dantapavi } Sons.  
2. Súppabudd'ha }

The latter married Amíta, and they had two sons.

1. Subhada Kabhaiyana.

2. Dewadat'ha.

Sudodhana son of Jaiyasena and Kachaiyana married Maha Maya.

Their son Sidhatta Kúmára, who married Bimba *alias* Subhada Kachaiyana. Their son was Rahula.

Bárómmalak'hanát.

Bhakk'hawá.

Somdet Satsaná.

Karunná (Karunya).

Maha Krasát.


The following are from the Milinda Raja Four Budd'ho, or classes of priests and titles.

1. Suta Budd'ho—who are deeply read in Pali learning.

2. Chatú sachcha ditto—applied to learned expounders of the doctrine.

3. Pachék'ha ditto—those whose virtuous deeds have brought them to the threshold of Nirvana.

4. Sapp'hanyo ditto—who were divinely gifted or inspired with holy knowledge.

I have a Pali book in my possession bearing the title of Thassachatta  as the Siamese pronounce the words, or the ten sepa-

rate states of existence of Buddha. It is in as many volumes, and is rather bulky. With the help of my native assistant I many years ago made short abstracts of each of these sections—and should I find that they may be at all useful in elucidating the history of the kings of central India, and not yet translated, they can be forwarded for the Journal of the Society.

*The ten states of the earthly existence of Buddha previous to his becoming a Buddha ; from the Pali.*

|    |    |    |    |    |     |     |    |    |    |
|----|----|----|----|----|-----|-----|----|----|----|
| Te | Ja | Su | Né | Ma | Bhú | Cha | Ná | Wi | We |
| တေ | ဇ  | ဗ  | နေ | မာ | ဗု  | ဇာ  | နာ | ဝိ | ဝေ |
| 1  | 2  | 3  | 4  | 5  | 6   | 7   | 8  | 9  | 10 |

မလ္လဗိဇာ Ela migá.  
2

ပိဗ္ဗိဇာ P'hicha nak'ha.  
3

ဝိဗ္ဗိဇာ Wichíta  
4

နေရဗ္ဗ ကာကဇာ Ne'raya kakh'ata.  
5

ဓမ္မေဇ္ဇဗဏ္ဍာ Umaungkha pichta.  
6

အာလံကာဗျဗောဓိဇာ Alambhaya hétita.  
7

ဗာဏဗျဗိဇာ Yaya púchita.  
8

ပာဏ္ဍိဝိဗ္ဗိဇာ Panhang wichita.  
9

ဗာဏ္ဍဗျဗိဇာ Yakké mahithita.  
10

ဝတ္တဇာပပုဗ္ဗိဇာ Wangkaté pap'hachitto.

ဖရောဓိဇာ Phra sídhata or thatha.

The Siamese have, but not contrary, I suppose, to the spirit of Buddhism, treated Devadatta (or their Thewathát), the persecutor of Buddha throughout his ten states of existence, with more consideration than he would have, under like circumstances, met with from the bráhmans. He did indeed sink down through the weight of his misdeeds into hell, where he is to remain for one half of an infernal day, each of which is equal to five hundred and six years in the heavenly regions—while one day of such a year is equivalent to one thousand earthly years; but, then again, after having undergone this almost eternal fiery trial, he will return to the earth, become an Arahat, a degree of sanctity to which (only) eight [of Buddha's] disciples attained, and after teaching for seven days will enter Nivana.

Wilford remarked that the Buddhi Satwa of Siam calls Salivahana by the name of Devetat.

My observation does not confirm this, although it is not improbable that the bráhmans introduced the belief amongst some of the Siamese priesthood. In a drawing which I got long ago from a Siamese Bhiku or Bhikchu or Buddhist Priest, this Devadhatta is represented in the lowest or fifth mansion of hell, undergoing his punishment. Wilford, in the *Asiatic Researches*, describes this victorious personage under the name of *Tacshaca*, observing that he was “crucified by order of Buddha, on an instrument resembling the cross, according to the writings of travellers into Siam. By others he was impaled alive upon a double cross and hurled into the infernal regions, and Samana Gautama foretold that he would be a God in reality.”

Hence too, certain writers, wishing, with a very misplaced and mischievous zeal, to have it believed that the Buddhists received their ideas of Devadhatta or Devodassa, from the Christians, although the latter person lived and *sinned* B. C. 543, at the latest, have adduced this cross as a proof of their position. I subjoin a correct copy of the representation in my drawing as above alluded to. From the marks of blood on the arms and legs it should seem that it is intended to represent him as having been nailed to the four beams, and not impaled.

“King Aryyá is the same with the Pra Aryya-sira of the followers of Gautama in Siam and other countries to the eastward of it. He is the mighty pre-chief of the Arryas or Christians, and with him Buddha waged war, as well as with *his* disciple Praswana.

The Aryyá Raja is also the same with the Deva Twash'ta or Deva-

tat, who was crucified by order of Buddha.”\* “Dévatat being, several times worsted in his wars with Buddha, made overtures of peace, and Samana Gautámá consented on three conditions, first to worship God, then his word, and lastly himself. This last article was rejected, and Tevatat was worsted in the next battle and was taken prisoner, and impaled alive by order of Buddha, and his limbs trussed up upon a *double cross*, and in that state hurled into the infernal regions.”† I suspect, with exception of Devatat’s enmity to Buddha, the rest of this account is apochryphal; first, there was no prominent self-existent God in the then Indian systems; secondly, it does not appear that Buddha inculcated at any period the worship of himself in his earthly shape, and doubtful if he did so in his future one; and thirdly, such a cruelty inflicted on his enemy was in direct contradiction to the whole tenor of his life, which was marked by practising and preaching humanity, forgiving even the person who poisoned him.

Buddha’s disciples were we know numerous enough. They are classed by the Buddhists of Siam as *Araháns*. The chief of these was P’hrá Arahán, but he is stated in the 10th Vol. of the Asiatic Researches “to have been Siva or Uranus, who both preside over astronomy.” But the inference or identification does not appear to me to have been proved. His followers are likewise described as having at one period been the most powerful amongst the heterodox sects, meaning the Buddhists in this instance.

The Phra Araham are borne on the Siamese war flag under the symbol ☉ 8 as there were eight of them—and they are represented in their various stages of the metempsychosis under various forms of half-human half-bestial; or with human heads peeping out of shells, as in Sancha-dwip.

In the Páli Book called by the Siamese Milin, which I have supposed to be the Milinda Rájá, and of which I have, as already noticed, a copy, there is a section or passage descriptive of the *Arahantá*, who are rated at 100,000. Amongst these were pre-eminent

Assakhuttá Theró, who full of divine inspiration, abode on the top of the mountain Yukhunthan, (Vicuntha, I suppose,) and who had gone to call Nágásená down (from heaven) when he was a Devatta.

\* As. Res. Vol. x. p. 44.

† As. Res. Vol. x. pp. 94, 95.

P'hra Nágá, who while a Devatta in Tavatinsa, abode in the palace Kétumtí in the west.

Róhana Theró, who was the teacher or spiritual guide of P'hra Nágá until he became priest, and who attended him during the succeeding seven years, until he attained to be *Soda*, or perfectly versed in holy writing, language, and ordinances.

P'hra Nágá was also called P'hra Arahatta when his time of entering the state of Nivan or Nibritti was at hand ; and he had become perfect in divine knowledge, and the Dhammanga sacred language. His condition then was that of *essassókárám*, or of one freed from all earthly affections and passions. His residence was in Pataliputro. This holy man also met with Milinda at the Vihan of the priest the Ayúban Asangk'haiá pariwéná, where were multitudes (80,000) of his followers.

Maurice\* curiously classifies the Buddhists thus, on what authority I forget, but I think on Wilford's :—"Mahadeva is believed by the Jainas to have assumed the form of Araham or Mahiman, accompanied by his wife Mahámauyá" [Buddha's mother Mahá Mâyá is perhaps here meant]. "The *heterodox* Indians [by which he here means Buddhists] are divided into three sects. The followers of Jaina, on the borders of India, the Buddhas in Tibet, *who perverted Devodasa*, and the Araham, said to have been formerly the most powerful, and whose followers now reside principally in Siam." But I have shown that the Siamese do not apply the name to Buddha. The order too I think should have here been reversed. The Buddhists, or so called Araham first, the Tibetans second, and Jainas the last, for I cannot help being of opinion that the Tibet Buddhists received the doctrine after it had changed its dress from the Pálí to Sanskrit : leaving the most orthodox class in possession of the original books in the Pálí, while the Jainas are confessedly heterodox from both.

Other noted Buddhists were Anirúd'ha, Mahá Kacháyá, Meghi, Khonthan, Assachina, Mahánama, Avapa, Bhakkhaivama, Chún-dha, Maha Thero. This last personage is invoked to cure diseases, and is believed by the Siamese to have been a celebrated astronomer.

Ananda, Kacháyá Upphakhutta, Anirúd'ha, Malaiya, Kassapha, Ubali, Simp'hali, Dattharatha, Anghulimára, who seems to be the Angulimála who was instructed by Buddha.†

\* Indian Antiquities.

† As. Res. Vol. II. p. 387.

It is related of this disciple that he was instructed in his duties as a priest, by a high caste brahman, who became much attached to him. He was then however, it seems, of the brahminical sect, for, as the legend runs, this partiality of the spiritual guide towards him so excited the enmity of several other noviciates that they conspired, and accused the favorite to the brahman of carrying on an illicit amour with his daughter.

The brahman, dissembling his rage under the mask of friendship, and with a view to lead to his destruction, sent for the disciple, and communicated to him as a secret a mode by which he would assuredly attain to Nivana without further study. This was to frame a necklace of 109 human skulls (Siva's necklace occasionally). The disciple followed the advice, and had by waylaying travellers and killing them collected 108 of these skulls, when Buddha appeared before him in order to prevent a meditated matricide. The disciple, ignorant of his rank, pursued him to slay him, but Buddha rose into the air, and admonished him, and he, dreading the consequences of his conduct, besought Buddha to pardon him, and place him on the list of his spiritual sons. This legend was doubtless fabricated at a modern period, for if true, which it cannot be, this convert must have been instigated to these reputed and foul murders by a priest either of Kali or of Siva. But it shows how corrupted Buddhism must have become to countenance, as a fact, so atrocious a transgression of the law.

The birth and life of Buddha, as recorded in the Siamese sacred books, agrees closely with the description given in the Mahawānso of Ceylon. The Buddhists attracted so little notice of the learned until some few years back, that I did not think it worth while to publish all of the translations which I had made of portions of Buddha's history. I think it probable that a copy of the Mahawānso may exist in the archives of the palace at Bankok. But no visitor seems yet to have had access to any Siamese *Library* there.

The Siamese have been deeply embued by the brahman with a mania for astrology, necromancy, and their kindred arts. The following are some of their invocations, which the Sanskrit scholar will readily trace to their source. Empiricism too, being fostered in Siam, these invocations are in high repute with their *faculty*. They are believed

to have been conferred on Buddha by five Devatta Patítha-thá, whose names are given in the Milinda Rájá.

*Om.*—The all-powerful invocation which was framed by the mighty *Indra* and *Sri Rama* and the divine *Devattas* of all degrees for the use of man in his several occupations and perplexities.

*A. U. M.*, according to the Asiatic Researches\* is Vishnu, Siva, and Brahma or Brahmé. It is the *everliving* of the ancient Tartars.†

Faber notices of this celebrated trilateral word that it thus occurs om-phic-al, or the oracle of the Solar God, which the Greeks changed into om-pha-lus, and the Latins into umbilicus.‡ I have alluded further on to this enigmatical trilateral, in connexion with the worship of the sun as the great first Cause and supporter of life throughout the whole of animated nature, according to the ancient Persians.

#### *Invocations.*

May the beneficent and powerful throughout the three worlds, heaven, earth, and hell, namely, the glorious *Indra* or *Ph'ant'ha*, and *Narái* or *Sri Rama*, with all the good and benignant inferior deities give efficacy to their own potent invocation for the attainment of our present desire.

And thou *Sri Sarap'hát*, who art Buddha or Samana Khatama, and art now in the enjoyment of heavenly rest, who art purified from, and exalted above, every earthly affection, who when *called upon*, art omnipresent, who knowest all hearts, who alone possesses the power and privilege of *walking upon the waves of the ocean*, who nicely discriminateth betwixt good and evil, virtue and vice. And ye inferior *Devattas* who adore Buddha *T'háraní*, and thou, O *Iswára* [*P'ho pen chau*, of the Siamese, or literally "*man become Lord*] who *established or made the heavens and the earth and all that is in them.*"

Who also framed the equinoctial line [typified by a threefold thread or platted line, and which is used to encircle a new building or a ship to consecrate it].

\* Vol. V. p—.

† Key to Hindu Chronology.

‡ Faber's Cabiri, Vol. I. p. 66.

Who art invisible, intangible, and a *respector of Buddha, although his superior*. “O come with all the benignant powers of that divine Being (Buddha). He who established the Páli, *founded the sacred order* [the latter one it is to be supposed] of the priesthood, and exhibited in himself a pattern for imitation to the world.”

If such were the tenets of early Buddhism, they were much fewer and more theistical than they now are.

“And thou O Manla phi cháí, the famous physician of old, whose works have enlightened posterity and Saleng.”

“And thou Yama, ruler of the infernal abodes, and *Hunuman* and P’hra Thammayai, and P’hra Thammayan, lend your aid. And ye O Maha Changklí, and P’hra Lai Dárakan, come and render abortive the machinations of evil spirits. And ye all also Krot—Kalinghárát—Phonlawibat—Taling Sakh’an—Narái Seng—Narai Kramáu—Kammayáu—Thammay’i—Sonthayá—Ratri and T’háranisan, the latter of whom wrote a book describing whatever there is of evil in Jumbo Dwipa, in air, earth, or water, and injurious to men, come all and prove propitious.

“And may these invocations which I am going to repeat prove efficacious, seeing that *Iswara* deigned to employ them;—Maha Samai, Maha Chai, Maha D’hammachak, Maha Thassahak, Wi-pasit and Parit.

“And may ye O Buddha ong, and Thitp’ha nangkán and Widok Tháutraí and Sut and Winai be gracious.

“And may I be aided by the Maha Chat or the ten states of existence of Buddha (the fourth) which a priest received from that holy one when he had undergone the tonsure at the lake Anaudat [Manasarowara] previous to or at the period when he entered holy orders, and who had seated himself below a pipul tree.”

“At this spot the divine sage was visited by all the Devattas. It happened that a Yakhsha named Marathera, arrived at the same time. Now this Rakhsha had formerly proffered his daughter in marriage to Buddha along with the *sovereignty of the whole world, at the end of 7 days*, but had been refused, because the offer was coupled with the condition that he should abandon his design of becoming a priest. For Buddha contemned the riches and glories of this world. When Bud-



dha had retired and was reclining beneath his pipul tree (Bo tree), this Rakhsha attacked him out of revenge. But Thárani, the goddess of earth, came instantly and *rescued* Buddha [not yet a Buddha] by overwhelming the Rakhsha in a lake of water which she wrung from her ebony tresses.”

[This goddess is depicted in this attitude in a Siamese cosmographical drawing in my possession in a compartment betwixt the earth and hell. She occupies the left corner, and Mekhala, I think, the right, and betwixt the two are two snakes entwined and recumbent, but with their heads erect].

“May Methangkaro [a title of Buddha] approaching by the portal of the N. W. render propitious this spell.

Muni Deva, Muni Nagha.

Muni Buddha, Muni Phala.

Sapphé sattru winat sánti.”

[Aparagita protects on the N. W.—*As. Res.* vol. viii. p. 83].

“May Sakya Muni K’hatama resplendently enthroned in the N. prove favorable to this spell, [another title of Buddha.]

Sappa Deva.

Pisa Chewa.

Devá Alawakat’hayo.

Picha K’hattha latang t’hittawa.

Sapphé Yakk’há.

Paláyanti.”

[Varahi riding on a buffalo protect me on the north.—*As. Res.* vol. viii. p. 83.]

“May Saranangk’haro [another title of Buddha] gracing the N. E. render powerful this spell.

Wipassisará namat’hó.

Chakk’hó matsá (or massa) sirimató.

Sik’hitsa pinawat’husa.

B’húb’húta nukámpinó.

Wetsap’hó (or Wessaphó) sanamat’hó.

Natá Katsak’hapá Sinó.”

[Narasinhi protects on the N. E.—*Ibid.*]

“May Kakúsandhó [the 1st Buddha] whose place is every where, prove also propitious to all the spells.

“ May T. Yhipp’ha Macará also shield us by powerful spells, and so may Raja Naga—encircle me with his folds and protect me, and let Saranang come too and Parit aid also.”

Then come invocations for the expulsion of national sprites such as the Phi Mon, who are the cause of diseases and possess men, the Phi Chalong or guardian genii of mines and excavations, and to whom I have every reason to believe human sacrifices were made before Buddhism humanised the Hindu-Chinese, or Mahometanism struck down the bloody altars of Siva, next the spirits of women who have died in child-birth. Then philters and charms are to be guarded against, especially those prepared out of materials procured in *cemetries*, and also lightning and other dangers, and against unmarried persons beyond the age of twenty-two years.

Early marriage is so inculcated in Siam that bachelorism after the above age is considered to harbour something devilish about it, and is to be suspected!

Save us likewise from childless people and dreamers.

“ May we be aided by Chinnasí and by Sena Barami and Dhamma Barami and by

Budd’hó.

D’hammó.

Sanghó.

Saribut.

Buddhá Banlang.

May Buddha’s influence under the following attributes prevail :—

Síla uppa báramí.

Síla báramattha báramí.

Dhammá ditto.

Dhammá uppá ditto.

Ditto baramatha ditto.

Nik’ham barámi.

Panya ditto.

Wiriya ditto.

Khanthí ditto.

Sach’chá ditto.

Athithan ditto.

Metta ditto.

Ubekha ditto.

May Buddha's influence also avert the mischief arising from the spirits of persons who have died a violent death [because such having died in a passion they seek revenge], and from those sprites which hover about the makers of coffins, and door-frames and windows, and flit around all classes of artificers and painters, such people disturbing the spirits pervading matter, the elements, &c. and requiring to make ablutions to drive them away; also the mischiefs produced by the genii of the woods, wells, springs, ditches, and reservoirs, or which follow stage-performers or diggers of hidden treasure."

I may here remark that the Siamese are inveterate seekers for concealed treasure, and that so degenerate have the priests become, that they often set the example. Of this I have had many proofs, and a Siamese who had been a Bhiku or Priest, when he saw me excavating an old ruin, told me as a great secret how to find the treasure he believed I was in search of. Alluding to a book called *Tamra Kritsana*, *lé lai theng*, *lé len ré pré t'hat*—he described such treasure as of three kinds. First, that concealed in the areas of temples [to dig for which is death by the Siamese law, at least where such temples have not been deserted]. The second kind is that which has been buried by charitable persons for the use of those who can find it. The third is that derived from the transmutation of the baser into the precious metals, earths and other substances. This last study, or search for the Philosopher's stone, is in great vogue in Siam.

The simple and innocent owl has not here escaped anathematizing, as being of fearful omen to those over whose house it hoots.

May *Patt'ha Muttaró* [another title of Buddha] approaching the East or *Barap'ha*, render efficacious this spell.

"*Patt'hamang b'hint'hukang chatang t'hetiyang t'hant'ha méwa chettayang p'hetcha kánchéwa chattut'hang ángkhosá b'hawang pancha sirisang chatang nataró hoti sambhawo.*" [Sakra guards the East, *As. Res.* vol. vi.] Brahmani protect me on the east riding on a swan, [*As. Res.* vol. viii. p. 83.]

May Buddha or *Rewatto* propitiously occupying the *Akhane* or south-east, also assist me with this spell.

[*Narayani* protects on the S. E.—*Ibid.*]

"*Samp'hutdd'hó att'ha wisanchá t'hewat'ha sancha sahatsaké panchá sata sahassaní namá mi sirisá ahang tesang dhammanchá sanghanchá*

at'hadaré ninamá mi sri sangháng namá mára nub'háwe mahantawá, sapp'hé uppat'hawé aneká antará yaní piwinat santé asesato."

May Kassiyapa [Buddha] entering the portal of the south, prove propitious with this spell. [Maheswari riding on a bull protects on the south, *Ibid.*]

Trini singhé—the three lions. Sattha nakhé—the seven elephants. Pancha Phichanu name wacha—the five ministers of Indra. Chatu thewá—four Devatas. Cha watsa (wassa) Raja—the six kings. Pancha Indra—the five Indras. Mahit t'hika Eka Yaksha—the Rakhsha. Nawa thewa—the nine Devos. Pancha Brahma or (Phrahma of Siam)—the five Brahmas. Sahabadi T'hawé Raja—the two princes. Attha Arahanta—the eight Arahans. Pansha P'hutt'ho—the five Buddhas.

May Sumangkhaló [another title of Buddha] in the portal of the south-west, assist me with this spell. Chamunda protects in the S. W. [*Ibid.*]

Siromé Buddhá t'hewanchá lalaté Brahmá t'hewda hant'hayé t'hannarai nayakan t'hewá hatt'hat'hepéparang surapat'hó powissonu kanchewá sapp'há kamá pasitt'hémi.

May Buddha Sikkhi, another title of Buddha, seated in the west, aid me in this spell. [Caumari riding on a peacock protect me on the west. *Ibid.*].

Faber considers the eight gods of Egypt to be the Octoad, as representing the poetic family, or Archites\* spell.

Chatturó.

Nauwá mó.

Thamé chó.

Tri nik'ha.

Pancha.

Sattha.

Attha.

Eka.

Cho.

Sapp'hachai winasanti Buddhā.

Buddha received the Buddhist creed from the following deified mortals :—Satakhiriyakk'ho, Asurinthó [or Rahú, I think], Maha Raja of the heaven, Maha Rajika, Sakkotatha or Indra. Maha Brahma, he with four faces.

\* Faber's Cabiri.

The creed runs thus—Buddhang pachhakhami, D'hammag pachhakhami, Sanghang pachhakhami. Buddha—the Word—the Hierarchy.

The Vedas were venerated in human shapes because *orally* delivered [A. R.] The brahmins who have in later times gone to Siam continued to instil into many there the belief that [their, the brahmin] Trivikrama, and Buddha are the same, alleging that the latter, in guise of an ascetic obtained a boon from a king of Jumbo Dwipa, as much ground as he could compass in three strides, so he compassed the world and thus got the sovereignty, but refused to retain it.

A prominent feature of Buddhism is the veneration of relics.

Some years ago a Siamese priest who had gone to Ceylon to procure relics, arrived at Penang from Siam, bearing the Emperor's order to the priests to erect a relic temple, or Chaitya, there, and deposit part of the relics in it. There are now two principal ones and one inferior Chaitya on the Island.

The inquirer into the origin of Buddhism is in a great measure relieved from the necessity of classifying gods and goddesses, ad infinitum almost. There is only one real type which he has to trace out, through its corruptions.

Buddha it is said, declared that the relics or S'arira were for the vulgar only (meaning the relics of former Buddhas).<sup>\*</sup> But although he certainly did not manifest any particular anxiety as some western heroes did regarding the disposal of his body after his death, the omission must have been owing also in some degree to his being aware that his relics would be worshipped, since the enshrining of those of his predecessors was a rule or dogma of the religion he preached.

The following is from a Siamese version of a Páli work, entitled "An account of the death of Buddha and the distribution of the relics."

"Let all praise and glory be ascribed to the mighty and holy Buddhó, who when he was on the eve of entering the divine state of Nivan was reclining upon a stone couch shaded by the meeting branches of two sacred (Bo) trees near to the country of Kosinaraké, the abode of peace and delight.

"In the year of the little snake Maseng [sappo sang wachcharo] in the sixth month, on Tuesday, at the golden dawn of day, did Phra *Chinnasi* [a title of Buddha] disappear from the earth and rest in Nirvana.

\* T. R. A. S. Vol. XII.

“The relics which this divine personage left behind him out of compassion for mankind were in number and quantity as follows:—

First. Seven large bones, namely, two collar bones, the lower jaw-bone, and four canine teeth. The right collar bone was taken to Ceylon in B. C. 307, and the right canine tooth was preserved for a long time in the capital of the Devos (Mahawanso).

Secondly. Of smaller bones there were sixteen thanan or dona measures.\*

All of these remained after the body of Buddha had been consumed by the fire which proceeded from it.

They were afterwards separated into portions. The first portion of the small bones, about the size of split peas, comprised five thanan of the Siamese [dona of the Pali] or measures, and resembled gold of the ninth touch.

The second, about the size of rice grains bruised, and vying in lustre with the adamant, amounted to six measures. The third portion, of the size of mustard seed, amounted to five measures.

These relics were all conveyed away by Garuda, by mankind, and by the Devattas residing in the heavenly mansions.

The first mentioned relics [in whole or in part] were thus disposed of:

First. The *right* bone was secured in a holy Phra Chedi (or Dagoba) in the country Khant'haratt'ha wisái, or in Páli, as the Siamese priest gave it to me, Khantará wisayé (Candahar I suppose).

Secondly. The left *collar* bone was conveyed to Sawanna, and there enshrined. This appears to be the Sawanna pabbato or golden mountain.†

Thirdly. One of the upper canine teeth on the right side was taken to Dáuwadungsa Sawan, or in Páli, Tawatinsa se patit-thi-tang, one of the heavens of the Buddhists, the capital of the Devos by the Mahawanso and enshrined in a *T' hupani* (or *Sthoupa*).

Fourthly. The lower canine tooth of the right side was carried to Sihala t'hipaké, or Ceylon.

\* The limbs of Osiris were burned and parted into fourteen pieces, and were then dispersed all over the world (Wilford and other writers). I am not perfectly certain that this osteology is correctly given.

† Not being quite sure to what part of the body these two bones belonged, and having no clue to their proper names, I have left them unnamed, the rest are named as given to me by my Siamese assistant.

Fifthly. A canine tooth of the left side, was enshrined at *Gand'hara wisayé*.

In the Mahawanso of Ceylon this country is thus noticed, "Gand'hára and Kasmira" near the "Naga King."\*

Sixthly. One of the left lower teeth was deposited in a Fane at *Nag'hapuri*.

The sixteen measures of bones before described were divided into three sorts, and distributed throughout eight different regions of Jambu Dwip, in the proportions of two measures to each. These were probably the pre-eminently Buddhist countries at the period. In B. C. 157, according to the Ceylonese Mahawanso,† there were priests from 14 places in India, who attended the building of the Maha Thupo, namely, *Rajagaha*, *Isipattana*, a temple near *Báránesi*, Jelo Wiharo (near *Sawathipura*) Mahawanno Wiharo of *Wesali*. The Ghosita temple of *Kosambia*, *Ujeni* temple, *Asóko* temple of *Pupphapura*, *Kasmira*, *Pallawabhago*, *Allassada*, the capital of the Yona country (q. Bactria). The *Uttania* temple in *Winjha*, *Bodhimando*, Wannawaso, and lastly from the *Kelaso Wiharo*. But are we sure that the whole of these fourteen countries were Buddhized during Gotama's life?—In the list of countries visited by Buddha given by me [T. R. A. S. 1831, Vol. III.] the following, which are here named, do not appear, unless names be confounded.

Anlakapaké, Ramakhamo (or gamo), Wet'hatípaké, Weya Képale, Panchala [q. Punjab], Kosali, Mithila, Wideha, Indraprestha, Bráhma's Town [q. trans-Himalayan], Kúru Khandahara Wisayé, Naghapuri, Pátaliputra. It is true that in the list alluded to Buddha, like Hercules, is said to have visited the four quarters of the world. It should seem that Buddha did not visit Kandahar. This if proved might show that Buddhism had not travelled east or S. E. by that route. But we must I fancy deem it as more probable from its distance from Buddha's birth-place, and from having thus so early after his death obtained relics, that it had been essentially a Buddhist country, in the days of Kassapho Buddha. Indeed it seems to me that all which we possess regarding the Buddhism of India points towards the N. E. from Sakya's birth-place as the quarter whence it emanated.

\* Turnour's Translation of the Mahawanso, 171.

† Turnour's Mahawanso, 15, 16, et seq.

1st. To Rajak'hahá (or Rajagriha in Behar) ; (𑀕𑀸𑀢𑀺𑀓𑀢𑀺𑀓 Páli) also Rajagaha.

The Páli or Bali from the Milint'ha, }  
 𑀓𑀺𑀢𑀺𑀓𑀺𑀓𑀺𑀓 } 2nd. Wesali, [Yampuré.]

This might be Visala or Oujein, but more probably it was Wisali, the capital of the Wajji, the country of the Lichchawi Rajas, mentioned in the Mahawanso.\*

3rd. 𑀕𑀺𑀢𑀺𑀓𑀺𑀓 Kabiulaphat or Kapilla Watthú (Saming). This appears to have been the birth-place of Buddha, where his father Sudhodano reigned. Supposed, observes Turnour, to be in the neighbourhood of Hurdwar in India, and to have derived its name from Kapillo, the name of Gótama in a former existence. It is elsewhere noticed as a place called Kapilavastu, N. of Gurruckpore, near upon the Rapti river, where it issues from the hills.† The Siamese say it lies close to the Chinese frontier. In the Mahawanso this country is named Kapilawatthapura.

This is the Burmese Kapila pyé over which reigned Ichada and his line.

4th. 𑀕𑀺𑀢𑀺𑀓𑀺𑀓 Anlakapaké may be the Aláwipura of the Mahawanso, (p. 181).

5th. 𑀕𑀺𑀢𑀺𑀓 Ramak'ham.

This would seem to be Rámágamó of the Mahawanso‡ a town on the Ganges, for in this work, I find it thus noticed :—

“The pre-eminent priest the Thero Mahá Kássapo, being endowed with the foresight of divination in order that he might be prepared for the extensive requisition which would be made (at a future period) by the monarch Dhammasoko for relics (by application) to king Ajatasattú, caused a great enshrinement of relics to be celebrated with every sacred solemnity in the neighbourhood of Rajagaha ; and he transferred the other seven donas of relics (thither), but being cognizant of the wish of the divine teacher (Buddha) *he did not remove the ‘dona’ deposited at Rájagámo.*” This temple was afterwards destroyed by the inroad of the Ganges, (Mahawanso.)

\* Turnour's Mahawanso, p. 73.

† Turnour's Mahawanso, (Index,) p. 11.

‡ *Ibid.* p. 184-5.



6th. <sup>+</sup>ဝေတံဗုဒ္ဓါနေ Wet'hat'hipaké.

7th. ပာဝေဗျာဏ်ဗလေ Pawaiyaka or Wéyaképalé.

This appears to be the Pawananagara of the Mahawanso, (p. 181.)

8th. <sup>၇</sup>ကုသိလ္လိကနေ Kosimmarai, Kúsinaraké. The Burmese Kusawady in my list of Burman kings, may have been Kusinagara, or rather the city of Hurdwar, which Mr. Turnour observes is supposed to have been the place where Goutama Buddha died. Buddha however died at Kúsinará, wherever that city lay. In the [Mahawanso this country is written Kúsinanagará,\* (p. 181.)

In the Siamese Milin just alluded to, and having several of the features of a Paurana, are some accounts of the relics, which I shall extract.

*From the Milin Relics.*

ဗုဒ္ဓဗျာဏ်, Relics of Buddha and their size.

မဟာဗျာဏ်ပဏ္ဍိတိန္ဒြိယာဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

Mahahanta pancha nali b'hinna mutta suwanna wanna.

မတ္တိမာဏိယာဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

matjima chanali b'hinna khantala p'halika wanna pab'ha.

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

uthaka pansha nali chasapha matta phikula wanna.

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

Chaturo d'hat'ha

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်ဗုဒ္ဓဗျာဏ်

Then follow the eight countries into which the relics were distributed, as already described, the names agreeing.

Next we have a list of durations and whence derived.

|                         |                     |
|-------------------------|---------------------|
| ຈາກ, or 18 D'hato.<br>ັ |                     |
| ຈາກຈາກ.....             | Chako d'hato.       |
| ສວາຈາກ.....             | Sota ditto.         |
| ງາຊາ.....               | Ghana ditto.        |
| ຈີວາ.....               | Chiwa ditto.        |
| ທາຍາ.....               | Thaya ditto.        |
| ງຸປາ.....               | Rupa or roop ditto. |
| ສາທາ.....               | Sat'ha ditto.       |
| ກໍ່ຫາທາ.....            | K'hant'ha ditto.    |
| ງາຊາ.....               | Rasa ditto.         |
| ດູ່ຫາຟາ.....            | Dho tha-pha ditto.  |
| ຈາກວິສາກາ.....          | Cha ko wi.          |
| ສວາວິສາກາ.....          | Sota wi.            |
| ງາຊາວິສາກາ.....         | Ghana wi.           |
| ຈີວາວິສາກາ.....         | Chiwa-ha.           |
| ທາຍາວິສາກາ.....         | Kaya wi.            |
| ງາຊາວິສາກາ.....         | Yana wi.            |

The dress and effects of Buddha were thus distributed within Jumbo Dwip.

1. His sash or vest to *Pataliputra*.
2. His bathing dress to *Panchala* (Panchal Desa).
3. His drinking cup to *Kosali*.
4. Aranicha or flint and steel, to *Mithila*.
5. Wéthéhé parisawanang widéhá. His cloth strainer to *Wideha*.
6. Wasi suchi gharanchapi Int'hapat'hé patitt'hita. His sewing apparatus to *Indraprestha*.
7. Upahanang kunchi kanchá t'hawiká yancha sapp'haso usira Brahmana khamé. His slippers and his key (to the temple of Cloacina) to a *brahman's town* (trans-Himalayan?).

8. Pachatharana mang kuté. Lanka Thípe (Dwípe), pattanchapi. His cloth or mat for sitting on, to *Magadha*, and his begging pot to *Lanka*.

9. B'hatd'ha nakarécha chiwarang, Kurunak'haré ni sit 'hanang. His upper dress, or chewon, to the *Kuru* country.

In the 'Ratana Kalapa' are the following notices :—The body of Buddha was burned on Monday and Tuesday, or the 6th and 7th days of the 6th month, year of the *little snake*. The relics were divided on Thursday on the 8th of the moon's increase, in the 7th month of the year *little snake*. The relics will be all collected again upon *Wednesday to Friday* on the 15th of the increase, to 1st and 2d of the decrease in the 6th month in the *rat* year, and they will be finally collected in Nivana (D'hatu Nivana) from Tuesday to Wednesday, the 6th to the 7th of the increase, in the 6th month in the year *rat*. The relics will be first collected and enshrined in a Cheti in Lanká, when all the Devos and Nagas and *Brahmans* will be present, and they will return to Mahá Bodi Mandapa, where Buddha first became a Buddha. Here this holy one will again appear refulgent, and the whole universe will be illumed by his splendour. The deities of the heavens will assemble and utter praises, exclaiming now the time of Buddha has expired, now we shall no longer see him, now has his religion ceased. A fire will then burst forth from Buddha's body and the flames will ascend to the Brahmé lóké. But there will be no more relics.

Ajatasattu Raja protected the faith four months after Buddha entered Nivana, one hundred years after Buddha (B. C. 443) Kalasóka Raja, son of Súsúnaga, became the protector of the faith.

In the year of Buddha 437 (B. C. 106) Wajjagamini (I suppose he may be the Wattagamini of the Mahawanso) appointed Buddhadatta to be chief of the sacerdotal order, at a place called Tissa Maha Wihar, where he had collected 1000 priests.

“It was at this period that they first began to *write* the history and dogmas of Buddha, a labour which occupied (these priests) one year.


A. B. 953. (A. D. 410.)—Mahanamo directed Buddha G'hósá to put the Páli Sihala Att'hakatha and Tika into the *Magadha* language in order to preserve the same in Jumbo Dwip. (This date and the circumstances closely accord with the account of Buddha Ghósá in the Mahawanso).

A. B. 1587. (A. D. 1044.)—Parrakoum Bahú Raja and the Theró Kassapa convocated 1000 priests and got them to translate into the Magadha language the *Trai Pikok*.

A. B. 855 (A. D. 312) Buddha's tooth was conveyed to Lanká. In the Mahawanso this is reported to have happened in the 9th year of the reign of the Ceylonese sovereign Tirimeghawanno, who ascended the throne in 845, A. B., so that the difference is only ten years betwixt the two accounts.

A. B. 433. (B. C. 110).—The Panchama Sangayanai was compiled or written by order of Wajjagami or Wattagami. I do not find this mentioned in the Mahawanso.

A. B. 1000, (A. D. 457.)—In this year Anurudha arrived at Lanká [q. from the Indian continent] and having had all the sacred books copied he shipped them on board of two vessels and returned.

This *Milin* is, I think, the same as an Indian work which I have seen quoted as the *Milinda Raja*. This one in my possession is headed  Milithara, and Milintha Raja, is stated to have been the grandson of Punarathéwa (Deva), who was (king) of Sagala nagara. He built a Degoba on the banks of the Ganges. I believe that it contains chapters on subjects not usually found in Pauranas. But its general purport appears to me to support the statement given in the Asiatic Researches\* that the writings of the heretical sects of Hindus [meaning I suppose Buddhists] exhibit quotations from the Vedas, or they might have been quotations from books directly received or brought from Persia. However, as the book is chiefly in the form of dialogues betwixt a king, Milintha Raja, and a priest (of Buddha), it is most likely that they are the same as the *Milinda Raja* describes. If I can meet with a Siamese priest sufficiently learned in the Palí to be a scholastic guide, I may perhaps be able hereafter to include this in an abstract or catalogue of the Palí works in my possession, and those which I may yet procure, for at present I have neither a grammar (excepting portions of a Palí one untranslated) nor a dictionary to assist me. But the Veda called Caushitaci† contains two dialogues betwixt Indra and Ratardama, and another in which Ajatasattu, king of Kasi (and a Buddhist) communicates divine knowledge to a priest named Balasi.

\* A. R. vol. viii. p—.

† *Ibid.* vol—, p—.

My copy is evidently an abridged one, for in many places the titles and heads of chapters, and their sub-divisions, only, are given, yet it contains 150 folio pages. The introduction to it informs us that "the Mili (n) thara contains one thousand and one K'hat'ha or chapters."

Raja Milin is further therein stated to have flourished in the period of Kassypó Buddhó, or the third Buddha, Sakya's immediate predecessor. His preceptor was Nágáséna a [Buddhist] priest. At this time he was son of Athitcha Wangsa, king of Sakhalá or Sagala Nagara. The youth had many angry discussions with his tutor, who was over-zealous in his discipline. Both died in the usual course of nature, and were born again.

In the year 500 of the Era of Buddhó (B. C. 43) Milin was born again, as king of Sak'hálá. Nágaséna was likewise born again, but many years later than Milin, and in time became an officiating priest (of Buddha) and at this latter period Milin had reached a rather advanced stage of life.

This priest is further known under the titles

|           |   |                                                     |
|-----------|---|-----------------------------------------------------|
| Wirásená, | { | Ationg papang nakarotiti nak'ho.                    |
| Surásená, |   | Senti sayanti été nawat'ha pachat'hikachanati seno. |
| and       |   | Nak'ho chaso senochati nakhaseno.                   |
| Sihásená, |   | Sila khand'ha t'hihi t'hara titi t'hero.            |

Milin and Nákhasená had a second time left the earth, when a learned priest named Maha Pitaka Chula bháya thera composed this Book, (Milinthara,) purporting to be dialogues betwixt Milin and his said preceptor.

The priest it is added, was considered to have had the best of the argument owing to his former metempsychological abode having been in one of the heavens.

When king Milinthara (last) appeared, the fame of his learning alarmed the priesthood [Buddhist] who could not brook a rival. From this we might infer that Milintha was not a Buddhist. With this feeling one of the Arahanta who resided on the hill Yok'húntara, one of the seven hills of Meru, hurried off to the heaven of Indra, or Tavatinsa, and besought Nakhasená, who was then a Devata, to visit (or revisit) the earth in order to dash the spiritual arrogance of Raja Milintha. These Arahanta were 80,000 in number, and their chief was named Assak'hutta Thero (before alluded to).

Nakhasena, who was residing then in the resplendent palace Ketumf Wechayantapasat, in the western quarter (of the heaven), condescended to veil himself in a human shape to save the priesthood from the disgrace of being worsted in argument by a person not of their own *order* (the priesthood). Nakhasena's lineage was as follows:—

1. His paternal grandfather Sóna Brahmaná.
2. Ditto ditto mother Sóni Brahmaní.
3. His maternal grandfather T'hóna Brahmaná.
4. Ditto grandmother Sónant'ha Brahmaní.
5. His father was Sonúttá Brahmaná.
6. His mother Sónúttari Brahmaní.

His first residence was called Konlak'hamma, or Donagama, and when he became a priest he resided at the temples and monastery of Esasokarama, in the country of Patalibutta (Pataliputra). His spiritual guide was the learned Rohana Theró, with whom he remained for seven years and ten months; after he had attained to the rank of an officiating B'hikkhú or priest. His piety and knowledge of sacred things then entitled him to be Soda, or one who lives in the world unattracted or corrupted by its frivolous enjoyments or pursuits, and unaffected by its moral vicissitudes. He met Raja Milintha at the abode of the priest Ayuban, who had an immense number of followers of his religion.

Raja Milintha's geneology is thus detailed:—

His paternal grandfather, Punara-t'hewa.

His maternal ditto, Narab'ho K'hawana.

His paternal grandmother, Wichitawi.

His maternal ditto, Sunant'ha.

His father At'hichcha Wangsa (of the race of the sun).

His mother Chant'ha T'hewi (of the divine Lunar race).

His consort was Akk'na Mahesi Int'ha T'hewi.

King Milintha derived much of his knowledge from the sacred books called 1st, Buddha Wuchana, regarding the great saviour, and containing 404 sections or volumes, and from 2d the Winaya pancha chatthicha sattati thawi, satta sutté, abhi dhámmé nawa sathi chattari chattu sattayo (q. the Vinac.)

*The abbreviated names of the 28 Buddhas who were anterior to the five Buddhas (including Mettiya who is yet to come) :—*

|      |    |     |      |    |      |    |      |    |    |
|------|----|-----|------|----|------|----|------|----|----|
| ඌ    | ඡ  | ඪ   | ඨ    | ඬ  | ඡ    | ඪ  | ඨ    | ඬ  | ඡ  |
| Tang | Me | Sa  | Thi  | Ko | Sa   | So | Re   | So | A  |
| ඡ    | ඬ  | ඡ   | ඪ    | ඨ  | ඡ    | ඬ  | ඡ    | ඪ  | ඨ  |
| Pa   | Na | Pa  | So   | So | Pi   | A  | T'ha | Si | Ti |
| ඪ    | ඨ  | ඬ   | ඡ    | ඬ  | ඡ    | ඬ  | ඡ    | ඬ  | ඡ  |
| Si   | We | Thu | P'ho | Ka | P'ho |    |      |    |    |

*Buddhas.*

|    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|-----|
| ඬ  | ඡ  | ඬ  | ඡ  | ඬ  | ඡ  | ඬ  | ඡ   |
| Na | Ma | Na | A  | Na | Ka | Na |     |
| ඬ  | ඡ  | ඬ  | ඡ  | ඬ  | ඡ  | ඬ  | ඡ   |
| Ka | Ká | A  | Ná | A  | Ná | A  | Áng |

*Females or the Wives of Buddhas.*

|   |    |    |      |        |      |    |      |
|---|----|----|------|--------|------|----|------|
| ඬ | ඡ  | ඬ  | ඡ    | ඬ      | ඡ    | ඬ  | ඡ    |
| U | Mi | A  | Mi   | Má     | P'hi | Su | Tang |
| ඬ | ඡ  | ඬ  | ඡ    | ඬ      | ඡ    | ඬ  | ඡ    |
| A | So | Ná | P'ho | T'hang | So   | Ná | A    |

*Some Account of the Battle Field of Alexander and Porus, by Capt.*

JAMES ABBOTT, *Bengal Artillery—Assistant to the President at Lahore, and Boundary Commissioner, Hazara District.*

WHEN Alexander, encamped upon the western bank of the Hydaspes, justly dreading to land his cavalry in face of a long line of elephants, decided upon crossing at a point higher up the stream, he discovered a suitable spot in a woody promontory of the western bank, opposite to a small woody island in the river. Leaving therefore Craterus with a small column in his standing camp at Jelum to mask the movement, he, in the darkness of a night-storm, aided by the uproar of the elephants, conveyed to the promontory the flower of his army; and

reaching with them the Island (probably by boat, for it was the season of the monsoon) speedily wafted them across the second channel, and supposed the Hydaspes to be passed. But what was his mortification on discovering that they had but gained a second and larger island, around which, considering the force of the swollen torrent, there could be little hope of timely towing the boats.

At length, however, out of hope, (for such good fortune in such a river, at such a season and after such a storm, was marvellous) they discovered a ford, through which the Phalanx waded breast-deep and gained the eastern bank. It is probable that the dawn broke as they reached the larger island, for the alarm was then given, and Porus hastened from his camp opposite the present Jelum to give him battle. They met upon a level plain of firm sand; the chariots, elephants and infantry of Porus, opposed to the Companion cavalry and to the Macedonian Phalanx. The result was the signal triumph of Alexander and the surrender of his gallant foe.

Now, in glancing the eye over the accompanying chart of the river, we perceive one singular advantage in Alexander's position, viz. that he commanded the chord of an arc in his flank movement; whilst his adversary had to follow the curve. Accordingly, the spot selected by Alexander is about 10 miles from his camp by a level road; whereas it is about 19 miles from the camp of Porus. The river is at this moment so exactly as described by Alexander's historian, that the map might seem rather an ancient than a modern production. The only channel which can be forded during the monsoon is that which I have designated Alexander's channel. The bottom is of massive boulders of quartz firmly imbedded. The soil around is a very firm stratum of mingled sand and clay. In fact, the river Jelum, bursting here from its prison of rock upon the open valley, has inevitably diffused its waters by numerous channels, none of which, owing to the solid substratum of boulders can be deepened beyond a certain level, and whatsoever alterations have occurred in the course of the river since first projected upon the valley, arise from the efforts of the water to find the lowest level of this pavement, from which they were originally deflected by the solid cliff on the western bank opposite the fort of Mungla. The firmness of the soil and the shelter from wind afforded by the height on either side prevent any considerable deposit of sand in the older channels,



which remain naked and sharply defined as when first grooved in the soil, and never entirely lose their office of conduits to the waters.

Nearly all the fifty\* islands of the Hydaspes are cultivated. Several are thickly inhabited. But the Tamarisk springs rapidly upon the fallow, forming in three or four years cover sufficient to screen at night the passage of a hostile armament. The length of several of the islands is very considerable. That which I suppose to be the larger island of Alexander† is about 6 miles in length by an average breadth of half a mile. It is cultivated like the mainland: and no one from the level plain of the western side could conjecture it to be an island.

A glance at the map will assure us that from time immemorial there has been but one ferry to the Hydaspes between Mungla and Jelum, and that this ferry must ever have been near its present site at Pindi. Alexander could not have been two days at Jelum without discovering that the river above that point was full of islands,‡ and he would naturally have sought a passage near the ferry, because, at that season none of the numerous channels could be supposed fordable. But as the ferry itself would certainly be (as indeed he found it) watched by a hostile force, he would have made the crossing at sufficient distance to escape their opposition.

Now if we suppose both the old and the new channels to be occupied during the monsoon, as at this day, we shall have opposite the promontory at Bhoonna, a cluster of four small islands,—or if we suppose the minuter channels to be recent, we shall have a single island in their stead. The island immediately abreast could not be reached owing to the power of the current; the boats would therefore thread the small channel (a) and come to at the easternmost island of the group; which if covered, as at this day with Tamarisk, would effectually cover the passage. From thence, on the arrival of the rear-guard, they would put off for what they would naturally suppose to be the mainland, being the land of the established ferry. They would land in the parallel of the village Seem, and would quickly discover that they had reached only a

\* Between Mungla and Jelum the number of islands is fifty. Below Jelum there are many more.

† Marked in the map (b).

‡ In one of those islands a contest was maintained between the adventurous spirits of Alexander's and Porus' camps, (see Quintus Curtius.)

very large island. Around this, they could not have towed the boats in time to escape opposition.

The channel intervening between them and the shore is that marked Alexander's channel. It is the only channel of the Jelum fordable during the rains. The map will assure any one familiar with the phenomena of rivers that its depth is lessening every year. And accordingly, it is now only knee-deep during the monsoon. But as the Jelum is more effected by the melted snow of the mountains than by the rain, it is at the moment of writing this\* about a foot deeper than during the monsoon.

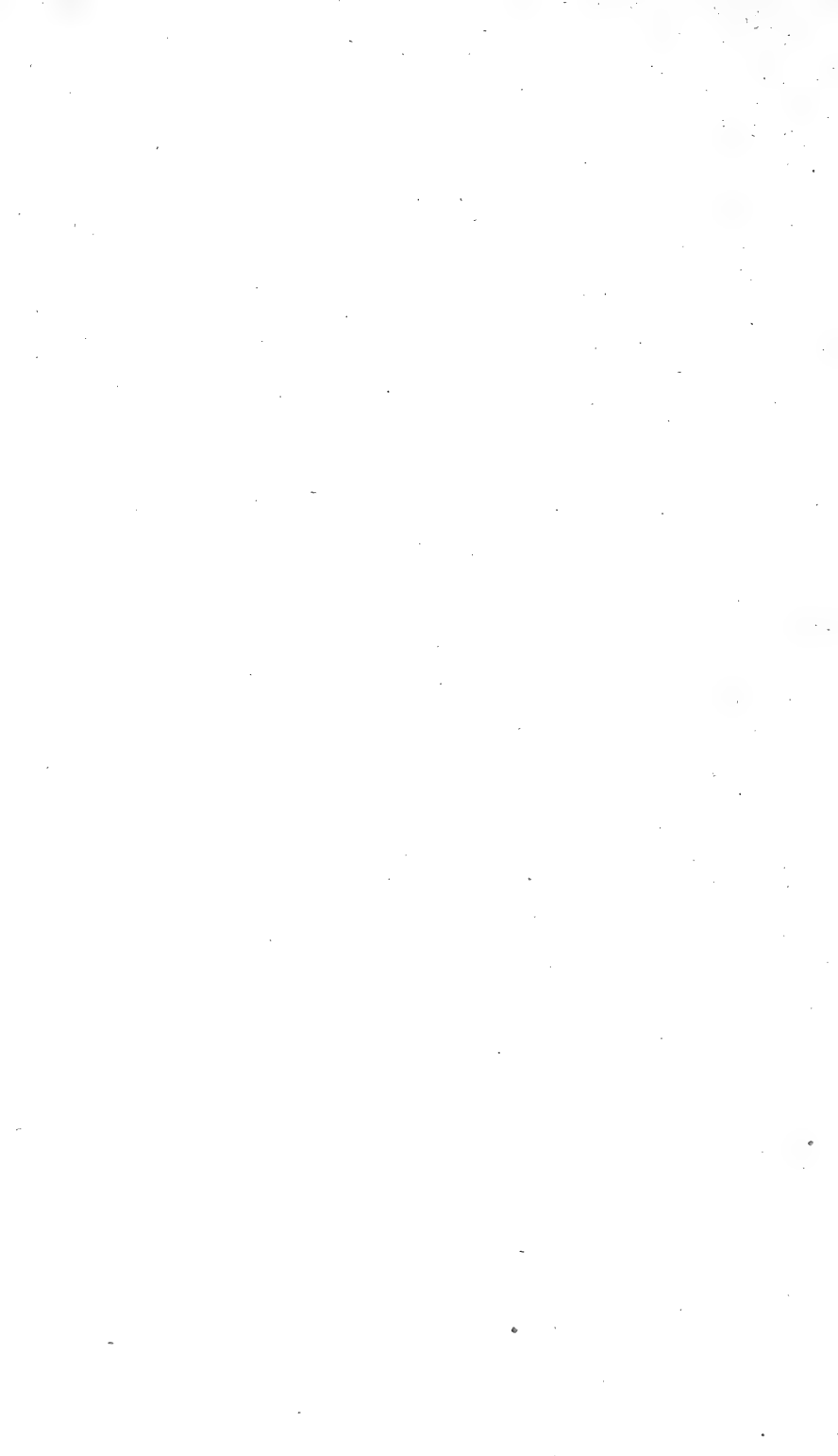
Now it is a fact with which every military man should acquaint himself, that barring accidental holes, the outermost curvatures in the sinuosities of a river are deepest, the innermost, the point of least depth. And it follows, that between any two windings there exists a ridge or shallow, diagonally connecting the two inner curves. It is therefore probable that the ford was opposite Sirwali.

But be this as it may, there can be no question, that this is the channel across which the Macedonian army waded, breast-deep, on that eventful morning. In the course then of 2175 years, the western channels of the Hydaspes have been enlarged just sufficiently to drain off one half of the water flowing by the easternmost channel. This appears to me an important fact, as offering a standard so much needed by the Antiquary and Geologist for decyphering the handwriting of time.

Allowing, then, that Alexander effected his landing somewhere near Sirwali, the camp of Porus, which must have been opposite Jelum, was distant from the landing-place about 19 miles; a considerable detour being necessary to avoid the quicksands of the Sookaytur. The bed of the Sookaytur, a level plain of sand a mile in width, and dry excepting during the monsoon, interposed at the distance of 9 miles from the camp of Porus, and at the same distance from the landing-place. But this level plain, which might otherwise answer the description of the battle-field, is a torrent after heavy rain, and is so full of quicksands as to be unsuited to military operations. As therefore, Alexander could scarcely have completed his landing before noon, and, as by that time Porus must have been six hours advertized of the movement; allowing for the unreadiness to stir of an Indian army, it is probable that they met in the latitude of the village Pubrál; a plain of firm sand stiffened

\* April 1848.





with clay, bounded on the S. west by the Hydaspes, and by a range of low hills and ravines on the N. east, the interval being about 5 miles.

Had Porus but been aware, wherein consisted the peculiar strength of his adversary, wherein the peculiar feebleness of his own array, the narrowness of this battle field might have been turned by him to good account; his right resting upon the quicksands of the Sookaytur opposite Alibeg, and his left upon the Jelum. But it was the encounter of military genius practised in the tactics of eastern foes, with the valor which knew but of one mode of combat.

As I rode upon an elephant over the whole of this haunted ground, splashing across the numberless channels of the crystal Hydaspes, the whole tragedy seemed once more to be enacting around me. The perilous transit of the cavalry, across the swollen and turbid gulf, in the ponderous boats of the country amid the darkness and the thunders of an equinoctial storm. Their formation in the stern silence of perfect discipline. Their sudden mortifying check, as they found a wide, deep and tumultuous current still separating them from the eastern bank; the galloping of horsemen hither and thither to ascertain at once the length of the island and the practicability of fording; their dismay when they found the island almost interminable; their sudden discovery of a ford breast-deep through a current of portentous power, the plunge of the iron clad Companion cavalry and steady stride of the Macedonian Phalanx, hand linked in hand, through the foaming torrent; the splash, the scramble up the farther bank and instant reconstruction of their veteran Battalia; the stern joy of the young conqueror, as he finds that nature ceases to oppose him, and that there remains but the encounter with fellow-men.

Meanwhile, fiery with haste the horsemen of the Powarr are dashing toward the camp of their Raja, and suddenly drawing rein before the guarded enclosure, exclaim breathless, "The men,—the iron-men have crost."

Then the mighty camp is one scene of confusion and of life: warriors snatching up their arms; horsemen saddling their war-steeds or yoking the courser to the chariot of battle; the elephant caparisoned in his iron panoply, surmounted by the castle, filled with bowmen or hurlers of the winged dart; the half drest food relinquished, the half formed lustration abandoned, the half-breathed prayer cut short; whilst

to the sound of the shrilly conch the ranks are rapidly arrayed. And now in one dense, deep mass, the host advances to battle. The cavalry leads the van, throwing out videttes on either hand. The war chariots follow and then the infantry: and lastly, the ponderous elephant, with long, but slow and cautious strides heaves onward his portentous, battle-mented bulk; as if the very towers and castles of the sultry east had mustered in life to arrest the invader. Onward rolls the vast tide, heavy with destruction, carefully and warily they cross the treacherous sands of the Sookaytur. The elephant sounds the footing with his trunk and judges of the ground by the echo of that hollow organ. They have past the sands, they are nearing the Hydaspes. Their van is halted. Doubtless the enemy is in sight. No! it is only their corps of observation flying in disorder and dismay: and he who led them shall return no more. The sight inspires the needful caution. The host proceeds more slowly and in better array. The cavalry falls back upon the flanks. The elephants are advanced beyond the infantry, which leaves intervals for their retreat. And now a distant gleam of steel betrays the presence of the invaders, and the Indian host is halted in the plain, the left resting almost on the Hydaspes, the right some furlongs from the hills. Why does not the noble Powarr diminish the intervals to a span. He counts upon them in either case for the manœuvres of his cavalry. He little knows how terrible a cavalry is opposed to his own light horse. Could he but connect with his Phalanx of elephants the hills and the river's brink he might yet be winner of the fight: for the terror of the invader is the companion horse, and they could never face the array of elephants.

Scarcely is the Indian army in position, when the few, but iron squadrons of the invader are at hand. They form, they pause. Their young leader, conspicuous for his lofty crest and costly arms, and the coal black charger which bounds beneath him, reconnoitres the position from flank to flank. Then, like a whirlwind burst upon the devoted wings of the Indian the iron clad Macedonian chivalry: horse and man inspired with the same uncontrollable ardor and with an energy impossible to the exhausted children of the sun. Like the sound of fire amid the forest is the crash, the burst, the turmoil of those strong sons of battle as the ranks go down before them, as the helmet is cleft and the mail is riven and the spear is shivered upon their iron flanks. In

vain does the gallant Raja bear down with all his force to crush or to sweep into the river by the weight and terror of his elephants and the shock of his chariots the destroyers of his broken ranks. For now the Macedonian Phalanx advances and a storm of arrows, of stones and of winged javelins rains upon the timid elephant, or rolls his guider in the dust. Frantic with terror and with pain, the huge monsters reel round upon their master's ranks and spread confusion and dismay. Then rages the tumult of the battle. The light reed arrows of the Indian archer rebound shattered from the plated mail of the Greek. That steady, self-possessed, never wavering mass of broad shields and brazen helmets and long protruded pikes, never hurrying ever advancing wins, step by step, its gory way. Death is busy in their ranks but makes no chasm there, for the ready files still close together, self-supported and supporting, whilst over their heads and from either flank the archers and slingers pour their murderous hail.

Meanwhile the battle rages upon the Indian left. Cænus with his cavalry has past round the right flank of the Indians and driven before him in confusion the succour sent to the other wing. The cavalry that waits to be attacked is lost, and what chance has the timid light-armed horseman of the Indian with men whose souls are fire, their swords sledge hammers, their tunics of tempered steel. The broken and disordered horse are driven pell mell upon the frantic elephants and upon the wavering foot. The chariots whose power is velocity are destroyed without a blow. The whole dense host of the Powarr abandons the field in the panic of flight.

Porus alone maintains the contest. His elephant still wades through the sea of life and death, trampling, destroying, affrighting as he moves. The Tarkhaili chief is sent to summon him. His answer is a winged shaft. Meroo\* is more successful. He represents the hopelessness of prolonged resistance, he points to his scattered army, he assures the Raja of honourable terms. Then, the two brave foes meet face to face: the successful robber and the patriot whose heroism is vain. And the robber, whose heart revolts from the iniquity his ambition has devised, soothes the noble spirit whom, without provocation, he has wronged.

Such were the scenes which crowded upon my mind's eye, as for

\* Meroo is still a common name in Huzara.

two successive days, from daybreak until evening, I was wading through the crystal waters of the Hydaspes and sketching the topography of the Battle Field. For it happens that the boundary of the Sikh and mountain kingdoms meet upon this most interesting line, and the inhabitants are either side have inherited all the rancour which animated the combatants here in Alexander's day: so that every island is contested, and an accurate plan was essential to enable me to adjudicate the claims.

The scene itself is quite worthy of the stirring memories with which it is associated. The Hydaspes, bursting from the mountains, sweeps around the castle-crowned cliff of Mungla: and exulting in its escape from the prison of the rock, spreads wide its waters over the fertile valley, forming some fifty smiling islands, cultivated and often inhabited. Its waters gushing over a bed of white Quartz Boulders, form by turns, rapid, pool and shallow, each of which has its own peculiar and lovely tint. The shallows ripple in the most liquid of azure, the rapids pass into a delicate crysolite, as they hurry together, entangling the eye and the heart in their ceaseless whirl: the pools engulf those glad dancing waters without addition to their stilly depths, without alleviation to their sombre blue by accession of those sparklers of the deep.

As we gaze up the glittering, living pavement of crysolite and sapphire, fringed on either hand by the lively green of the willow, other hues are brought into direct contrast with our foreground. The distant greens of the graceful Beere and Seesoo, clumped over the Field of Battle, the purple of the successive ranges of mountains of Jup-pall, and the mighty barrier snow-clad from base to summit, which walls in the loveliest and most unblest of valleys, itself relieved upon the bosom of the azure sky. To Alexander, first arrived from the wretched, ravine-worn waste of Potowar, the scene must have offered happy promise of the land he so coveted to possess. I describe it, as it appears in the winter. At other seasons, but one channel can be forded by the elephant.

To this description I may add, that the Taxiles of the Historian is without doubt the Tarkháili clan,\* still inheriting a portion of their

\* The personal name of Taxiles was Oomphis. Taxiles was the family name. Khaun i Zemaun Khaun is the present head of the house, to which I lately was permitted to restore their ancestral possessions.



old possessions, viz. the mountain ridge of Gundgurh,\* on the left bank of the Indus and about 30 miles above Atok. The Affacini have no doubt long since been identified with the Eusafzyes, who still inhabit the country they then possessed. The long sought rock Aornos towers high above all the neighbouring mountains, its foot washed by the broad flood of the Indus; the wide plains of the Affacini spread below it on the south, their inaccessible valleys on the east and west, its sides covered with dense forests of mountain pine. Its numberless and perennial fountains, the support of the tillage of the mountain skirts; its inexhaustible pastures, the sustenance of myriads of cattle of the Affacini; its forests and fastnesses, the refuge of all the outlaws for hundreds of miles around; its summit, furrowed by a hundred ploughs; its skirts by perhaps eight hundred more; a mountain almost without parallel in the world, and too faithfully described to be mistaken.

There was formerly a fort upon the crest of this mountain, but its very name is lost, although traces of the walls remain, agreeing exactly, if my informant correctly describes them, with the site of Aornos. Professor Wilson has shown that Aornos may be merely the Greek rendering of the Sanscrit word Awur, a fortification. The use of this word is retained only in ancient sites, and the greater number of these have lost it, in the neighbourhood of the Affacini; Kote being substituted, and every old castle whose name is lost being called Kawfur Kote, or the castle of the heathens. Upon the crest of Moha Bunn (a name embracing a whole district comprised by the trunk and ramifications of this mountain, and harboring some ten thousand matchlockmen) Nadir Shah, the Alexander of Persia, encamped his army, as the only means of reducing to order the lawless Affacini. The mountain is a long isolated ridge not less I think in length at summit than 5 miles. The height is upwards of 7000 feet above the sea's level, or 5000 above that of the Indus. The length at base must be upwards of 12 miles. At the very summit is a small square Tumulus apparently from 50 to 100 feet high and scarped with precipices. This may have been the site of the celebrated fortress—Bunn signifies in the language of the country both a forest and a pool, and Maha Bunn

\* This mountain, no thanks to the successor of Taxiles, has been my refuge since the mutiny of the Sikh army, and I despatch this packet therefrom. The Mushwanis of Srikote are the truest and bravest race in the Punjab.

means probably the mighty forest, a name well deserved, as standing in the naked plains of the Eusafzyes.

I would not give in to the notion that any thing is exaggerated\* by the Greek historians. Such an idea would, I think, lead us astray. Their history, like their sculpture, emanates from a mental organization most critically balanced. The same severity of taste which caused them to discard whatever was superfluous in architecture, whatever was beyond the perfect law of proportion in nature, seems to have dictated a close adherence to truth in their histories, as the secret of historical symmetry. So far as my own observation extends, (and I have wandered over a large portion of Alexander's track) the difficulties are actually underrated: the descriptions so truthful that on visiting the scene, the *dramatis personæ* seem to confront us, and that wonderful series of conquests seems but the work of yesterday.

The Maha Bunn agrees to the minutest particular with the description of Aornos, standing on the right bank of the Indus, feathered with forests, watered by perennial springs. Its summit, a plateau capable of holding the camp of a Persian army, and of employing a hundred ploughs; its pastures, the support of innumerable cattle; its forests and fastnesses the refuge of the Affacini of the plains and of fugitives from Ahisara and Taxila; its height, gigantic and pre-eminent: its position sufficiently near to annoy Alexander's columns; its inhabitants to this day unconquered, paying neither allegiance nor tribute to any man. Khubul, a large village washed by the waters of the Indus, is still a noted hotel for fugitives from Peshawur and Huzara; so that I was obliged some months ago to blockade it.

The Taxila of history is supposed by Captain Cunningham to be the present Tukht purri or Trukh purri, 6 miles westward of Manuk-yala. This old site is adjacent to Rabaht, the cemetery of the eastern or Dhangulli branch of the Gukka family, and subsequently the seat of a subdivision of that tribe. The name long ago struck me: but there are some difficulties attending the identification. Taxila was the place selected by Alexander for recruiting the strength of his army. It was also the capital of Taxiles. Now the Tarkhaili have no tradition of

\* The breadth of the Hydaspes at Bukephalia appears to me very correctly estimated by Quintus Curtius as four stadia or half a mile, he is speaking of its state during the monsoon.

ever having held lands so far eastward. Tukht purri also is in a bare uninviting country, far from the Indus, where all Alexander's preparations were progressing, viz. : the structure of boats to be carried to the Jelum. Hussun Ubdul appears to me a more probable locality. Its ancient name I have vainly endeavoured to discover. But it must have been an important place very early, on account of the abundance of its water, and of its lying upon the main road between India and Afghanistan. It is also an hereditary appanage of the Tarkhaili wrested from them by the Sikhs within a few years ; is the boast of the country for its water, its groves and its salubrious atmosphere : is close to the rich plains of Chuch and the fertile valley of Huzara, and sufficiently near the Indus for communication with the Board of works established there. Tukht or Trukh purri is said to signify the disjected rock ; a probable interpretation ; the last spine of the sandstone formation jutting up there through the plain in a remarkable manner, accompanied by several enormous disjected masses of Tufa.

On the Maha Bunn the Ivy must, I think, grow in abundance, as I have found it at much lower elevations in Huzara, and Mt. Mœrus must be looked for amongst the subordinate hills of Maha Bunn. The wild olive forms one of the principal forest trees in Khaunpoor (of Huzara). Waving over sites from which we turn up Grecian relics, it has often occurred to me that it may have been transplanted hither from Attica.

I may perhaps be accused of extravagance in fancying I can trace the course of the Macedonian conquerer in a singular custom prevalent throughout that tract. On the approach of a Chief or Governor, the women run together and sing poems in his praise. The chaunt is every where the same : but it is not often easy to catch the words. When I have succeeded, I have found them to consist in repetitions of "the conquering Raja, victorious in battle!" Grecian habits sit ill upon Hindu persons. The obligation to be bashful, imposed by eastern decorum, struggling with a determination to maintain a privilege not always agreeable to their Lords, drives the women together in clusters, with faces to the centre : whilst the display of untidy linen and the ravages of time upon such faces as are visible, are dangerous to a reader of Macbeth. Nevertheless the custom is decidedly derived from the followers of Bacchus or of Alexander. On first entering Kote, one

of the towns of Huzara, at a time when the appearance of a British Officer was a welcome sight, I observed two old crones upon a housetop, hiding their faces in one another's rags, whilst one of them beat either a tambourine or a parchment sieve and both screamed in chorus. Here, on the Hydaspes, the villages near Alexander's crossing are dangerous of approach owing to this custom, as it is made an excuse for demanding a *douceur*. In Huzara it is a spontaneous tribute of respect.

This paper, excepting a few corrections, was written in April last upon the Hydaspes, previous to the appearance of Captain A. Cunningham's interesting correspondence in the February number of the *Journal of the Asiatic Society*. It was detained owing to some errors in the measurements of my native surveyors, and subsequently by the disturbed state of the Punjab. Whenever my opinion may differ from that of so distinguished an antiquary, it is offered with hesitation. Had his leisure allowed him to visit the Maha Bunn, I think he would agree with me that it is the only mountain upon the Indus answering to Arrian's description of Aornos. And that if it be not the identical mountain, the site must be sought for upon the Loondi river. This would reconcile the difficulty arising from Quintus Curtius' statement of 16 marches from Ekbolima to Atok. From Umb, at the foot of Maha Bunn to Atok, not above 8 marches intervene. As, however, neither Arrian, nor Quintus Curtius had seen the country they describe, and as both wrote long after the events they record, their itineraries are not very certain guides, and accordingly Quintus Curtius brings Alexander to Nicæa previous to the capture of Aornos, whilst Arrian reverses the order of events. Quintus Curtius on the other hand brings Alexander to Ekbolima after the capture of Aornos, whilst Arrian states that he took part there to reduce the rock.

Aornos is always styled by Arrian *η πετρα*, the Rock, and certainly the sense of the historian would seem to apply this term to the mountain upon which the Fort was built. Such a term would scarcely have suited the Maha Bunn, which is essentially a mountain and not a rock, albeit scarped at summit with precipices. But on the other hand, it is difficult to imagine any mere rock answering to the description of the historian as abounding in fountains, springs and forests, with arable land for a thousand ploughs and pastures for the hundreds of thousands of cattle of the plains. Such are the attributes of a mountain and not of a rock. I therefore infer that Aornos is a name applicable only to the

castle itself and its basement rock. The ruined castle of the Maha Bunn appears to have been sited upon a square, rock some 50 or 60 feet high, springing from the table summit, scarpd to eastward with tremendous precipices, having a ravine to the north and an inferior mound beyond it, and being protected on the other quarters by its own precipitous sides.

Bearing in mind that the Macedonians, themselves mountaineers, were fresh from the conquest of a land abounding in the loftiest and most rugged mountains, and from the storm of several mountain strongholds, I should hesitate to allow that they could have mistaken a hill of one thousand feet, for a mountain of four thousand. The Maha Bunn, by a rude triangulation of bearings, and a ruder observation with the sextant, I made upwards of 5,000 feet higher than the river at its base. Arrian reckons the height of Aornos at 11 stadia or 4125 feet above the plain. And this altitude, if measured at all, must have been computed by means of instruments far ruder than mine. The great and pre-eminent attitude of the mountain is all we can elicit from the reading. There is no mountain comparable with the Maha Bunn upon the right bank of the Indus within twenty miles farther north, a distance too great for the circumstances narrated. Opposite Maha Bunn, and across the Indus, is a rocky curb to the valley, called Durbund, the only site in this neighbourhood to which I have ever heard the name of Alexander attached. The attack upon Aornos appears to me to have occurred in April or May; for the passage of the Hydaspes was effected in July and from Aornos to the Hydaspes, are about 20 short marches. Owing to the great heat of the plains, the Maha Bunn, retains its snow only one third of the period usual to mountains of similar altitude, distant from the plains. By the end of March or earlier the snow is melted from its summit.

Capt. Cunningham's identification of the Dumtour district with the Urasa of Indian history is the more happy, that he does not seem to have been aware, that it still retains the name Aorush. But he would probably not have supposed it the Varsa Regio of Pliny, had he been aware that the huge table mountain of sandstone upon the right bank of the Hydaspes about 35 miles above Dhangulli is to this day called Nurr Varsova, a name which at once arrests the attention by its identity with that of the Polish capital. The Sutti however of this Var-

sova bear not the slightest resemblance to the Sarmati of the Polish Varsova. Their origin is uncertain. They call themselves aborigines and are undoubtedly one of the oldest tribes hereabouts. It was from the pine forests of Varsova that Alexander must have constructed the celebrated fleet by which he wafted his army to the mouths of the Indus.

These observations are offered with deference to the able and accomplished officer with whose conjectures I have sometimes presumed to differ. They are presented as the suggestions of a Pioneer who has been over ground which Capt. Cunningham's leisure did not admit of his visiting, and are insisted upon only so far as they recommend themselves to his judgment.

I see that in the map of that prince of topographers, Arrowsmith, whose delineation of the features of the Punjaub is beyond all praise, one of the Swant mountains is designated Aornos: but I know not upon what authority:—whilst in other maps a Nicetta (quære the long sought Nicœa), appears upon the Loondi R.

The rivers Kooner and Loondi may, indeed, by a certain latitude of interpretation, be called the springs of the Indus, and the people of Bajoor (the Bezira besieged by Alexander), would naturally retreat to the Swant mountains.

But it appears to me necessary to the consistency of the narrative, that Aornos should be sited upon the Indus, and I think it quite impossible that so famous a retreat of the turbulent Affacini as the Maha Bunn should have been passed unnoticed by Arrian.

I must however observe, that people of Bajore assure me there is a mountain upon the spot indicated by Arrowsmith's map, of the following description. It stands upon the right bank of the river Loondi. It is girdled to the south and east with stupendous cliffs, which give it the aspect rather of a castle\* than of a mountain. Its summit is the abode of the Siah-posh Kawfurs, who maintain such vigilant watch, that no stranger can enter without their permission. It is quite unsailable and forms the principal path of communication between Bajore and the Siah-posh Kawfur country. There is also another mountain of not less altitude than the Maha Bunn, standing about 20 miles to the

\* *Terræque motu coactum absistere*—says Quintus Curtius, was the popular tradition of Aornos.

north-west of the latter, extremely precipitous and apparently isolated, but not I think of extent sufficient to agree with Arrian's description. It is called Elum and stands upon the limit of the Maha Bunn and Sohaut districts. A subordinate summit of the Maha Bunn overhangs Khubl on the west bank of the Indus. It is about 2000 feet higher than the river Indus, peaked at summit, extremely steep and covered with forest. Its name is Aonj which the Greeks would probably write Aornos, but there is no record of its ever having been crowned with a fort, though the remains of a temple are there. The position of Rani ka Kote was pointed out to me. It is one of the inferior processes of the Maha Bunn. There is not a doubt that the sculpture of which fragments remain is Indo-Greek. At the foot of the Maha Bunn on the western brink of the Indus, and at the highest point accessible to an army is the celebrated castle of Umb, the stronghold of the late Poynda Khan and now of his son Jehandád Khan. Mr. Vigne thinks this the Umbolima of Arrian which Quintus Curtius writes Ekbolima: but although the position agrees sufficiently well with that of the historian, I have vainly endeavored to discover any rock or village in the neighbourhood called Balimah. Such a rock exists on the western bank of the Jelum, above Dhangulli. It is crowned with a castle or rather Tower, in which Chuttur Singh is said to have deposited his wives. Those who have seen Nicetta assure me there is no hill in the neighbourhood of more than 500 feet altitude.

The disturbed state of the country has for the present put a stop to personal research: but I hope the roads will soon again be open.

J. ABBOTT.

P. S. We must look to the Pushtoo names of places with regard to their identification with those mentioned by the Greek historians. Thus Peyshawur is to this day called Peykawur, in Pushtoo, i. e. by the Eusafzyes and establishes the right long acknowledged to be the Peukelaotes of Arrian.

*Route from Káthmándú, the capital of Népal, to Darjeling in Sikim, interspersed with remarks on the people and country, by B. H. HODGSON, Esq.*

*1st Stage to Choukót, East, 7¼ cos.*

Proceeding viâ Mángal, which is within a  $\frac{1}{4}$  mile of the city, we came to Nangsál, at the like distance from Mángal. Both are petty suburban Névár villages. Thence to Deopátan, distant  $\frac{3}{4}$  cos, a large pakka\* village inhabited by Névárs. Thence to Thémi,  $1\frac{1}{4}$  cos. Thémi is a considerable pakka town of Névárs, and is famous for its pottery. Thence to Bhátgáon, distant one cos; Bhátgáon is a large handsome Névár town situated near the eastern end of the valley of Népal, and is said to contain 12000 houses. Its palace, temples and tanks are very striking structures. Thence to SÁNGÁ, 2 cos. This bridge-like place stands on a low ridge separating the great valley of Népal proper from the subordinate valley of Banépa. It is a small place, but the houses are all pakka, as usual with the Névárs. Thence to Banépa, one cos. Banépa is a small pakka town inhabited by Névárs, and situated in the vale of the same name. Thence to Khanarpú, one cos. It is a nice little Névár village, situated near the point where the dales of Banépa and Panouti blend with each other. Thence to Choukót,  $\frac{1}{4}$  cos, ascending a low ridge and quitting the level country thus far traversed, and all of which is highly cultivated, yielding autumn crops of rice and spring ones of wheat.

*2nd Stage to Kálápáni, East, 6 cos.*

Ascend the large ridge of Batásia and come to the mountain village of Phúlbári, which is somewhat less than one cos from Kálápáni. Thence along the ridge  $2\frac{1}{4}$  cos to Syámpáti, another small village of Parbatias. Thence to Saláncho, one cos. Saláncho is a third small hill village, and it overlooks the glen of Káshi Khand on the left. Thence to Kánpúr, a Parbattia village, close to which is the halting place, at a tank called Kálápáni, distant from Mithya Kót  $1\frac{1}{4}$  cos.

\* Pakka here means built of burnt bricks. This word and its correlative Kachcha are most convenient terms for which I know no English equivalents.



*3rd Stage to Jhángá jhóli, South East, 6½ cos.*

This stage runs along the same ridge of Batásia. But it is here called Ténál. Half a cos to the hill village of Bohatia, and another half cos to that of Gimti, both inhabited by Múrmis. Thence  $\frac{1}{2}$  cos to Pokri, another similar village of Múrmis. Thence to Chápá Khár, about  $\frac{3}{4}$  cos, a fourth Múirmi village. Thence to Gárchá, another hamlet of Múrmis, distant from the last rather less than 2 cos;  $\frac{1}{4}$  cos more brings one to the descent into the Biási or vale of Dúmja, on the banks of the Rósi and Sún Cósi. The Biási is low, hot and malarious, but fertile in rice, triangular in shape, and about a mile in greatest width. The Bar, Pipal, Sémal and Khair trees\* grow here, and large Dhanéses (Buceros Homrai) are seen eating the fruit of the Pipal. The Sún Cósi at Dúmja flows freely over a wide bed of sand, and is about 40 yards broad and one foot deep. This river, if the Milanchi be regarded as its remotest feeder—arises from the eastern side of Gosainthán, the great snowy peak overlooking the valley of Népál, and is the first of the “seven Cósi” (sapt Cósi) of the Népálese. Others contend that the true Sún Cósi is that which arises at Kálingchok east of Kúti.† There are several upper feeders of the Sún Cósi which form a delta, of perhaps 30 cos either way, between Milanchi, Kálingchok and Dallálghát, where the feeders are all united. From Dúmja, which lies a little below Dallálghát, proceed along the right bank of the river Sún Cósi to Jhanga-jhóli, by the rugged glen of the river 2 cos, the road impeded by huge masses of rock lying half in the water.

*4th Stage to Sital-páti, East, 4 cos.*

Leaving the river on the left you ascend the ridge of Sidhak and travel along its side, far from the top, to the village of Dharma, inhabited by Múrmis. It is  $1\frac{1}{2}$  cos from Jhanga-jhóli. Thence half cos to Jhámpar, a village of Múrmis. Thence descending again to the bed of the Sún Cósi you proceed along the right bank for one cos to Chayanpúr-phédi, or the base of the Chayanpúr range. Thence an ascent of one cos to the top of Chayanpúr where stands the Powa or small Dharam-sála of Sital-páti, the halting place, and which is close to the village of Choupur.

\* The occurrence of the Indian figs, cotton tree, and acacia, so far within the mountains, shows that the Biásis, wherever situated, have a tropical climate. See on.

† See annexed Memorandum and sketch Map.

*5th Stage to Liáng, East, 6 cos.*

Two cos along the heights of Chayanpúr bring you to the confluence of the Tamba Cósi and Sún Cósi, where the united rivers, of nearly equal size before their junction, are passed at Séliaghát, a little below the Sangam or junction. The Tamba Cósi, or second Cósi of the Népálese, has its source at the base of Phallák, a Himálayan peak situated some ten cos perhaps east of the Kúti pass, which is on the great eastern high road from Káthmándú to Lassa. From Séliaghát the road makes a rapid ascent of one cos to the high level or plateau of Gumounia, one cos along which conducts you to Bhalaiyo, which is only another name for the same plateau. From Bhalaiyo-dánra, one cos to Bétáni village, still along the plateau. Thence one cos along the same high level to the halting place or Liáng-liáng which is a large village well inhabited chiefly by Névárs. Some Parbatias also dwell there, and there is plenty of cultivation and water on the flat top of this low ridge, which is neither mountain nor plain.\* The rice called Touli by the Névárs grows well, and wheat, and generally all the field and garden produce of the valley of Népál.

*6th Stage to Narkatia, South East, 4½ cos.*

One and half cos along the plateau of Liáng-liáng, you come to Bhirpáni, having the Dápcha and Manthali glens on the left, by which there is another road, used chiefly in the cold season. Thence at half a cos you descend slightly to Wádi Khóla, a small hill stream, and passing it make the great ascent of Hiliapáni and reach Lámágáon after one cos of climbing. Close to the village of Lámágáon is another called Sálu, inhabited by Parbatias.† Thence one cos to the Likhú Khóla, a slight descent. Thence a small ascent to Bhálú-dánra or the Bear's ridge, half a cos along which brings you to the village of Nigália or Narkatia, the halting place. The Likhú Khóla is the third Cósi of the Népálese. It is a large unfordable river which is crossed by a bridge, but is smaller than the Sún Cósi or Tamba Cósi. It comes nearly due south from the snows at Kháli Múngali, and forms one of the seven chief feeders of the great Cósi.

*7th Stage to Báj-bisounia, East, 3 cos.*

Still along the Bear's ridge  $\frac{1}{4}$  cos to the small village of Láchia, and another half cos to the village of Chúblú. Thence quit the ridge and

\* See note at stage the ninth. † For tribes of Népál, see Journal for Dec. 1847.

by a slight descent reach Phédi Khóla, at  $1\frac{1}{4}$  cos. Phédi Khóla is a small feeder of the Molang. Pass the stream and ascending slightly for one cos reach the halting place which is a village of good size, where plenty of provisions may be had.

*8th Stage to Búngnám Kót, East, 4 cos.*

Along the same low ridge to the village of Saliáni, close to which you come successively to the villages of Chilounia and Pokhalia and Aisiálú, all within the compass of less than one cos. Beyond Aisiálú,  $1\frac{1}{2}$  cos, is a small pond, the water of which, though not rising from rock, never fails. Its name is Dhimilopáni, and on its left runs the ridge of Tháridánra and Katonjia village; on its right, the Bhandaridge and the village of Jaljalia. Beyond Dhimilopáni commence a descent of somewhat less than a half cos leading to the Molang or Morang Khóla, before named. Cross the Khóla and ascend one cos to Búngnám Kót, a large village and residence of the rural authority, having the smaller village of Bari on its right.

*9th Stage to Chirkhú, East, 6 cos.*

After one cos of descent reach the Lipia Khóla, which stream you cross at once and ascend the Lipia-dánra or ridge, travelling along which you soon come to Okal-dhúnga, a village of Bráhmans and Khas. Thence to Jyá-miria, another village close by on the right. Thence going a cos you reach Charkhú-dánra, merely another name for the Lipia ridge. Descending slightly and advancing one cos you come to Rúmjátár, a celebrated and extensive pasture tract, where the Gúrúng tribe feed large flocks of sheep (*Ovis Barúál*.)\* Thence  $2\frac{3}{4}$  cos of slight descent to Dhanswár, the head village of the rural arrondissement, where the Dwária, or deputy of Rankésar Khatri, who holds the village in private property, resides. Had the village belonged to the first, would have been called, as the Dwária's abode, not Dhanswár but Kót.

\* The more general character of Társ is described in the sequel. This one must be very unusually lofty and cool, else neither Gúrúngs nor their sheep could dwell in it. It is probably only a cold weather place of resort. Otherwise it must be 5 to 6000 feet high, like the plateau of Liáng, spoken of at stage 5. Both are exceptional features of the country, which nevertheless with all its precipitousness, has more numerous, diverse and extensive level tracts than is commonly supposed.

*10th Stage to Háchika, East, 6 cos.*

After half a cos of descent we arrived at Thotnia Khólá, a hill torrent which joins the Dúd Cósi about 3 miles ahead. Proceeded down the rugged stony glen of the Thotnia to the junction, which is reached at Rasuá ghát. Thence down the right bank of the Dúd Cósi for 2 cos to Katahar Biási, where the river, which had thus far run through a narrow glen incumbered with boulders, has a wider space on either bank, capable of cultivation and yielding fine crops of wet rice, but hot and malarious. This sort of tract is what is called in the Parbatia language a Biási. Katahar Biási belongs to bráhmans, who dwell on the heights above. The road leads down the Biási, which is above half a cos wide, for more than one cos, and then ascends the ridge of Kúvindia for one cos to the halting place or Háchika, which is a village inhabited by Kirántis, whose country of Kiránt is bounded on the west by the Dúd Cósi, and begins on this route where the Dhanswár estate ends. The Arún is the eastern boundary of Kiránt. The Dúd Cósi is the fourth great feeder of the Mahá Cósi, which latter enters the plains as one river at Váráhá Kshétra above Náthpúr in Purneah. We have already passed three of these great tributaries or the Sún Cósi, the Tamba Cósi, and the Likhú Cósi. The remaining ones are three, or the Arún Cósi, Barún Cósi and Tamór Cósi.\* Thus there are seven in all: and eastern Népál, or the country between the great valley and Sikim, is called Sapt Cousika, or region of the seven Cósís, from being watered by these seven great tributaries of the Mahá Cósi. Kiránt and Limbúán are subdivisions of the Sapt Cousika, so called from the tribes respectively inhabiting them; the Kirántis dwelling from the Dúd Cósi to the Arún; and the Límbús from the Arún to the Tamór. The country between the great valley and the Dúd Cósi is not so especially designated after the tribes inhabiting it. But the Névárs and Múrmis of Népál proper are the chief races dwelling there. Of all these tribes the Névárs are by much the most advanced in civilization. They have letters and literature, and are well skilled in the useful and fine arts. Their agriculture is unrivalled; their towns, temples and images of the gods, are beautiful for materials and workmanship; and they are a steady, industrious people equally skilled in handicrafts, commerce and the culture of the earth. The rest of the highland tribes or people are fickle, lazy races, who have no

\* See Memorandum at the end of the Itinerary and annexed Sketch.

letters or literature, no towns, no temples nor images of the Gods, no commerce, no handicrafts. All dwell in small rude villages or hamlets. Some are fixed, others migratory, cultivators perpetually changing their abodes as soon as they have raised a crop or two amid the ashes of the burnt forest. And some, again, prefer the rearing of sheep to agriculture, with which latter they seldom meddle. Such are the Gúrúngs, whose vast flocks of sheep constitute all their wealth. The Múrmis and Magars are fixed cultivators; the Kirántis and Limbús, for the most part, migratory ones: and the Lepchas of Sikim still more completely so. The more you go eastward the more the several tribes resemble the Bhótias of Tibet, whose religion and manners prevail greatly among all the tribes east of the valley of Népal, though most of them have a rude priesthood and religion of their own, independent of the Lámás.

*11th Stage to Sólma, South East, 3 cos.*

Leaving Háchika, which is itself lofty, you ascend for 2 cos through heavy forest by a bad road exceedingly steep to the Kiránti village of Dórpá, which is situated just over the brow of the vast hill of Háchika, the opposite side of which however is far less steep. Going half a cos along the shoulder of the hill you then descend for half a cos to the village of Sólma, the halting place.

*12th Stage to Lámakhú, East, 2½ cos.*

An easy descent of one cos leads to Lapché Khóla, a small stream, which crossed you ascend the ridge of Lámakhú via Gwálúng, a Kiránti village situated near its base. Thence the acclivity of the hill is steep all the way to the halting place, which is about half way to the hill top, and 1½ cos from Gwálúng. Lámakhú is a Kiránti village like Gwálúng but smaller.

*13th Stage to Khika Mácchá, East, 4 cos.*

Descend half a cos to the Sápsú Khóla, a petty stream, which however the Kirántis esteem sacred. Cross it and commence ascending the great mountain Tyám Kyá. Climb for one cos by a bad road to the village of Kháwa, and another cos equally severe to Chákhéva bhanjáng, or the ridge, and then make an easy descent of one and half cos to Khika mácchá, the halting place. It is a village of Kirántis in which a mint for coining copper is established by the Durbar of Népal. The workmen are Bánras (Bandyas) of the valley of Népal, of whom there

may be 50 or 60. There is also a Taksári or mint master, and a squad of 25 soldiers under a jemadar.

*14th Stage to Jinikhésáng, East, 5 cos.*

After a cos of tolerably easy travelling you come to Júkya Khóla, a petty stream, which passed, you arrive in half a mile at Pakri, a village situated at the base of the Khokan ridge. Thence slightly descending for half a cos reach Pikhúá Khóla. Cross it and ascend the hill of Bhaktáni for one cos and reach Múrkiahúlák, a post station of the Government close to the 66th mile\* stone of the great military road leading from Káthmándú nearly to the frontier. Thence a descent of one cos to the Khésáng Khóla, one of the innumerable small mountain streams. Cross the Khóla and ascend the ridge of Thaklia for half a cos to Bánskim and Powagaon, two small conjunct villages of Kirántis. Thence along the ridge of Khésáng for  $1\frac{1}{4}$  cos to Jinikhésáng, a large Kiránti village, the head of which is Balbhadra Rai, and whence there is a very fine view of the snows.

*15th Stage to Jarai tár, South East,  $5\frac{1}{2}$  cos.*

Descending slightly for  $1\frac{1}{2}$  cos reach Yákú village, and then descending more abruptly for one cos, come to the Ghongaria Khóla, a small stream. Cross it and proceed along the nearly level base of the Yákú ridge for two cos and a half, to Jarai tár, a large village inhabited by Kirántis, Khas and bráhmans, and situated at the opening of an extensive and cultivated flat running along the right bank of the Arun river, and raised some 30 or 40 cubits above the level of its bed. Such an elevated flat is called in the Khas tongue a Tár, whereas a low flat or one on the level of the river is termed a Biási. Every great river has here and there Társ or Biásis, or both.† Társ, from being raised are

\* The route gives 61. The difference of 5 cos is owing to the travellers making an occasional short-cut, for they kept, generally, the great military highway.

† It is remarkable how universally this phenomenon of high and low levels of the land, indicating change in the relative heights of the land and water, prevails wherever obvious sedimentary deposits are found in definite locations. Herbert and Hutton in their reports of the geology of the Western sub-Himálayas, perpetually speak of the phenomenon as occurring in the mountains, and, according to Herbert, also in the Dúns and even Bháver; and Darwin (*Naturalist's Journal*) constantly records it in the course of his long survey of South America from Rio Janeiro to the north point of Chili.

The same thing is very observable in the great valley of Népál, whose whole surface is almost equally divided into high and low levels, though the operating

usually too dry for rice, but some can be well irrigated from the adjacent mountain, and then they will produce rice as well as Biásis. If not constantly irrigable, wheat, barley, millets, pulse and cotton are grown in them. The elevation of Társ is too inconsiderable to exempt them from malaria, though they are usually rather more wholesome than the lower and often swampy Biásis. Jarai tár is an extensive one, being  $1\frac{1}{2}$  cos wide, and, as is said, several miles long, following the river. The soil is red but fertile, and the whole of it is under cultivation. The village is large for the mountains, and has some 50 to 60 houses, some of which are pakka, as a caravansery here called Dharam-sála or Powa, and one or two more. The site of the village is higher than the rest of the Tár. The *Pinus longifolia* abounds in Jarai tár and peacocks are very numerous. Also jungle fowl\* and Káliches (*Gallophasis melanoleucos*).

*16th Stage to Púkharibás, South East,  $2\frac{1}{2}$  cos.*

Proceeding half a cos you come to the ferry of the Arún, which is a large river rising in Bhot, passing the Himáchal above Hathia, and forming the main branch of the great Cósi. It is also the conterminal limit of Kiránt and Limbúán. It is passed at Liguaghát by boat, and is there very rapid and deep, and some 30 to 40 yards wide. Thence down the left bank of the Arún for 1 cos to Mángmá, a village inhabited by Kirántis and Limbús, being on the common frontier of both tribes. Thence quitting the Arún you reach the Mángmá Khóla in  $\frac{1}{4}$  cos, and crossing it proceed half a cos along the mountain side (manjh) to Ghórlí Kharak, which is the name of a small village, and also of a celebrated iron mine, the workers of which dwell above the line of road. A vast quantity of fine iron is procured. This mine, like all others in Népal, cause must here have been modified in its action, as indeed is perpetually the case in different localities. The high and low levels of Tár and Biási, I consider to represent the pristine and present beds of the rivers, whose constant erosion has during ages created this difference of level, often amounting to 150 or 200 feet. The low level of the valley of Népal I consider to have been suddenly scooped out when the waters of the pristine lake (for such the valley was) escaped in one tremendous rush under the action of an earthquake, which rent the containing rock and let off the waters at once.—(See accompanying sketch.)

\* From these indications, which are altogether exceptional as regards the mountains, it may be confidently stated that Jarai tár is not more than 1500 feet above the sea.

is the property of the government. Iron and copper abound in Népál. Most of the iron is consumed in the magazines for the army or otherwise within the country. But a deal of the copper is exported and forms a good part of the pice currency of the plains on this side the Ganges. The Nepalese are very military. Khas, Maghar, Gúrúng and even bráhmans, except those of the priesthood, constantly wear sidearms of home manufacture; and the large army of the State is furnished with muskets, swords, and Khúkris from native ore. Thus much iron is consumed, so that none is exported, at least none in the unwrought state, possibly because from defective smelting the ore becomes hardened by the accession of fumes of charcoal, and is thus rendered unfit for those uses to which soft iron is applied. From Ghórlí Kharak, an ascent of quarter cos to Pakharibás, the halting place, which is a Gúrúng village, large but scattered, according to the wont of that tribe.

*17th Stage to Dhankúta, South East, 2½ cos.*

After a severe ascent of a cos and half a wide flat-topped mountain is gained, whence there is a fine view of the plains, and on the top of which is a small lake, very deep, and about half a cos in circumference. Its name is Hilia, and the water is clear and sweet. Thence a steep descent of one cos brings you to Dhankúta, distant from *Káthmándú* 78 standard\* cos by the great military road, as recorded on the mile-stone at Dhankúta. Dhankúta is the largest and most important place in Eastern Népál, and the head-quarters of the civil and military administrator of all the country east of the *Dúd Cósi*† to the Sikim frontier, excepting only what is under the inferior and subordinate officer stationed at Ilám, who has a separate district bounded towards Dhankúta by the Tamór river. Bijaypúr, Cháyanpúr, Mánjh-Kiránt and a great part of the Limbuán are subject to Dhankúta, where usually resides a Kaji or Minister of the first rank, who likewise commands the troops stationed there. After defraying the local expenses, he remits annually nine lakhs of revenue to *Káthmándú*. Towards the plains

\* The itinerary gives  $71\frac{1}{2}$  cos. The difference has been explained in a prior note. The standard cos of Népál is equal to  $2\frac{1}{3}$  English miles.

† The central administration extends to the *Dúd Cósi*. See essay on the laws and legal administration of Népál in the Transactions of the Society, Vol. 17, and Journal of Royal Asiatic Society.



the jurisdiction of Dhankúta extends over the old Bijaypúr principality, and towards the hills, over the country of the Kiránts and Limbús. But both the latter tribes are poor at once and impatient of control, so that the Nepal Government is content with a lax general submission and a light revenue levied and paid through the Rais or native heads of those tribes. And this is the reason why only nine lakhs are remitted from Dhankúta to Káthmándú. The present Governor of Dhan-kúta is a colonel, and brother to the Premier Jang Bahadur Konwar. There is a cantonment, a powder manufactory, a parade ground at Dhankúta, where the Sri Jang regiment, 500 strong, is now stationed. The place owes its origin to the Gorkáli dynasty, and is therefore recent ; but it is growing fast into a town, the pakka houses being already numerous, and the tradesmen and craftsmen abundant, active and skilful. Provisions are plentiful and cheap, and the workers in Kánsa (mixed metal) are celebrated for the excellence of their commodities, many of which find sale so far off as Kathmándú. The Kirántis and Limbús, who constituted the soldiery or militia of the former Bijoypúr state, pay to the Ghorka Government annually in lieu of all other taxes and claims,  $7\frac{1}{2}$  rupees per house or family. The houses or families are large, so that each can cultivate a great extent of ground. But how much (or little) soever they may raise, each family is free on payment of the annual fixed assessment, which the Rais above noticed collect and deliver. The Rais also administer Police and Justice among their own people in all ordinary cases. Capital crimes are referred to the governor of Dhankúta, who must have the Durbar's sanction for every sentence of death or confiscation. Dhankútá overlooks Bijoypúr, the old capital of the Eastern Makwáni or Bijaypúr Principality, which stands on the skirts of the Tarai of Morang, but within the hills ; and no part of the low lands (Madhés) is subject to the Governor of Dhan-kúta. The Madhés is administered by Súbahs, of whom there are seven for the whole.\*

*18th Stage to Bhainsia tar, south east, 6 cos.*

A sharp descent of one cos brings you to the banks of the Tamór, which is a large river, though less than the Arún. It is never fordable and is crossed in boats. It is very deep, rapid, but not clear, and about

\* The 7 zillahs of the Népalése lowlands, which extend from the Arrah to the Mechi, are Morang, Saptari, Mahótari, Rotahat, Bára, Parsa and Chitwan.

30 cubits wide between the hot weather banks. This is the seventh and last of the great feeders of the Cósi, which it joins at Tirbéni, a holy place of pilgrimage, so called from its being the point of union of the three rivers, Tamór, Arún and Sún Cósi.\* The Tamór rises from the Western aspect of Káng cháng júnga. We crossed the Tamór in a boat, and then proceeded half a cos down its left bank. Thence, quitting the river, you skirt the base of the Mádi hill for one cos to the Tankhudá nadi, a small hill stream. Cross it to Mámagá tár, and then travel through this fine extensive flat for two cos. The whole is cultivable, and the most part cultivated by Dénwárs and Mánjhis, and it is situated on the banks of the Tamór, to which the winding of the road again brings you. Quitting the Tár you advance a quarter of a cos to the Rasua Khóla, which forded, you proceed along the base of the Télia ridge for  $1\frac{1}{4}$  cos to another Tirbéni and place of pilgrimage, where the Cherwa and Télia rivers join the Tamór at Cherwa ghat. A great fair is annually held at Cherwa, to which traders go even from Káthmándú. Thence proceeding a  $\frac{1}{4}$  cos you reach the halting place or Bhainsia tár. The tar may be  $\frac{1}{2}$  cos wide and one cos long. It is very hot and malarious, and is inhabited by the Mánjhi tribe.

*19th Stage to Lakshmipúr, E. N. E. 5 cos.*

A quarter cos of slight ascent brings you to the Nawa Khóla, a moderate-sized stream, which is ascended for 3 cos by a very bad road that crosses the bouldery bed of the river many times. Thence quitting the Khóla you commence the severe ascent of Lakshmi chúria, which is climbed incessantly till you reach the halting place near the hill top. Lakshmipúr is a large and flourishing village of Limbús, where men and goods abound, and the climate is fine and the water cold—a great relief after the burning Társ recently traversed.

*20th Stage to I'bháng, East, 3 cos.*

After a slight descent of  $1\frac{1}{2}$  cos you come to Pokharia Khóla, a small stream which is at once crossed. Thence a slight ascent of one cos up the ridge of Nángi, along the top of which another half cos brings you to the halting place, which is a Khas village of large size.

\* Of the seven Cósis, the Tamba and Likhú are lost in the Sún Cósi, and the Barún in the Arún, the latter, far above the route. Tirbéni is immediately above Báráha Kshetra before noticed, as the point where, or close to which, the united Cósis issue into the plains.

*21st Stage to Khándráng, East, 4 cos.*

A slight ascent of  $\frac{1}{4}$  cos to the village of Múléi, inhabited by Khas. Thence a great descent of one cos to Kokalia Biási, or the Magpie's glen, which is watered by the Déó mai, a small stream. Cross it and ascend the ridge of Timkyá a short way, and then skirting along its waist (mánjh) for  $1\frac{1}{4}$  cos come to the Léwá Khóla, another of the innumerable streamlets of the hills. Cross it and proceed for  $1\frac{1}{2}$  cos along the base of the ridge of Khándráng to the village of the same name, which is the halting place and a small village of bráhmans.

*22nd Stage to Ilám, East, 5 cos.*

Descend the Khándráng ridge for half a cos and come to a small stream called the Ratia Khóla. Cross it and then make a severe ascent of one cos up to the ridge of Gólákharak, whence Karphók, the great ridge dividing Nepál from Sikim, is visible. Thence an equally difficult descent of 1 cos to the Ilám Khóla, a small stream. Thence, crossing the stream, make the severe ascent of Tilkiáni ridge for  $1\frac{1}{4}$  cos. Thence skirt along the side of the hill (mánjh) for 1 cos to the halting place or Ilám, which is a small fort designed to guard the eastern frontier of Népal. The Chatelain is a Captain and has 100 soldiers under him, with 8 artillerymen and one cannon of small calibre. This officer is also the civil authority of the arrondissement and raises the extraordinary revenues thereof to meet the local expenses, sending the balance, if any, to Káthmándú. The land revenue is wholly assigned to his troops in pay.

*23rd Stage to Gódhak, East, 2 cos.*

After a steep descent of one cos you come to the Jógmai or Mai river, a small stream, which passed, you commence the steep ascent of Gódhak, and continue ascending to the halting place, which is a small village of bráhmans half way up the hill.

*24th Stage to Siddhi, North-East, 3 cos.*

Detained much by rain to-day and yesterday, and therefore made short marches. Leaving Gódhak ascended by a very bad road loaded with dense vegetation for  $1\frac{1}{4}$  cos to Karphók chouki, a frontier Gorkháli post, where 8 soldiers always reside. Thence one cos along the ridge or Lékh to Súdúng, which is but another name for the ridge. Thence a slight descent of one cos to the Siddhi Khóla, a small stream, on the banks of which we halted on account of the rain.

*25th Stage to the English Chouki, N. E. 7½ cos.*

Crossed the Siddhi stream and proceeded  $1\frac{1}{2}$  cos of slight ascent and skirting the mountain bases to Thaplia. Thence half a cos of descent to the small streamlet of Séchideu. Thence a quarter cos over low hills to the Méchi river. The Méchi is the present boundary of Népal and Sikim. It is a small stream which rises in the Singalélah ridge, a spur of Karphók. Crossed it and ascended the hill of Nágri, by a very bad road and severe ascent of  $1\frac{1}{4}$  cos to the top. Thence a severe descent of one cos to the smaller Rangbhang Khóla, a streamlet merely. Thence along the glen to the great Rangbhang, distant one cos. Thence a steep ascent of one cos to Nágri Kót, an old fort in ruins. Thence a painful descent of  $\frac{1}{2}$  cos to the Balason river. It is a moderate sized stream, larger than the Méchi. Thence half a cos of rather uneven travelling to the halting place.

*26th Stage to Darjeling, North, 4 cos.*

A severe ascent of one cos, and then an easy half cos along a ridge, brought us to the Company's high road, along which we travelled for  $2\frac{1}{2}$  cos to Jellapahár and Herbert hill at Darjeling.

Total cos 109.

At  $2\frac{1}{3}$  miles per cos=miles 254.

NOTE.—The Nepalese standard cos is equal to  $2\frac{1}{3}$  English miles, and the travellers had this standard to refer to along a great part of their way, as being coincident generally with the measured military road several times adverted to on the route. Hence their distances from stage to stage may be perfectly relied on, though in the details of each stage the same accuracy cannot be expected.

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*Memorandum relative to the seven Cosis of Népal, by B. H.  
HODGSON, Esq.*

The enumeration of the seven Cosis by the Itinerists is doubtless the accredited one, and what I have myself often heard at Kathmándú. Nevertheless names are not always applied in strict correspondence with things in geography. Witness the neglected Jáhnavi, the true and transivcan source of the Ganges! Now, if we are to estimate the seven chief feeders of the great Cósi according to the length of their

courses, or their effect on the physiognomy of the country, the enumeration ought seemingly to be as follows :—

- |                       |  |
|-----------------------|--|
| 1st. The Milamchi.    | } Local series beginning from the<br>West. |
| 2nd. The Bhotia Cósi. |  |
| 3rd. The Támba Cósi.  |  |
| 4th. The Likhú Cósi.  |  |
| 5th. The Dúd Cósi.    |  |
| 6th. The Arún.        |  |
| 7th. The Tamór.       |  |

This list omits the Barún of the usual enumeration, and substitutes the Bhotia Cósi for the Sún Cósi : and not without Nepalese authority for both changes, for it is very generally allowed that the Barún hardly belongs to the Sub-Himálayas, and that Sún Cósi is rather the name of the general receptacle of the Cósís till joined by the Arún, than that of a separate Cósi. The following remarks on each river will make this apparent.

1st. The Milamchi rises above the Bhotia village of that name, and at or near to the eastern base of Gosainthan, the great snowy peak overlooking the valley of Népal. From the snows the Milamchi has a south-eastern course of probably 60 miles to Dallál ghát. It is joined from the west by the Sindhu, the Tánd, and the Chák, and from the north and north-east by the Indrávati, the Balamphi and the Jhári. The three former are petty streams ; but the three latter are considerable ones, one of them rising in the snowy region, and another having two subordinate affluents. The Indrávati comes from the Hemáchal at Panch pokri and flows nearly due south into the Milamchi below Hémú. The Balamphi and Jhári have only sub-Himálayan sources, situated south-east of Panch pokri, but they have longer independent courses than the Indrávati before they unite, after which they presently join the Milamchi not far above the confluence of the Chák. The subordinate feeders of the Balamphi above adverted to, are the Boksia and Lipsia. They have short parallel courses W. S. W. into their parent stream. Thus the Milamchi is a notable river, and it is the more so as forming very distinctly the western boundary of the basin of the great Cósi, of which the equally distinct eastern limit is the Timór.

2nd. The Bhotia Cósi has its sources at Deodhúnga, a vast Himálayan peak situated some 60 or 70 miles east of Gosainthán and a little

north and east of the Kúti pass, being probably the nameless peak which Colonel Waugh conjectures may rival Kángchángjunga in height. The river flows from the base of Deodhúnga past the town of Kúti, and has a S. West direction from Kúti to Dallál ghát, where it joins the Milamchi after a course about as long as the Milamchi's,—the two rivers, of nearly equal size, forming a deltic basin. In about its mid-course the Bhotia Cósi is joined by the Sún Cósi from Kálingchok. But Kálingchok is no part of the true Hemáchal, nor is the stream thence flowing equal to that coming from the snows at Deo dhúngá. Consequently the name Bhotia Cósi should prevail over that of Sún Cósi as the designation of one of the separate seven Cósis, and the name Sún Cosi be reserved for the general receptacle, within the mountains as far east as Tirbéni. The Bhotia Cósi is joined at Listi by the Júm Khóla, whilst from the Mánga ridge another feeder is supplied to it, much lower down or below the confluence of the Sún Cosi, from the east. But as the Milamchi below the junction of the Balamphi and Jhári is often called the Indrávati vel Indhani, so the Bhotia Cósi below the junction of the Sún Cósi is frequently styled by the latter name, which others again with more reason confine to the more general confluence below Dallál ghát. There no doubt the name Sún Cósi begins to be well applied, it being universally the designation of the great receptacle of waters running W. and E. from Dúmja to Tirbéni. At Dúmja, which is only a few miles south of Dallálghát, the Sún Cosi receives a considerable affluent from the west. This affluent is called the Rosi. It rises on the external skirts of the great valley under the names Biyabar and Panouti, from the respective dales watered by the two steamlets.

3rd. The Támba Cósi. It rises at Phallák in the snowy region, about two journies east and a little north of Kálingchok, or the fount of the upper and pseudo Sún Cósi. The Támba Cósi's course from Phallák to Sélaghat, where it falls into the receptacle, is nearly south, and as far as I know it has only one considerable affluent, which is the Khimti. The Khimti rises in the Jiri ridge and flowing nearly south, parallel to the Támba Cósi, joins the latter in its mid-course at Chisapáni.

4th. The Likhú. This river is less than the Támba Cósi and seems to rise somewhat beneath the snows, though its place of origin at Kháli Mungali is said to be a ridge connected therewith. Its course is still more directly south than that of the Támba Cósi, to which however its

general direction is very parallel. I know but one of its feeders, the Kháni, which comes from the Cháplú ridge on the east of the main river.

5th. The Dúd Cói. It is a large stream, larger even than the Tám-ba Cói, though inferior to the Arún or Támor. It rises amid the perpetual snows, but at what exact spot I do not know, and it has a southern course to the Sún Cói at Rasua. Its feeders are numerous. But I know only those near Rasua, which are the Thotia and the Sisnia on the west, and the Rao on the east.

6th. The Arún or Arún Cói. It is the largest by much of the whole, and consequently the main source of the Maha Cói, having several feeders in Tibet, one from Darra on the north, another from Tingri on the west, and a third from the east from a lake. The Arún is not only the greatest of the Cósís but of all the Sub-himálayan rivers, if the Karnáli be not its equal. None other can compete with it. The Barún, often reckoned a separate Cói, is a mere feeder of the Arún and joins it so high up that there is little propriety in admitting the Barún as a member of the Sapt Kosi. The Barún is lost in the Arún in the Alpine region, at Hatia, the great mart for the barter trade of the Cis and transniveans by the very accessible pass of the Arún. Lower down the Arún receives many tributaries—from the west, the Salpa and Ikhua—from the east, the Sawai, the Héngwa, the Pilwa, the Ligua, and the Mámagá. Its course on this side the Himálaya is generally north and south; but in Tibet it spreads to the west and east also, covering and draining a deal of ground there.

7th. The Tamór Cói. The Tamór also is a very fine river, inferior only to the Arún. It is alleged to have more than one trans-himálayan source. It passes the snows at Wállúg chúngh, or arises there from the snows. Its course from Wállúg to the general junction at Tirbéni is south-west, and it receives many affluents on the way, as the Wállúg, the Chúngh, the Yángmá, the Méwa, the Kabaili, the Kháwa, the Nhabo, the Tankhua, the Teliá, the Nava, the Chérwa, the Kokaya.

To this appendical memorandum on the Cósís I subjoin a sketch of the several primary feeders of the so called Sún Cói, made from my own observations as well as enquiries. I have no personal knowledge of the rest of the "Sapt Cousika." Indeed no European has yet set foot in this region save myself on the western, and Dr. Hooker on the eastern, margin. We may shortly expect much information from Dr. H. as to the latter, or the skirt confining with Sikim.

*On the Chépáng and Kúsúnda tribes of Népal, by B. H. HODGSON, Esq.*

Amid the dense forests of the central region of Népal, to the westward of the great valley, dwell, in scanty numbers and nearly in a state of nature, two broken tribes having no apparent affinity with the civilized races of that country, and seeming like the fragments of an earlier population.

“They toil not, neither do they spin;” they pay no taxes, acknowledge no allegiance, but, living entirely upon wild fruits and the produce of the chase, are wont to say that the Rajah is Lord of the cultivated country as they are of the unredeemed waste. They have bows and arrows, of which the iron arrow-heads are procured from their neighbours, but almost no other implement of civilization, and it is in the very skilful snaring of the beasts of the field and the fowls of the air that all their little intelligence is manifested.

Boughs torn from trees and laid dexterously together constitute their only houses, the sites of which they are perpetually shifting according to the exigencies or fancies of the hour. In short, they are altogether as near to what is usually called the state of nature as any thing in human shape can well be, especially the Kúsúndas, for the Chépángs are a few degrees above their confreres, and are beginning to hold some slight intercourse with civilized beings and to adopt the most simple of their arts and habits. It is due, however, to these rude foresters to say that, though they stand wholly aloof from society, they are not actively offensive against it, and that neither the Government nor individuals tax them with any aggressions against the wealth they despise or the comforts and conveniences they have no conception of the value of.

They are, in fact, not noxious but helpless, not vicious but aimless, but morally and intellectually, so that no one could without distress behold their careless unconscious inaptitude. It is interesting to have opportunity to observe a tribe so circumstanced and characterised as the Chépángs, and I am decidedly of opinion that their wretched condition, physical and moral, is the result, *not* of inherent defect, but of that savage ferocity of stronger races which broke to pieces and outlawed both the Chépáng and the Kúsúnda tribes during the ferocious ethnic struggles of days long gone by, when tribe met tribe in internecine strife contending for the possession of that soil they knew not how to fructify! Nor





*A man of the Cheping Tribe.*

*T. Nash, Acetate Lith. From Colton's*



is there any lack of reasonable presumptions in favour of this idea, in reference to the Chépánga at least; for the still traceable affiliation of this people (as we shall soon see), not less than the extant state of their language, demonstrates their once having known a condition far superior to their present one or to any that has been their's for ages.

That the primitive man was a savage has always appeared to me an unfounded assumption; whereas that broken tribes deteriorate lamentably we have several well founded instances in Africa.\* Quitting however these speculations I proceed with my narrative. During a long residence in Nepal, I never could gain the least access to the Kúsúnda, though aided by all the authority of the Durbar: but, so aided, I once in the course of an ostensible shooting excursion persuaded some Chépánga to let me see and converse with them for 3 or 4 days through the medium of some Gúrúnga of their acquaintance. On that occasion I obtained the accompanying ample specimen of their language; and, whilst they were doling forth the words to my interpreters, I was enabled to study and to sketch the characteristic traits of their forms and faces.† Compared with the mountaineers among whom they are found the Chépánga are a slight but not actually deformed race, though their large bellies and their legs indicate strongly the precarious amount and innutritious quality of their food. In height they are scarcely below the standard of the tribes around them‡—who however are notoriously short of stature—but in colour they are very decidedly darker or of a nigrescent brown. They have elongated (fore and aft) heads, protuberant large mouths, low narrow foreheads, large cheek-bones, flat faces, and small eyes. But the protuberance of the mouth does not amount to prognathous deformity, nor has the small suspicious eye much, if any thing, of the Mongolian obliqueness of direction or set in the head. Having frequently questioned the Durbar whilst resident at Káthmándú as to the relations and origin of the Chépánga and Kúsúnda, I was invariably answered that no one could give the least account of them, but that they were generally supposed to be autochthones, or primitive inhabitants of the country. For a long time such also was my own opinion, based chiefly upon their physical characteristics as above noted

\* Prich. Phys. Hist. Vol. II. passim. Scott's exquisite Novels throw much light on this subject.

† See the accompanying outline, which is remarkably faithful and significant.

‡ Magar, Múrimi, Khás, Gúrúnga, Névár.

and upon the absence of all traceable lingual or other affinity with the tribes around them. So that I took the Chépánga, the Kúsúnda and the Haiyus, a third tribe, remarkably resembling the two former in position and appearance—to be fragments of an original hill population prior to the present Tibetan original inhabitants of these mountains; and to be of Tamulian extraction, from their great resemblance of form and colour to the Aborigines of the plains, particularly the Kóls. It did not for several years occur to me to look for lingual affinities beyond the proximate tribes, nor was I, save by dint of observation made, fully aware that the Mongolian type of mankind belongs not only to the races of known northern pedigree, such as the mass of the sub-Himálayan population,\* but equally so to all the Aborigines of the plains, at least to all those of central India. Having of late however become domiciled much to the eastward of Káthmándú, and having had more leisure for systematic and extended researches, those attributes of the general subject which had previously perplexed me were no longer hindrances to me in the investigation of any particular race or people. I now saw in the Mongolian features of the Chépánga a mark equally reconcileable with Tamulian or Tibetan affinities; in their dark colour and slender frame, characteristics at first sight indeed rather Tamulian than Tibetan, but such as might, even in a Tibetan race, be accounted for by the extreme privations to which the Chépánga had for ages been subject; and in their physical attributes taken altogether I perceived that I had to deal with a test of affinity too nice and dubious to afford a solution of the question of origin. I therefore turned to the other or lingual test; and, pursuing this branch of the inquiry, I found that with the southern Aborigines there was not a vestige of connexion, whilst to my surprise I confess, I discovered in the lusty† Lhópás of Bhútán the unquestionable origin and stock of the far removed, and physically very differently characterised, Chépánga! This lingual demonstration of identity of origin, I have for the reader's convenience selected and set apart as an Appendix to the vocabulary of the Chépánga language; and I apprehend that all persons conversant with ethnological enquiries will see in the not mere resemblance but identity of thirty words of prime use and necessity extracted from so limited a field of comparison

\* See Journal for December last. I date their transit of the Himálaya from Tibet fully 1200 years back.

† See the subjoined note at the end.

as was available for me to glean from, a sufficient proof of the asserted connexion and derivation of the Chépángo, notwithstanding all objections derivable from distance, dissolution of intercourse and physical nonconformity. But observe, the last item of difference is, as already intimated, not essential but contingent, for both Lhópá and Chépángo are marked with the same essential Mongolian stamp, whilst the deteriorations of vigour and of colour in the Chépángo, though striking, are no more than natural, nay inevitable, consequences of the miserable condition of dispersion and out-lawry to which the Chépángo have been subject for ages anterior to all record or tradition. And again, with regard to local disseveration, it should be well noted, in the first place, that by how much the Chépángo are and have long been removed from Bhútán, by so much exactly do conformities of language demonstrate identity of origin, because those conformities cannot be explained by that necessary contact with neighbours to which the Chépángo language owes of course, such Hindi, Parbatia and Newár terms as the vocabulary exhibits ; and, in the second place we must recollect that though it be true that 300 miles of very inaccessible country divide the seat of the Chépángo from Bhútán, and moreover that no intercourse therewith has been held by the Chépángo for time out of mind, still in those days when tribes and nations were, so to speak, in their transitional state, it is well known that the tides of mankind flowed and ebbed with a force and intensity comparable to nothing in recent times, and capable of explaining far more extraordinary phænomena than the disruption of the Chépángo, and their being hurried away, like one of the erratic boulders of geologists, far from the seat of the bulk of their race and people. Indeed, the geological agents of dislocation in the days of pristine physical commotion may throw some light, in the way of analogy, upon the ethnological ones during the formative eras of society ; and, though we have no record or tradition of a Lhópá conquest or incursion extending westward so far as, or even towards, the great valley of Nepal, we may reasonably presume that some special clan or sept of the Bhútánese was ejected by an ethnic cataclysm from the bosom of that nation and driven westward under the ban of its own community alike, and of those with which it came in contact in its miserable migration, for misfortune wins not fellowship.

The lapse of a few generations will probably see the total extinction of the Chépángo and Kúsúnda, and therefore I apprehend that the

traces now saved from oblivion of these singularly circumstanced and characterised tribes, now for the first time named to Europeans, will be deemed very precious by all real students of ethnology. Their origin, condition and character are, in truth, ethnic facts of high value, as proving how tribes may be dislocated and deteriorated during the great transitional eras of society.

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*Addendum on Bhútán.*

Lhó is the native name for Bhútán, and Lhópá and Dúkpá (written Brúkpa) are native names for an inhabitant of Bhútán—whereof the former is the territorial, the latter, the religious, designation. In other words, a Lhópá is one belonging to the country of Bhútán, and a Dúkpá (rectè Brúkpa), a follower of that form of Lamaism which prevails in Bhútán, and which has become equally distinctive with the local designation for an inhabitant of the country, since the people of Bhót or Tibet were converted to the new or Gélúkpá form of that faith. Bhútán is a Sanscrit word, and is correctly Bhútánt, or ‘the end of Bhót’ (inclusively), the brahmans like the natives, deeming the Cisnavian region an integral part of Tibet, which it is ethnographically, though by no means geographically. Had Klaproth and Ritter been aware that Lhó is Bhútán, and Lhópá an inhabitant of Bhútán, we should not have had their maps disfigured by a variety of imaginary regions placed East of Bhútán and termed Lokabadja, &c. a sheer variorum series of lingual error resting on the single local name Lhó and its derivatives of a personal kind, as correctly and incorrectly gathered by them. Originally some Bengáli rendered Lhó by the, to him, familiar word Lók (regio); and then, being unaware that the Tibetan affix bá vel pá means belonging to, inhabitant of, he subjoined to the bá his own equivalent of já (born of) and thus was deduced Klaproth’s furthest error (I omit others short of this one) of Lokabadja. To trace an error to its source is the best way to prevent its repetition, an aphorism I add, lest any person should suppose me wanting in respect for the eminent persons whose mistake I have pointed out. Klaproth was possibly misled by Hastings’ letters to and from T’cshúlúngba.\* But he and Ritter are fairly chargeable with constant creation of new regions out of mere synonyma! I could give a dozen of instances from their splendid maps.

\* See Turner’s Embassy and native account of Bhutan, in the Society’s Transactions.

*Vocabulary of the language of the Chépang.*

<i>English.</i>	<i>Chépang.</i>	<i>English.</i>	<i>Chépang.</i>
The world	Caret,	Winter	Namjúng
God	*Nyam Ding	The rains	Nyamwá
Man	Púrsi	Grain	Yam
Woman	Mírú	Rice, unhusked	Yáng
Quadruped	Syá	Rice, husked	Chúí
Bird	Móá	Wheat	Kan
Insect	Pling	Barley †	Caret
Fish	Gna T	Plantain	Maisé
Fire	Mí T	Pear	Pásai
Air	Máró	Tobacco	Mingo
Earth	Sá T	Pepper	Marich H
Clay, plastic	Sá lena	Red pepper	Raksai
Water	Tí	Garlick	Bin
Light, lux	Angha	Oil	Sáté
The Sun	Nyam T	A tree	Sing-tak T
The Moon	Lámé T	A leaf	Ló T
The Stars	Kar T	A flower	Ró
A mountain	Rías T	A fruit	Chai
A plain	Dáni	Wood	Sying T
A river	Ghoro	Fuel	Jháro sying
A ferry	Titachaparna? (fold)	Grass	Caret
A boat	Caret	Straw	Won
A bridge	Tá	Bran	Rók
Husband	Palam	A horse	Séráng
Wife	Malam	An ox	Shyá
Father	Pá	A bull	You shyá
Mother	Má	A cow	Mó shyá
Brother	Hou	A buffalo	Misha T
Sister	Hou dhiáng	A dog	Kúí T
Grand-father	Tó	A cat	Caret
Grand-mother	Aié	A monkey	Yúkh
Uncle	Páng	A jackal	Karja
Aunt	Múm	A tiger	Já
Child	Chó	A leopard	Mayo já
Boy	Chó	A bear	Yóm
Girl	Chó riáng	A goat	Micha
Kinsfolk	Laikwo	A sheep	Caret
Strangefolk	Sáing	A hare	Caret
Day	Nyi Gni T	A hog, pig	Piak T
Night	Yá	An elephant	Kísí N
Dawn	Wágo	A deer	Kasya
Noon	Syáwa	A rat	Yú
Evening	Nyam rama	A mouse	Mayo yú
To-day	Tén	A manis	Cháng júng
Yesterday	Yon	A fowl (gallus)	Wá
To-morrow	Syáng	Its egg	Wá-kúm
A week	Caret	A pigeon	Bak-wá
A fortnight	Bákha yatlá	A crow	Káwá
A month	Yatlá	A sparrow	Yúrkúnwá
A year †	Yatang	A lark	Bajú wá
Summer	Lhapa	A partridge	Tithara H

\* Nyam is the Sun, which is no doubt worshipped, and hence the identity of terms.

† The separate 12 months and 7 days have no names.

‡ No other grain named but wheat and rice.

<i>English.</i>	<i>Chépáng.</i>	<i>English.</i>	<i>Chépáng.</i>
A quail	Umbá-wá	Cord, thin	Rhim
A kite or hawk	Mó-wá	Thread	Mayo rhim
A fly	Yang	Needle	Gyap
A bee	Túmbá	Pen	Ré syáng
The human body	Mhá	Ink	Hildang
The head	Tolong	Sovereign	Rájah H
The hair	Min	Subject	Parja H
The face	Khén	Citizen	Bérang moy
The forehead	Jyé	Countryman, rustic	Bó moy
The eye	Mik T	Soldier	Gal moy
The nose	Gné Nyé	Villager	Désing moy
The mouth	Móthong	Priest	Jhákri
The chin	Kám-tyó	Physician	Chimé
The ear	Nó T	Druggist	O'sa yilong
The arm	Krút	Master	Sing chopo
The hand	Kútpá	Servant	Mayo? (small)
The leg	Dom	Slave	Gráng
The foot	Caret	Cultivator	Kámin chara
The belly	Túkh	Cowherd	Góthála H
Bone	Rhús T	Carpenter	Sing kami N
Blood	Wí	Blacksmith	Kami N
Blood-vessel	Só	Weaver	Naik yousa
A house	Kyim T	Spinner	Rhim rhousa
A door	Kharók	Taylor	Rúpsa
A stone	Báng	Basket-maker	Gráng kíoni
A brick	Caret	Carrier	Pún rúpo
A temple	Ding tháni	Tanner	Pún lai
An idol	Simtá	Cotton-dresser	Rhim rhowan
Dinner	Amjia	Iron	Phalám P
A dish	Ló	Copper	Támba H
A plate	Mila	Lead	Sísa H
Flesh	Mai	Gold	Liáng
Bread	Lang	Silver	Rúpa H
Vegetables	Kyáng	Rain	Nyóng wá
Honey	Túm	Frost	Chépú
Wax	Main P	Snow	Rápáng
Milk	Gnúti	Ice	Chépú
Gheu	Gheu H	Fog	Khású
Cloth	Nai	Lightning	Marang
Clothes, apparel	Nai	Thunder	Marang múra
Bed clothes	Lou	A storm	Marhú
Upper vest	Doura	A road	Liam T
Lower vest	Súmbá	A path	Mayo liam
Shoe	Panai P	A spring (water)	Tíshakwó
Stocking	Dócha P	Trade	Yinláng
Wool, raw	Min	Capital	Rás
Cotton, ditto	Kapás H	Interest	Chó
Hemp, ditto	Kyou	Coin	Tanka H
Bow	Lúí	Robbery	Latiláng
Arrow	Láh T	Theft	Ditto
Ax	Wárhé	Murder	Jénsatáng
Spade, hoe	Taik	Rape	Kútyáláng
Plough	You sing	Cultivated field	Blú
Loom	Caret	City or town	Bérang
Knife	Phiá ghúl	Village	Dési N
Brush, broom	Phék	Horn	Róng T
Basket	Tokorong	Ivory	Laik
Rope, thick	Rá	A still	Kúti póng



<i>English.</i>	<i>Chépáng.</i>	<i>English.</i>	<i>Chépáng.</i>
Beer	Han	Stupid	Wai-ra chúl
Spirits	Rakshi P	Honest	Waba pina
The senses	Caret	Dishonest	Waba pilo
Touching	Dina ?	Great	Bronto
Smelling	Gnama ?	Small	Maito, Mayo
Seeing	Yorsa ?	Heavy	Lito
Hearing	Saisa ?	Light, levis	Caret
Tasting	Yangsa ?*	Black	Gálto
Hunger	Rung	White	Bhámtó
Thirst	Kióp	Green	Phelto
Disease	Róg H	Blue	Gálto
Medicine	O'sá N	Red	Dúto
Fever	Aimang	Yellow	Yérpo
Dysentery	Boárláng	Sweet	Nimto
Small-pox	Bróm	Sour	Nimlo
Fear	Rai	Straight	Dhimto
Hope	Áphró	Crooked	Dóngto
Love	Mharláng	Hot	Dháto
Hate	Ghrim náng	Cold	Yésthó
Grief, sorrow	Manbharáng	Dark	Caret
Joy	Yang náng	Light, luminous	Takto
One	Yá-zho	Great	Bronto
Two	Nhi-zho T	Greater	Mhák talto
Three	Súm-zho T	Greatest	Mhak táltó
Four	Plói-zho	Small	Maito
Five	Púma-zho	Smaller	Cholam
Six	Krúk-zho	Smallest	Cholam
Seven	Chana-zho	To stand	Chimsa
Eight	Práp-zho	To fall	Chónsa
Nine	Takú-zho	To walk	Whása
Ten	Gyib-zho	To run	Kísa
Half	Bákhá	To climb	Jyákst
The whole	Yágúr	To question	Hótsa
Some, any	Caret	To answer	Dyenguúksa
Many	Jhó	To request	Bájhínáng ?*
None	Dómánalo	To refuse	Bainánglo ?
Near	Lóktó	To fight	Kaichínáng
Far	Dyángtó	To kiss	Chopchínáng
Blind	Mikchángna	To laugh	Nhisa
Lame	Domtonga	To cry	Rhiása
Dumb	Nósa chúl	To eat	Jhicháng
Deaf	Nósa mal	To drink	Túmcháng
Clean	Bhangto	To talk	Nhocháng
Dirty	Gálto	To be silent	Ashimanga ?
Strong	Jokto	To shit	Yésháng
Weak	Joklo	To piss	Chúcháng
Good	Pito	To ascend	Jyákcháng*
Bad	Pilo	To descend	Súsyáng
Ugly	Pilo	To cut	Palchínáng
Handsome	Dyángto	To break	Tlésháng
Young	Dyáng mai	To join, unite	Chócháng
Old	Bupha H	To jump	Jyésháng
Clever	Chimo	To sit down	Múcháng

\* Sá I think is the infinitive sign, and áng the participial. And one or other should appear uniformly here.

† If as I suppose, Sá be the infinitival sign there must be error and the rather that all the verbs should have one form. Aug I think is the participial sign.

English.	Chépáng.	English.	Chépáng.
To stand up	Chingsa	To write	Résa
To sleep	Yémsa	To read	Brósa
To wake	Tyoksa	To sing	Mansa
To give	Búisa T	To dance	Syáksa
To take	Lísa T	To lie down	Kontimúsa
To lend	Búisa	To get up	Caret
To borrow	Lísa	To tell a falsehood	Hekaktáng
To buy	Yingsa	To see	Chéwáng ?
To sell	Yinlángalsa	To hear	Saiyáng ?*
To exchange	Gyésa	To taste	Lyémsa
To live	Caret	To smell	Namsa
To die	Caret	To touch	Dimsa
To reap	Rása	To count	Théngsa
To sow	Wársa	To measure	Krúsa
To thresh	Rhápasa	To remember	Mhardangsa
To winnow	Krápsa	To forget	Mhoiyangsa

N. B.—T postfixed indicates a Tibetan etymon for the word, H a Hindi origin, P a Parbatia or Khas, and N a Népál, ditto. It was not in my power to do more than collect vocables. I could not ascertain structure: but comparing all the words I conceive the anomalies of the verbs may be set right by assuming Sá to be the infinitival sign, and áng, varied to chang, yang and nang, the participial one.—B. H. H.

*List of Chépáng words derived from the Tibetan language and especially the Bhutanese dialect of it.*

English.	Tibetan.	Lhopa.	Chépáng.
Eye	Mig	”	Mik
Sun	Nyimá	Nyim	Nyam
Sky	Namkháh	Nam	Nam
Ear	”	Nó	Navó
Mountain	Rí	Rong	Rías
Star	Karma	Kam	Kar
Free	Jon-shing	Shing	Sing-tak
Wood	”	Shing	Sing
Leaf	Ló-ma	”	Ló
Salt	Tsá	Chhá	Chhé
Road	Lam	Lam	Liam
House	Khyim	Khim	Kyim
Moon	Lávo	”	Lámé
Bone	Rúspa	”	Rhús
Fire	Mé	Mí	Mí
Arrow	Dáh	Dáh	Láh
Dog	Khyi	Khi	Kúí
Buffalo	Mahi S	Méshi	Mísha
Day	”	Nyim	Nyi
Earth	”	Sá	Sá
Fish	Nyá	Gná	Gná
Hog	Phag	Phag	Piak
Horn	Rá	Róng	Róng
Two	Nyis	Nyi	Nhí-zho†
Three	Súm	Súm	Súm-zho
Give	Búh	Bin	Búi
Take	Lan	Ling	Lí

\* These should be Chésa and Saisa I apprehend.

† Zho is an emunerative servile affix like Thampa in the decimal series of Tibetan.

*A passage from Ibn Qotaybah's Adab al Kátib' on Arabic Astronomy ; by A. SPRENGER. Communicated by H. M. ELLIOT, Esq. Foreign Secretary to Govt. of India.*

We find in Arabic two sets of names for stars and constellations. Some are purely Arabic, like *بَدَات نَعَش* (the Bear), others are transcribed or translated from the Greek, as *دَب* (the Bear), and *قَيْقَاوَس* a corruption of *قَيْفَاوَس* (Cepheus). In the same manner we find two totally distinct systems. In one (the purely Arabic) we find names for southern stars which are visible only in Arabia and not in Greece or Babylonia ; the ecliptic is divided into twenty-eight parts, and not into twelve, and, consistently, the year has twenty-eight solar months ; many stars have names of which the Greeks have not taken notice, and they are grouped into constellations in a manner different from that of the Greeks. This system of astronomy rests solely on observation without calculation or generalization.

Greek astronomy seems to have been first introduced among the Arabs by Khálid b. Yazyd, who flourished towards the end of the first century of the Hijrah ; he had several books translated from the Greek into Arabic, and was in possession of a celestial globe which had been made by Ptolemy ;\* and so rapidly did this science take root and spread among the followers of Muhammed, that the Moors in Spain were, as early as the ninth century after Christ, the instructors of their northern neighbours. We find in the writings of the venerable Bede the words *Alidada* *العضادة* and *Almajest* *المجسطى* which bear witness to the Arabic origin of part of his astronomical knowledge. Ever since the time of Khálid, systematical writers on astronomy follow exclusively the Greek system, whilst encyclopædic authors mix the two without much discrimination. The chapter of Ibn Qotaybah on astronomy, though the tendency of the author is philology, is therefore very valuable ; for he carefully excluded every Greek ingredient from it with the exception

\* Kifty's *Bibl. Philosophorum*, the account of this (or globe) is in Casiri II. 417, but not complete : the passage ought to run

وكرة نجا سا من عمل بطلميوس وعليها مكتوب حملت هذه الكرة من الامير  
خالد بن يزيد بن معاوية وانا ملنا ما مضى من زمانها فكان الغا وما يتدين  
خالد بن يزيد بن معاوية وانا ملنا ما مضى من زمانها فكان الغا وما يتدين  
وخمسين سنة (compare the MSS. copy of Kifty in the Lib. of Paris).

perhaps of the names of the signs of the Zodiac, with which the Arabs were probably acquainted long before Muhammed.

The object of Ibn Qotaybah's\* book called the Writer's Manual, ادب الكاتب or according to others اداب الكذاب, is merely to explain the words and terms which occur in the poems, proverbs, &c. of ancient Bedouin poets, we can not therefore expect complete explanations. To supply what I can, I have added some extracts from the *Mabâhij al Fikr* of Wat-wât وطواط of which I believe, there is no copy in Europe, the extracts from this book however must be received with some caution, for the author is not always critical, and the MSS. not always correct; but the extracts from Ibn Qotaybah may be completely relied upon, and they will be found copied under the respective heads in the *Qámús* and *Ciháh* and translated in Freytag's *Dict. Arab. Lat.*

### معرفة فنى السماء والنجوم والازمان والرياح

السماء كل ما علاك و اظلك و منه قيل لسقف الهيت سماء  
و السحاب سماء قال الله عزوجل و انزلنا من السماء ماءً مباركاً يريد  
من السحاب و الفلك مدار النجوم الذي بضمها قال الله عزوجل  
و كل في فلک يسجون سماء فلک لاستبدارته و منه قيل فلکة المغزال  
و قيل فلک ثدي المرأة و للفلك قطبان قطب فى الشمال و قطب  
فى الجنوب متقابلان و مَجْرَة السماء سُميت مَجْرَة لانها كاتر المجر  
و يقال هي شرج السماء و يقال باب السماء و بروج السماء واحدها  
برج و اصل البروج الحصون و القصور قال الله تعالى و لو كنتم في  
بروج مشيدة و اسماءها الحمل و الثور و الجوزا و السرطان و الاسد  
و السنبله و الميزان و العقرب و القوس و الجدي و الدلو و الحوت  
و منازل القمر ثمانية و عشرون منزلاً ينزل القمر كل ليلة بمنزل منها

\* Died A. H. 276.

قال الله تعالى والقمر قدرناه منازل حتى عاد كالعرجون القديم  
والعرب تزعم ان الانواء لها وتسميها نجوم الاخذ لان القمر ياخذ كل  
ليلة في منزل منها والازمنة اربعة ازمنة الربيع وهو عند الناس  
الخريف سمنه العرب ربيعا لان اول المطر يكون فيه وسماه الناس  
خريفا لان الثمار تحترق فيه ودخوله عند حلول الشمس براس  
الميزان ونجومه من هذه المنازل العَفْرُ والزُّبَانِي وَالْاِكْلِيلُ وَالْقَلْبُ  
وَالشُّوْلَةُ وَالذَّعَائِمُ وَالْبَلْدَةُ ثُمَّ الشِّتَاءُ ودخوله عند حلول الشمس  
براس الجدي ونجومه سَعْدُ الذَّابِحِ وَسَعْدُ بُلَاعِ وَسَعْدُ السُّعُودِ وَسَعْدُ  
الْاَخْبِيَةِ وَفَرَعُ الدُّلُو الْمُقَدَّمِ وَفَرَعُ الدُّلُو الْمُؤَخَّرِ وَالرِّشَاءُ ثُمَّ الصَّيْفُ  
وهو عند الناس الربيع ودخوله عند حلول الشمس براس الحمل  
ونجومه الشَّرْطَانُ وَالْبَطْيِينُ وَالثُّرَيَّا وَالذُّبْرَانُ وَالْهَقَّةُ وَالْهَذَعَةُ وَالذِّرَاعُ  
ثُمَّ الْقَيْظُ وهو عند الناس الصيف ودخوله عند حلول الشمس  
براس السرطان ونجومه الذَّرْدَةُ وَالطَّرْفُ وَالْجَبْهَةُ وَالزُّبْرَةُ وَالصَّرْفَةُ  
وَالعَوَاءُ وَالسَّمَكَ وَمَعْنَى النُّوْءِ سَقُوطُ النُّجُومِ مِنْهَا فِي الْمَغْرِبِ مَعَ  
الْفَجْرِ وَطُلُوعِ آخِرِ يِقَابِلِهِ مِنْ سَاعَتِهِ فِي الْمَشْرِقِ وَانْمَاسِي نَوْءًا  
لأنه اذا سقط الغارب نأ الطالع يُدَوُّ نَوْءًا وَذَلِكَ الذَّهْوُصُ هُوَ النُّوْءُ  
وكل ناهض بثقل فقدنا به وبعضهم يجعل النوء السقوط كانه من  
الاضداد وسقوط كل نجم منها في ثلثة عشريوما واقضاء الثمانية  
والعشرين مع انقضاء السنة ثم يرجع الامر الى النجم الاول في  
استيناف السنة المقبلة وكانوا اذا سقط نجم منها وطلع اخر فكان عند

ذلك مطرا وريح او حرّة او برد نسيوه الى الساقط الى ان يسقط الذي بعده فان سقط ولم يكن مطر قيل خوي نجم كذا واخوي وسرّار الشهر وسرّارة اخر ليلة منه لاستمرار القمر وربما استسّر ليلة وربما استسّر ليلتين والبرء اخر ليلة من الشهر سميت بذلك لقبء القمر من الشمس والمحاق ثلث من اخر الشهر سميت بذلك لامّحاق القمر فيها او الشهر والنخيرة اخر يوم من الشهر لانه ينحر الذي يدخل والهلال اول ليلة والثانية والثالثة ثم هو قمر بعد ذلك الى اخر الشهر وليلة السواء ليلة ثلث عشرة ثم ليلة البدر لاربعة عشرة وسمى بدر المبادرته الشمس بالطلوع كانه يعجلها المغيب ويقال سمي بدرا لتمامه وامتلأه وكل شيء ثم فهو بدر ومنه قيل لعشرة الف درهم بدرة لانها تمام العدد ومفتهاه ومنه قيل عين بدرة اي عظمة والعرب تسمى ليا لى الشهر كل ثلث منها باسم فتقول ثلث غرر جمع غرة و غرة كلشئ اوله وثلث نفل وثلث تسع لان اخريوم منها اليوم التاسع وثلث وعشر لان اول يوم منها اليوم العاشر وثلث بيض لانها تبيض بطلوع القمر من اولها الى اخرها وثلث درع وكان القياس درع سميت بذلك لاسوداد او ايلها و ابيضاض سائرهما ومنه قيل شاة درعاء اذا اسود راسها وعنقها و ابيض سايرها وثلث ظلم لاطلامها وثلث حداس لسوادها ثلث دأدى لانها بقايا وثلث محاق لامّحاق القمر فيها او الشهر وللشمس مشرقان ومغربان وكذلك القمر قال الله عز وجل رب المشرقين

و رب المغربين فالشرقان مشرقا الصيف و الشتاء و المغربان مغربا  
الصيف و الشتاء فمشرق الشتاء مطلع الشمس في اقصر يوم من  
السنة و مشرق الصيف مطلع الشمس في اطول يوم من السنة  
و المغربان على نحو ذلك و مشارق الايام و مغاربها في جميع السنة  
بينها ذين المشرقين و المغربين قال الله عزوجل رب المشارق و المغرب  
و سمي النجم نجما بالطلوع يقال نجم السُّرُّ اذا طلع و نجم النجم  
و سمي طارقا لانه يطالع ليلا و كل من اتاك ليلا فقد طرقتك و منه  
قول هند بن عتبة نحن بَنَاتُ طَارِقٍ نَمَشَى عَلَى الذَّمَارِقِ تَرِيدُ اَنْ اَبَانَا  
نَجْمٌ فِي شَرْفِهِ و علوه قال الله تعالى و ما ادرىك ما اطارق النجم  
الثاقب و سمي القمر قمر البياضه و الاقمر الابيض و ليلة قمرء اى  
مضئية و الفجر فجران يقال للاول منهما ذَنَبُ السَّرْحَانِ و هو الفجر  
الكاذب شبهه بذنب السَّرْحَانِ لانه مُسْتَدِقٌّ صَاعِدٌ فِي غَيْرِ اعْتِرَاضٍ  
و الفجر الثاني هو الفجر الصادق الذي يستطير و ينتشر و هو عمود  
الصبح و يقال للشمس ذكاء لانها تذكو كما تذكو النار و للصبح ابن  
ذكاء لانه من ضوءها و قرن الشمس اعلاها و اول ما يبد و منها فى  
الطلوع و مواجبها نواحيها و اياه الشمس ضوءها و الدارة التي حول  
القمر يقال لها الهالة و الرياح اربع الشمال و هى التي تاتي من قبل  
الشام و ذلك عن يمينك اذا استقبلت قبله العراق و هى اذا كانت  
بالصيف حارة بارح و جمعها بوارح و الجنوب تقابلها و الصباياني  
من مطلع الشمس و هى القبول و الدبور تقايلها و كل ربيع جاءت

بين مَبْهَى رِيحَيْنِ فَهِيَ نَكْبَاءٌ لِأَنَّهَا نَكَبَتْ أَيْ عَدَلَتْ عَنْ مَهَابٍ هَذِهِ  
الاربع ودرارِى النجوم عظامها و احدها دُرِّى غير مهموز نسب  
الى الدر لبيضاة وقال ابو محمد و من همز فقال دُرِّى بِالْهَمْزِ اراد  
النجوم التي تطلع عليك و الجدى الذي تعرف به القبلة و هو جدى  
بنات نعش الصغرى و بنات نعش الصغرى بجانب بنات نعش  
الكبرى على مثل تاليفها اربعة منها نعش و ثلاثة بنات فمن الاربعة  
الفرقدان و هما المتقدمان و من البنات الجدى و هو اخرها و السهى  
كوكب خفى في بنات نعش الكبرى و الناس يمتكثون فيه الصبارهم  
و فيه جرى المثل فقيل اُرِيهَا السُّهَى وَ تُرِينِى الْقَمْرَ وَ الْفَكَّةَ كَوَاكِبَ  
مُسْتَدِيرَةً خَلْفَ السَّمَاءِ الرَّامِحِ وَ الْعَامَةِ تَسْمِيهَا قِصْعَةَ الْمَسَاكِينِ  
و قُدَّامَ الْفَكَّةِ السَّمَاءِ الرَّامِحِ سُمِّيَ رَامِحًا بِكَوْكَبٍ يَقْدُمُهُ يَقُولُونَ هُوَ  
رَمْحُهُ وَ السَّمَاءُ الْاَعْزَلُ حُدَّ مَا بَيْنَ الْكَوَاكِبِ الْيَمَانِيَّةِ وَ الشَّامِيَّةِ  
سُمِّيَ اَعْزَلُ كَانَهُ لِاسْلَاحٍ مَعَهُ كَمَا كَانَ لِاٰخَرَ وَ اَلذِّسْرُ الْوَاوِقُ ثَلَاثَةُ اَنْجُمٍ  
كَانَهَا اِثْنَانِي وَ بَا زَايَهُ اَلذِّسْرُ الطَّائِرُ وَ هُوَ ثَلَاثَةُ اَنْجُمٍ مُصَطَفَّةٌ وَ اِنَّمَا  
قِيلَ لِلْاَوَّلِ وَاوَقَ لِأَنَّهُمْ يَجْعَلُونَ اِثْنَيْنِ مِنْهُ جَنَاحِيهِ وَ يَقُولُونَ قَدْ ضَمَّمَهُمَا  
كَانَهُ طَائِرٌ وَ وُقِيلَ لِاٰخَرَ طَائِرٌ لِأَنَّهُمْ يَجْعَلُونَ اِثْنَيْنِ مِنْهُ جَنَاحِيهِ  
وَ يَقُولُونَ قَدْ بَسَطَهُمَا كَانَهُ طَائِرٌ وَ الْعَامَةُ تَسْمِيهَا الْمِيزَانَ وَ الْكَفَّ  
الْخَضِيبَ كَفَّ الثَّرِيَا الْمَبْسُوطَةُ وَ لَهَا كَفٌّ اٰخَرَى يَقَالُ لَهَا الْجَدُّ مَاءٌ  
وَ هِيَ اَسْفَلُ مِنَ الشَّرْطَيْنِ وَ الْعِيُوقُ فِي طَرَفِ الْمَجْرَةِ الْاَيْمَنِ عَلَى  
اَثَرِ ثَلَاثَةِ كَوَاكِبَ بَيْذَةَ يَقَالُ لَهَا الْاَعْلَامُ وَ هِيَ تَوَابِعُ الْعِيُوقِ وَ اَسْفَلُ



العيوق نجم يقال له رجل العيوق وسهيل كوكب احمر منفرد عن الكواكب ولقربه من الافق تراه ابدأ كانه يضطرب قال الشاعر أراقب لوحا من سهيل كانه اذا ما بدا من اخر الليل يطرف وهو من الكواكب اليمانية ومطلعه عن يسار مستقبل قبلة العراق وهو يري في جميع ارض العرب ولا يري في شىء من بلاد ارمينية وبنات نعش تغرب بعدن ولا تغرب في شىء من بلاد ارمينية وبين روية سهيل بالبحجاز وبين روية بالعراق بضع عشرة ليلة وقلب العقرب يطلع على اهل الربذة قبل الذسر بثلاث والذسر يطلع على اهل الكوفة قبل قلب العقرب بسبع وفي مجرى قدمى سهيل من خلفها كواكب و ابيض كبار لا تري بالعراق يسميها اهل البحجاز الاعيار والشعريان احدهما العبور وهي فى الجوزاء والاخرى الغميصا ومع كل واحدة منهما كوكب يقال له المرزم فهما مرزما الشعريين والسعود عشرة اربعة منها ينزل بها القمر وقد ذكرناها و الستة سعد الناشرة وسعد الملك وسعد البهام وسعد الهمام وسعد البارع وسعد مطر وكل سعد منها كوكبان بين كل كوكبين منها في راي العين قدر ذراع وهي متناسقة فهذه الكواكب ومنازل القمر مشاهير الكواكب التي تذكرها العرب فى شعارها واما الخنفس التي ذكرها الله تعالى في كتابه فيقال هي زحل و المشتري والمريخ والزهرة و عطارد و انما سماها خنفسا لانها تسير فى البروج و المنازل كسير الشمس و القمر ثم تخذس اي ترجع بنيا تري احدها في آخر البروج

كُرِّرَاجِعَا إِلَىٰ أَوَّلِهِ وَسَمَّاهَا كُنُسًا لِأَنَّهَا تَكُنُسُ أَي تَسْتَقِرُّ كَمَا تَسْتَقِرُّ  
الظُّبَاءُ وَتَكُنُسُ وَالظُّبَاءُ أَي تَسْتَقِرُّ \*

“*On the heaven, stars, seasons, and winds.*”—“All which is above you is called samá (heaven); therefore the roof of the tent is called samá, and a cloud is called samá. It is said in the Qorân, “We have sent from the samá, i. e. from the cloud blessed water.” Falak (sphere) is the name for the orbit of such stars as it contains. It is said in the Qorân ‘They all swim in a falak.’ The name falak has been chosen (to designate a sphere of the heaven) on account of its round shape; for you say the falkah (ball) of the spindle, you also say the breast of a woman became falak (round).

A sphere has two opposite holes; one in the south and one in the north.—The milkyway is called majarrah because it looks like a beam (supporting a vault); it is also called the sharaj (fissure) of heaven and the gate of heaven. The singular of borúj (signs of the Zodiac) is burj; it means fortress or castle (German, Burg); in this sense the word is used in the Qorân; ‘If you are in strong boruj (fortresses).’ The names of the signs of the Zodiac are: the ram, bull, transit, crab, lion, ear of corn, balance, scorpion, bow, goat, the water-basket, and the fish.

There are twenty-eight mansions of the moon. The moon is every day of the month in another mansion. It is said in the Qorân we have appointed for the moon mansions until she returns to her former place.” The Bedouins were of opinion that the term “anwá” (heliacal settings), is exclusively applied to the mansions of the moon; and they called them the stars of occupation, for the moon occupies every night another mansion.

The year has four seasons: the autumn is now called (by the Arabs settled out of their native country) Kharyf; but the Bedouins called it Raby (fresh grass), for in that season falls the first rain. It is called Kharyf, because people cut their crops in that season. It begins when the sun enters Libra. The sun passes during this season through the following mansions of the moon: ghafr (occultation), zobány, iklyl (crown), qalb (heart), shawlah (the curvature of a tail when raised), na’áyim (the ostriches), baldah (fissure).

Winter begins when the sun enters into the sign of Capricorn. He passes through the following mansions of the moon in this season: sa’d

al-dzabiḥ (the butchering luck), sa'd bola' (the devouring luck), sa'd al-so'úd (the luck of lucks), sa'd al-akhbiyah faragh al-dalw al-moqadam (the foremost trough of the bucket), faragh al-dalw al-mowakhkhar (the hindmost trough of the bucket).

Spring was called çayf by the ancient Arabs, and Raby by the latter Arabs who had settled in cities. It begins when the sun enters into the sign of the Aries. Its mansions are : sharaṭán (the two signs or marks), botazn (the small belly), thorayyá (multitude, i. e. Pleiades), dabrán or dabarán (Hyades), haq'ah (the race-course), han'ah (the curvature), and dzirá (the forearm).

Summer was formerly called qaytz by the Bedouins, and is now called çayf by the towns-people. Its lunar mansions are : nathrah (the back of the nose, the stars are on the nose of the lion), tarf (the eye, viz. of the sign of the lion), jabhah (the forehead), zobrah (the lion's mane between his shoulders), çarfah (returning), 'awwá (the barker or dog), sinsák.

Nawö (heliacal setting), means that one of those stars sets (heliacally) in the west, whilst another rises (heliacally) in the east. The term nawö, which means rising, is used in this instance (for setting), because the setting of one of the mansions of the moon is always accompanied by the rising of another ; some say that nawö means both rising and setting. One of the mansions of the moon sets (heliacally) and another one rises every thirteen days. The twenty-eight mansions make therefore their revolution once a year. If at the setting of a mansion of the moon a change of the weather took place, the Arabs used to ascribe it to the setting mansion, and they thought that it continued to influence the weather until the next mansion would set (the setting mansion, it must be recollected, proceeds towards coming in conjunction with the sun). If a mansion of the moon set and brought no rain it was called "empty."

Sirár or Sirar (occultation), is a term for the last night of the (lunar) month, for the moon becomes invisible, sometimes one and sometimes two nights. Barä (salvation), is equally the name of the last day of the month, for the moon escapes from the sun ; moháq (destruction), is the name for the last three days of the (natural) month, for the moon perishes during them. Naḥyrah (having the throat cut), is also a name for the last day of the month, for the coming month cuts the

throat of the going. The first three days after the moon has become visible she is called hilál, and the remaining days of the month the moon is called qamar. The thirteenth night of the month is called the night of equation, the fourteenth night is called the night of haste (full moon), for she hurries to overtake the sun before he sets and seems to drive him away. Some say that the word badr is to be taken in the meaning of 'completion or fulness' for the moon is then full, you use the word in this sense in calling a purse of 10,000 dirhams badrah, and in calling a full large eye badrah. Every three nights of the month had, with the Bedouins, a separate name. The first three were called ghorar, *plur.* ghorah, which means the first of any thing. The next three nights (4th, 5th, 6th) are called supererogations, the next three are called ninth, for the last of this three nights is the ninth of the lunar month; the next three are called tenth, from the first night of the set; and the next three (14th, 15th, and 16th) are called white on account of the silvery light of the moon, during these three nights, and the next three nights (17th, 18th, and 19th) dora' the regular form would be dor,' for the first half is dark and the other half is moonlight; you call a sheep dar'á if the head and neck is black and the rest of the body white. The next three nights (20th, 21st, 22d) are called dark, the next three (23d, 24th, 25th) are called black, dádiy, because they are a remmant, and the last three nights are called destruction, for the moon perishes.

The sun and moon have two orientes and two occidents. It is therefore said in the Korân "God is the Lord of the two easts, and of the two wests." One is the place where the sun rises and sets in summer, and the other where it rises and sets in winter. The exact place of the east of winter is the point of the horizon where the sun rises in the shortest day of the year, and the east of summer is the point of the horizon where the sun rises in the longest day of the year. The other risings and settings of the sun are between these two extremes; the words (orientes and occidents) are used in the plural in the Korân.

A star is called najm because it rises. You say of a tooth najama, i. e. it comes forth. You also say a star najama, i. e. it rises; a star is also called táriq, for it lights at night. You say of a man who comes to hue at night taraqa, in this sense, says the poetess, Hind b. (bint?) 'otbah: We are the daughters of a táriq, we walk on carpets. She

means to say our father is a star in nobility and height of position. "What do you know of the meaning of *táriq*? it is a bright star."

The moon is called *qamar* because she is white; *aqmar* means white; you say of the night it is *qamrâ* if it is light. There are two dawns, the first is also called the tail of the wolf, it is the false dawn and resemble a wolf's tail, because it is narrow and does not spread; the second is the true dawn which spreads, this is the red of the morning. The sun is called *glowing* for he glows like fire. The morning is hence called the morning of the glowing, (i. e. sun.) The highest part of the sun, which first rises above the horizon is called the horn of the sun. His sides are called *hawájib*; *iyáh* is the light of the sun; *hálah* means the halo of the moon.

There are four cardinal winds: the north wind which comes from *Shám* (left); or from the right if you are in the 'Iraq and place your face towards the *qiblah*. If the north wind is hot in summer it is called *trying*. The opposite wind is called *south wind*. The east wind comes from whence the sun rises, and the west wind comes from the opposite direction. A wind which comes from between two cardinal points is called *declinating*.

A large star is called *dorriyy* without a hamzah (pearly). *Abú Muhammed* says if you pronounce the word *dorriyy* with a hamzah and say *doriy*, it means a star which rises over you.

By the *jady* (polar star) through which you ascertain where the *qiblah* is, the *jady* of the *ursa minor* is meant. The *ursa minor* is close to the *ursa major* and resembles it; four stars are called *na'gh* (bier) and the other three are called *banát* (daughters). The first two of the four are called *farqadán* (the two calves), the last of the *banát* is called *jady* (polar star, literally, he-goat).—*Sohá* is an obscure star in the larger Bear on which people exercise their eyesight, and hence the saying: I show her the *sohá* (talks on subtilities) and she shows me the moon. *Fakka* (languor) is a round constellation (*Corona borealis*) behind the *Arcturus* the common people (*'ámmah*, and not *ghilmah*, as *Freytag* seems to have read) call it the poor man's cup. Before *Arcturus* is the *simák rámi*, (i. e. the *simák* armed with a spear;) it is called armed with a spear because there is a star before it which is called *spear*. The unarmed *simák* (*Spica virginis*) is between the southern and northern stars. The setting vulture consists of three

stars disposed like a julha (i. e. a fire-place consisting of three stones placed like a horse-shoe); opposite is the flying vulture which consists of three stars in a line. The former is called the sitting vulture, for two of its stars are considered as its wings; and it is conceived that the vulture has shut its wings like a bird that sits down. The latter is called the flying vulture, for two stars are considered as expanded wings, resembling those of a flying bird. The common people call this constellation the balance.—The tattooed hand is the open hand of the Pleiades. This constellation has another hand which is called the cut hand and which is below the sharaʿán. The 'ayyúq is on the right (south) side of the milkyway, behind it are three clear stars called marks. The lowest star of the 'ayyúq is called the foot of the 'ayyúq. Canopus is a red isolated star, as it is near the horizon it appears always twinkling. The poet says "I see a board from the Canopus which when it rises towards the end of the night, resembles a twinkling eye. This is a southern star, a man who faces in the 'Iráq the qiblah sees it to his left. It is visible in all Arabia but it is not visible in Armenia. The Bear sets in Aden but never sets in Armenia. You see the Canopus about ten days sooner in the Hijáz than in the 'Iráq. The heart of the Scorpion rises in the country of Rabadzah (which is four days journey from Madynah) three days sooner than the vulture, but at Kúfah the vulture rises before the heart of the Scorpion by seven days. On the track and behind the two feet of Canopus are large white stars, which are not visible in 'Iráq, and which are called Áyár in the Hijáz. Two constellations are called shi'rah (canis), one is called the shi'rá of setting over (the river), (i. e. canis major), and is in the Gemini, the other is called the shi'rá with sore eyes (canis minor). The canis major and minor have each a star called mirjam.

Ten stars are called sa'd (luck); four of them are among the mansions of the moon, and have been mentioned; the remaining six are: luck of the second grass, luck of the king, luck of the chickens, luck of the hero, luck of the distinguished, luck of the rain. Every one of these sa'd consists of two stars which are apparently one cubit from each other. They are regular, and these stars and the mansions of the moon are well known, and frequently mentioned by the ancient Arabic poets.

The Khonnas (retrograde) mentioned in the Qorán, is said to mean,

Saturn, Jupiter, Mars, Venus and Mercury, they have this name, because they move through the zodiac and mansions, like the sun and moon, but then they return; when you see one at the end of the zodiac it returns to the beginning. They are also called *konnas*, for they conceal themselves like “gazelles in their dens.”

The word *nawö*, helical setting of a mansion of the moon, (plur. *anwá*,) is of frequent occurrence in Arabic authors, and several of them have written monographies on the *anwá*, to which the changes of the weather were ascribed, as with us to the quarters of the moon; yet this term seems to have escaped the diligence of Ideler, and its meaning has baffled the learning of Richardson and Freytag; the former explains it: “setting in the west (as a star) in the twilight, another one rising in the east.” A passage from *Watwát*, which bears on the meaning of this term, may therefore be useful.

The mansions of the moon alternately watch each other. The term watching is employed, because one indicates the rise of another, as if one was waiting the setting of its fellow before it rises. The reason is this. The mansions are divided into two sets (or halves) as we have said, viz. the southern, which comprizes fourteen mansions, and the northern, which comprizes the same number. When the first mansion of the southern half rises, the first mansion of the northern sets. The first mansion of the northern set is the *sharatán*, and the first mansion of the southern set is the *ghafr*. When the *sharatán* rises the *ghafr* sets, and so on until the *simák* rises, which is the last mansion of the northern set, and which alternates with the *hút* (fish): the one sets when the other rises the second morning. Rising and setting are not to be taken in the usual meaning, or rising from the horizon; for in this sense, the mansions of the moon rise and set every twenty-four hours. The meaning is this. When the sun approaches to a fixed star or planet, he hides it and it is not visible to the eye of the observer; a star is therefore visible only at night and not at day time, and being in occultation is as much as being not on the sky. The star remains invisible until it is sufficiently distant from the sun; it can first be seen at dawn, for the light of the sun (not of the stars as the MSS. has it) is then weak and does not overpower the light of the stars; the star of the rising mansion can therefore be seen in the east in the morning. This is the meaning of the term “the rise of a mansion.” Its watch-

man becomes at the same time invisible, and this is the meaning of the term "it sets." Fourteen mansions are constantly visible in the hemisphere of the heaven which is above the earth, the other fourteen mansions are concealed under the earth, in the other half of the heaven. To every two and one third mansion corresponds our sign of the zodiac. The mansions of the sharaṭán, botayu and one third of the thorayyá correspond to Aries, &c.

وهذه المنازل بعضها رقيب لبعض و معنى الرقيب هو الذي يعرف به طلوع الاخر كانه يراقب بالطلوع غروب صاحبه والسبب في ذلك هو ان المنازل تنقسم قسمين كما قد منقسم يمانى وهو اربعة عشر منزلة وقسم شامى وعدده ذلك فاذا طلعت المنزلة الاولى من القسم اليماني غربت المنزلة الاولى من القسم الشامى و اول القسم الشامى الشرطان و اول القسم اليماني الغفر فاذا طلعت منزلة الشرطين غابت منزلة الغفر وهكذا الحال الى ان تطلع منزلة السماك وهي اخر منازل القسم الشامى و يغيب منزلة الحوت و غروبها طلوعها مع الفجر الثاني و غروبها مع طلوعها لا طلوعها من الافق و غروبها فيه فان ذلك موجود لها كل يوم و ليلة ولكن المراد به ان الشمس اذا قربت من كوكب من الكواكب الثابتة و المتحركة سترته و اخفته عن عيون الناظرين فصار يظهر نهارا و يخفى ليلا فكان خفاوة غيبة له و لا يزال كذلك خافيا الى ان تغيب عنه الشمس بعدا يمكن فيه ان يظهر لا بصر و ذلك عند اول طلوع الفجر فان ضوء الكواكب يكون ضعيفا حينئذ فلا يغلب نور الكواكب و فيرى الكوكب فى الافق الشرقي ظاهرا و ذلك عبارة عن طلوعه و يخفى في ذلك الوقت رقيبته و هو عبارة عن غروبه فلا يزال اربع عشرة منزلة خافية تحت الارض ابدآ في نصف الفلك و لكل منزلتين و ثلث برج من البروج الا ثنى عشر فالسرطان و البطين و ثلث الشريا للحمل و كذا الى اخر المنازل \*



It seems that the mansions of the moon must be considered as a division of the ecliptic by which the progress of the sun through the vastness of the heavens is measured, and the time of its annual revolution divided into twenty-eight parts or solar months. The motion of the moon has furnished this division. From the observation of the same stars from which the Arabs learned what solar month of the year was, they could also learn the date of the lunar month and even the hour of the night. The lunar mansions were the almanac and dial of the illiterate children of the desert, and they are probably their own invention. As a more precise knowledge of them may be of historical interest, I insert here another passage of *Watwát* (Lib. I. cap. 3) on the subject :—

“As the Arabs (Bedouins) had no knowledge of the results which the ancients had obtained by their observations of the fixed stars, and as they were not acquainted with the stars which might enable them to define the seasons of the year and to fix the time, they observed certain stars and attempted to ascertain by experience to what extent the heliacal setting of every star was true or deceptive (in predicting the weather), and what influence the stars exercise on the temperament and constitution of man when they rise or set. They did not however attend to the signs of the zodiac in their observations, but they divided the sphere of the fixed stars into a number of parts, equal to the number of days of a revolution of the moon, that is to say into twenty-eight. They looked for a sign to mark the distance which the moon passes in twenty-four hours; and called it “stage” (mansion). They began with the two stars in the horn of Aries, called *sharatán*, then they looked out for another star by which to might mark the distance which the moon goes in 24 hours, starting from the *sharatán*, and this star is *botayn*. After the *botayn* comes the *tharayyá*, &c. It is the Arabs who gave names to these stars without reference to the division or signs of the Zodiac, thus the *haq'ah* is one of the stars marking the limit of a mansion of the moon, yet it is not in the Zodiac but in Orion. The term mansion is taken by exact writers in the meaning of a portion of the heavenly sphere equal to one-fourth of one-seventh, i. e. one twenty-eighth of the circumference. It is not more than this, for the moon, in her mean course arrives on the 29th day at the spot from which she started. Mansion means originally the respective arc and not

the star, for the stars are only the limits which divide one mansion from another, but these were called after the stars, and now the names of the stars are applied to the respective mansions. Every mansion has  $13\frac{1}{12}$  days, for this is the result if you divide  $365\frac{1}{4}$ , the number of days of the solar year by 28. The almanack of the mansions is calculated by the solar year, for their apparition (read *ظهورها* instead of *طورها*) is connected with the solar year. Every mansion has therefore thirteen days or degrees. But the solar year is one day and one fourth of a day longer than this period (i. e.  $28 \times 13$  days), therefore one day is added to the last mansion, which is called *jabhat*. To make up for the remaining fourth, a day is intercalated every four years in the mansion of the *jabhah*. The *sharatān* are considered the first mansion, for they are in Aries, which is the first sign of the Zodiac."

ولمالم يصل الى العرب ما حققه القدماء برصدهم من الكواكب  
الثابتة وكان لاغنى لهم عن معرفة كواكب ترشد هم الى العلم  
بفصول السنة وازمنتها رصدوا كواكب وامتنحوا كلامنها بما يصدر  
عنه من صوادق الانواء وكواذيتها وما يحدث من التأثيرات في طبعمهم  
وقامتهم بطوالعها وغواريتها ولم يستعملوها صور البروج على  
حقيقتها لانهم قسموا الفلك المكوكب على مقدار الايام التي يقطعها  
القمر فيها وهي ثمانية وعشرون يوماً وطلبوا في كل قسم منها  
علامة يكون العباد ما بينها في راي العين مقدار مسير القمر في يوم  
وليلة وسموها منزلة وبدعت بالشرطين ثم طلبوا بعد الشرطين علامة  
اخرى تتضمن بعد اليوم والليلة فوجدت البطين وبعد البطين  
الثريا وكذلك سائر الاسماء وهم الذين وضعوا هذه الاسماء عليها  
ولم تلتفت الى البروج واقسامها ومقادير صورها لانهم ادخلوا  
الهقعة في جملة المنازل وليست في البروج وانما هي في الصور  
والمنزلة عند المحققين قطعه من الفلك مقدارها ربع سبع الدور  
وهو جزء من ثمانية وعشرين جزءاً من الفلك وانما لم تكن اكثر  
من هذا القدر لان القمر اذا سار سيرة الوسط انتهى في اليوم التاسع  
والعشرين الى الموضع الذي بدا منه فحذف المكرر فيبقى ثمانية

و عشرون يوما فجعلت المنازل على عدد الايام و المنزلة عبارة عن العصا لا عن الكوكب و انما الكواكب حدود تفرق بين كل منزلة و اخرى فعدل بالتسمية اليها و غلبت عليها و لكل منزلة من الايام ثلاثة عشر يوما و ربع سبع يوما و نصف ثمن سبع يوم على التقريب و سبب ذلك انك اذا قسمت السنة الشمسية التي هي ثلثمائة و خمس و سبعون يوما و ربع يوم بالتقريب على ثمان و عشرين خص كل منزلة ما ذكر من العدد و الكسور و انما اصيف العمل بها الى السنة الشمسية لان طورها و اختفاءها يكون بالنسبة الى الشمس و لما كان الامر كذلك جعل لكل منزلة ثلاثة عشر يوما التي هي ثلاث عشرة درجة من درج الفلك و جميع ما فضل من الكسور على كل ثلثة عشر يوما بعد انقضاء ايام المنازل الثمانية و العشرين فكان يوما و ربعا فجعل يوما في المنزلة التي توافق اخر السنة و هي الجبهة و بقى ربع يوم فسى اربع منين حتي صار يوما فزيد على الجبهة لليلة المذكورة و انما جعل ابتداء المنازل الشرطيين لانها في الحمل و الحمل اول ما عد من البروج و قد ذكرنا السبب الذي من اجله عد الحمل اولاً \*

In the following account of every mansion of the moon I follow the same author, but abridge his text :—

“ Fourteen mansions are northern and called the left mansions, and as many are southern and called the right. When the northern mansions rise (heliacally) the night is longer than the day, and when the southern ones rise the day is longer than the night. The moon either makes her daily stages in the respective mansion or a little before or behind it (but in the same line), or out of the line of the mansions to the north or south.

1. *Sharatán* or *shartán* (dual), sing. *shart* or *sharat*, pl. *ashrát*, which means signs *علامات*. Also called the horn (نطح) I would observe that this and most other pure Arabic terms of returning are obsolete in their common acceptation, or perhaps belong to a dialect, which forms but a slight ingredient into the written language) being, according to those

who paint the constellations, in the horns of Aries. The sharatán are two bright stars, not far asunder north and south; not far from the southern is another and smaller star, which is sometimes added to the preceding two. The setting of the sharatán portends luck. The Arabs say

إذا طلع الشرطان اعتدل الزمان وتخصرت الاوطان وتوافقت الاسنان  
وتهادت الجيران ويات الفقير بكل مكان

“When the sharatán rise (set?), day and night are equal, the country becomes green, the teeth stand opposite each other (?), neighbours make presents to each other, and the poor man may spend the night wherever he likes.”

2. Botayn (the small belly) the diminutive is used because there is a star in the fish called belly (*batn*). Three stars resembling a horse-shoe, somewhat less in magnitude than the sharatán. Those who make drawings of the constellations place them in the belly of Aries.

3. Thorayyá (Pleiades); six small stars; ignorant people believe that there are seven, they are close together and look like sparks. Some say there are twelve, but it would require the eye of Muhammed to see them. This constellation is called al-najm (the star) in the same manner as Venus is called al-kawkab (the star) *par excellence*. The Pleiades are also called the fat sheep's tail *الاية الحمل*; most times the moon does not go into the Pleiades but into Lhyqah *الضيقة* (straits) which is the name of two small stars between the Pleiades and Aldabaran. This is considered as the best and most lucky nawö by the Arabs, and occurs therefore frequently in their poetry. (The rhymes of the Bedouins on this and some other mansions are so much disfigured by errors that they could not be transcribed here).

4. Dabarán is a bright red star, before it (east of it) is a group of many stars, of which two stars are nearer to dabarán than the rest. These are called the two dogs *كلبان* of the dabarán; and the rest its booty *غنيمة* (غنيمة its flock of sheep?) or its camels *قلائص*. The two Bedouin proverbs: “more faithful than dabarán *يعزون الدبران*,” and “more treacherous than the Pleiades *اغدر من الثريان*” are owing to the constancy with which the latter follow the former, who is his faithless love. The dabarán is also called *تابع النجم* and *تالي النجم* and *المجدح* and *حادي النجم* and *الغنيق* and *عين الثور*. It is of the first magnitude.

5. Haq'ah (race-course, *دايرة تكون لسبق الغريم*) three small nebular stars called the jalha (fire-place of three stones disposed like a horse-shoe).

6. Han'ah (curved), five stars resembling a club with a hook at the top called *صوابجة*. Three form a straight line. The third is called the bow of the Gemini *قوس الجوزا*, the fifth is turned back (forms the hook) by about one space towards the south. Astronomers place the han'ah in the foot of the gemini; some call it the bow of the gemini, with which they shoot at the arm of the lion, and give to it eight stars which have the shape of a bow, and of which the two stars which form the han'ah in its more limited sense, form the place where it is held. Others say the han'ah consists of two stars which are very close to each other, and the northern of which is brighter and called the pearl, *در* and the southern is called *الميسان*. Sometimes the moon takes up her quarters in three stars called *النجاتي*, which are opposite the han'ah. Here the moon crosses the northern galaxy.

7. Dzirá' (arm), two stars, one bright the other dark, distant from each other the length of a horse-whip. There are several small stars between them called the nails *الاطفار*. This is the southern of the two arms of a lion and also called *متقبوضة* (shut), the other arm is called *مبسوطة* (expand), they are like each other. Astronomers place the latter in the canis minor. The Bedouins say

اذ طامع الذراع حسرت الشمس القناع واشعلت فى الارض الشعاع وترق السراب  
بكل قاع وكنت انظباء والسباع

“When the dzirá' rises the sun takes off her veil, the coal is lighted on earth, everywhere shines the mirage, and the gazelles and lions go into their dens.”

8. Nathrah is a nebula resembling a portion of a cloud. Astronomers place it into the hut of the crab. This star is called nathrah (bridge of the nose), because on either side there are two small stars called the nostrils of the lion, and before them is his forehead *جبهه*. Some however say that this mansion is mouth of the lion *فم الاسد* some call it the *اللهاة*.

9. Tarf (the eye of the lion), two small stars close to each other, before them are six small stars called by the Bedouins *اسفار* (traveller; this is probably an error instead of *اشفار* eye-lashes); two of these stars

stand symmetrically with the eyes, the other are before them. The Arabs make nearly as much of this mansion as they make of the Pleiades.

10. Jabhah (the forehead of the lion), three bright stars, the middle one is farthest to the east, they form therefore a triangle with long sides and a short base. South of them is a bright very red star called the heart of the lion قلب الاسد. The astronomers place this mansion in the shoulder of Leo. The nawö of this mansion causes high winds.

11. Zobrah, also called الزبرقان and الحراثنان and عرف الاسد, two bright stars two cubits asunder east and west, extending along the equator. They are called haráthán (incisions in the bow to receive the string) because they look like holes in the heaven. Below these two stars are nine lesser ones called hair شعر. These eleven stars together are compared with the mane on the back of the lion and called zobrah. The Arabs say اذا طلع الحراثنان اكلت أم حردان —“when the haráthán rise the small dates of the Hijáz are eaten.”

12. Cirfah, a bright star, it is considered to be the قتب of the lion, which is explained to وعاء القضيبي; close and almost connected with this star are seven very small stars. This mansion is called cirfah, for when it rises with the dawn (in March) the heat returns, and when it sets, the cold; it is therefore said to be the gate of time. Astronomers place it on the tail of Leo.

13. 'Awwâ five bright stars having the figure of J from north to south; four of them are in a line and one turn up. This mansion is also called the buttocks of the lion وركبي الاسد. The Bedouins also likened it to a dog who goes behind the lion. Astronomers place it in the breast of Virgo.

14. The unarmed simák (Spica virginis) is a bright bluish star. On its side is another bright star called the simák, with a spear (Arcturus), for it has a small star in front considered to be its spear. Both simáks are of the first magnitude. The unarmed simák is towards the south of the armed, سماك الرامح. The name simák (a thing with which another thing is raised) has been given to these two stars, because they are near the zenith. The astronomers place the simák in the Spica, عذرا; some times the moon takes up his mansion in four stars in front of the unarmed simák, called عجزا الاسد, (buttocks of the lion) or عرش السماك (seat of

the simák). This mansion is between the southern and northern mansions.

15. Ghafr—three very small stars on a curved line ; astronomers place them between the thighs of Leo. Prophets are born at the nawö of this mansion, which takes place in April.

16. Zobániyán—two bright stars ; astronomers place them in the scales of Libra. They are the length of a man asunder. The Arabs say : اذا طلع ازباني احدث الدهر لكل ذي عيان شاننا ولكل ذي ماشية هوانا .

“When the zobány rises, time assumes a new shape for every one that has eyes, and easy for every animal.”

17. Iklyl (crown), three stars about one cubit asunder, behind the ghafr. They are like a crown upon Scorpio. They are with astronomers on the beam of Libra. The Arabs say : اذا طلع الا كليل . هاجت الفحول و شممت الذبول تخوفت السيدول . “When the crown rises on male animals in heat and rivers dry up.”

18. Qalb—a red bright twinkling star, near two small stars, called نياتي القلب (the vein and artery which issue from the heart) by the Bedouins. Astronomers place this star in the heart of the Scorpion. There are four constellations which are called heart قلب, first the heart of the scorpion, simply called the heart, which has just been mentioned ; second قلب السمكة, third قلب النور, fourth قلب الاسد.

19. Shawlah ; several stars in a curved line resembling the raised tail of a Scorpion, among these are two small stars close together like a double star ; one of them is called by the Bedouins ابرة and the other حمة ; close behind them is another star called تابع . Some people say the moon does not enter the shawlah but remains before it. Sometimes she takes up her mansions in the فقار, which is between the qalb and shawlah, and consists of six white stars in a curved line.

20. Na'áyim—eight stars, the four southern of them are bright, and form an irregular square, and are called واردة, this is the station of the moon. Wáridah means sheep ; or cattle going to drink water, and this name has been given to these stars because they are close to the milky-way, which is likened to a river. The other four stars are called النعام الصادرة (i. e. returned from drinking water), because they are some distance from the milkyway. Astronomers place the wáridah in the hand of Sagittarius, with which he pulls the bow.

21. Baldah—a round fissure in the heaven without a star. Baldah means in the Bedouin dialect a fissure in the ground, *فُرْجَة من الأرض*. This fissure is surrounded by six small stars resembling a bow; some people call them. *أُدْحِي* (ostrich's nest), for not far from it are other stars called *بيض* (eggs) by the Bedouins. The moon sometimes makes her stage in the *odhá*. Astronomers place the baldah in the forehead of Sagittarius.

22. So'úd, (luck,) so called because they bring rain. There are four sa'd: 1st.—Sa'd dzábih—two small stars less than a cubit asunder north and south. Astronomers place it into the horn of Capricorn.

23. 2d. Sa'd bola'—two stars as far asunder as the above mentioned. Astronomers place it in the heel of Aquarius. The epithet devouring is given to this constellation, because at its nawö the rivers and wells being full the earth devours its own water.

24. 3d. Sa'd al-so'úd (luck of lucks). According to some, two stars, as the above, and according to others three, one is bright, the others smaller. Astronomers represent them in the breast of Aquarius. Sometimes the moon makes her stage in the *السعد الناشرة*; the Bedouins say: *إذا طلع سعد السعود ذاب كل جامود واخضر كل عود وانتشر كل مصرود ودفي كل مبرود* "When the sa'd al-so'úd rises, all which is frozen melts, and trees and shrubs come to life again."

25. 4th.—Sa'd al-akhbiyah. Some are of opinion that this mansion is marked by one star which is surrounded by three others. The latter form a triangle, and are the tent *خبا*, of the former star, which is considered to be the sa'd. Others considered the central star as the *pole* of the tent. Astronomers place this mansion on the eastern shoulder of Aquarius.

26. Farazh al-moqaddam, also called farazh al-awwal and farazh al-a'lá—two bright stars apparently about five cubits asunder. Astronomers place it into the northern hip of the horse.

27. Farazh al-mowákhkhar, also called the second or lower (i. e. southern) farazh or dalw. Two stars resembling the preceding; one is north and the other is south. Astronomers place them in the hind quarter of the horse. The moon sometimes stops short and takes up her mansion in the middle of the *عروقي*, and sometimes in the *بلادة الثعلب*.

28. *Hút*, *الحوت*, also called *رشاء*—consists of eighteen small stars which have the shape of a fish, whose head is towards the north and the tail towards the south. To the east of this is a star of the first magnitude



called the navel, *سرقة*, or heart, *قلب*, or belly *بطن* of the fish *السهمكة*, or *الحوث*; sometimes the moon takes up her mansion in the lesser fish, which is farther to the north of the greater fish. These two constellations resemble each other, but the lesser fish is broader and shorter than the greater. Another (the star) of them rises at the same time in the east. *Nawö*, means rising with a weight; some say that *nawö* means also setting, and that this is one of those words which have opposite meanings. The sun is in every one of the mansions of the moon 13 days, and after he has passed through them he returns into the first. If a change of weather takes place when one of these stars sets and another rises, the Arabs ascribe it to the star *thorayyá*, *dabrán*, *haq'ah*, *han'ah* or *dzirá'*. Summer is called *qaytz* by the Bedouins and *çayf* by towns-people, it begins when the sun enters into the Crab. The stars of the mansions of the moon are—*nathrah*, *tarf*, *jabhah*, *zobrah*, *çarfah*, *'awwá* and *simák*.

The meaning of *nawö* (*plur.* *anwá*) is that one of these twenty-eight stars sets in the west in the morning.

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*Notes on the Nidification of Indian Birds. By Captain THOMAS HUTTON, F. G. S.*

(Continued from No. 193, for July 1848.)

No. 21.—“*Psilorhinus occipitalis*.” (Blyth, J. A. S. XV, 27).

“*Pica erythrorhyncha*.” (Gould's Century.)

“*Psilorhinus albicapillus*.” (Blyth, nestling plumage.)

This species occurs at Mussooree throughout the year, collecting into small parties of 4 to 6 during winter. It breeds at an elevation of 5,000 feet in May and June, making a loose nest of twigs externally, lined with roots.

The eggs are from 3 to 5, of a dull greenish ash-grey, blotched and speckled with brown dashes, confluent at the larger end. Diameter  $1\frac{4}{16} \times \frac{13}{16}$  inches. The ends nearly equal in size. The nest is built on trees, sometimes high up; at others about 8 or 10 feet from the ground.

The “*Psilorhinus albicapillus*” of Mr. Blyth, is nothing more than the nestling of this species, as I have fully ascertained this season by

robbing several nests,—the plumage of the young birds agreeing exactly with his published description.

No. 22.—“*Dendrocitta sinensis.*” (Gray.)

*Crypsirina sinensis.* (Hodg. Gray.)

*Pica sinensis.* (Gray.)

*Corvus sinensis.* (Daud.)

Occurs abundantly about 5,000 feet during summer ; more sparingly at greater elevations,—and in the winter it leaves the mountains for the Doon. It breeds in May, on the 27th of which month I took one nest with 3 eggs and another with 3 young ones. The nest is like that of *Psilorhinus occipitalis*, being composed externally of twigs and lined with finer materials, according to the situation,—one nest taken in a deep glen by the side of a stream was lined with the long fibrous leaves of “*mare’s tail*” which grew abundantly by the water’s edge ; another taken much higher on the hill side and away from the water, was lined with tendrils and fine roots. The nest is placed rather low, generally about 8 or 10 feet from the ground, sometimes at the extremity of a horizontal branch, sometimes in the forks of young bushy oaks. The eggs somewhat resemble those of the foregoing species, but are paler and less spotted, being of a dull greenish ash, with brown blotches and spots somewhat thickly clustered at the larger end. Diameter  $1 \frac{2}{16} \times \frac{1}{16} \frac{3}{6}$  inches. Shape ordinary.

No. 23.—“*Geocichla citrina.*” (Blyth.)

*Petrocossyphus citrinus.* (Gray’s Cat.)

*Turdus citrinus.* (Lath.)

*P. pelodes.* (Hodg.) young.

Arrives at an elevation of 5,000 feet about the end of May and returns to the plains in autumn ; it breeds in June, placing the nest in the forky branches of lofty trees, such as oaks and wild cherry ; externally it is sometimes composed of coarse dry grasses somewhat neatly interwoven on the sides,—but hanging down in long straggling ends from the bottom. Within this is a layer of green moss and another of fine dry woody stalks of small plants and a scanty lining at the bottom of fine roots. The eggs are 3 to 4 in number, pale greenish freckled

with rufous; the spots of that colour confluent and forming a patch at the larger end. Diameter  $1 \frac{1}{16} \times \frac{1}{16}^2$  inches. Somewhat gibbous at the larger end.

No. 24.—“*Geocichla unicolor*.”

*Turdus unicolor*. (Tickell & Gould.)

*Petrocincla homochroa*. (Hodg. Gray.)

*Petrocossyphus unicolor*. (Gray's Cat.)

This bird arrives in the hills up to 7,000 feet, and probably higher, about the end of March, the first being heard this year (1848), on the 26th of that month, at 5,000 feet. Every morning and evening it may be heard far and near, pouring forth a short but pleasing song from the very summits of the forest trees. It is a summer visitor only, returning to the plains in early autumn. It breeds in May and June, laying 3 or 4 eggs of a dull greenish white, freckled, blotched and spotted with rufous, sometimes closely,—sometimes widely distributed.

The nest is neatly made of green moss and roots, lined with finer roots, and placed usually against the body of the tree, from whence spring one or two twigs;—sometimes placed upon the broad surface of a thick horizontal branch, or on a projecting knob. The diameter of egg— $1 \frac{1}{16} \times \frac{1}{16}^3$  inches, varying a little. Shape sometimes ordinary ovate; at others more rounded at the smaller end. When shot, the crop usually contained the half-ripe berries of a species of laurel (*L. lanceolatus*?)

The following is the description of a male, shot while singing on the topmost branch of an oak tree (*Quercus incana*.)

Bill yellow, as also the rim of the eyelid, gape, inside of mouth and the legs.—Iris brown.—Length 9 inches. Wing from bend  $4 \frac{3}{4}$  inches. Above uniform pale slate-grey;—throat, breast, and sides ash colour, the former palest and nearly white on the chin. Belly and under tail coverts pure white; under wing coverts bright ferruginous. Nails yellow, length of bill to gape  $1 \frac{2}{16}$  inches. Tarse  $1 \frac{1}{16}$  inches.

Female. Bill wax-yellow with dusky about the nostrils; legs and feet wax-yellow; Iris brown; length 9 inches;—wing from bend  $4 \frac{7}{8}$  inches; bill to gape  $1 \frac{1}{16}$  inches—to forehead  $\frac{7}{8}$  inches. Above uniform dark ashy-gray; chin and throat pale cinereous, bordered by a dark stripe descending from the base of lower mandible, between which the feathers are longitudinally dashed with dark centres; breast and

sides ashy tinged with fulvous ; belly, vent and lower tail-coverts white ; under-wing coverts bright ferruginous ; ear-coverts ashy with pale shafts.\*

The nestling is above like the female, but beneath the throat and chin are purer white in some ;—in others with a rufous tinge, but no spots between the stripes descending from the base of lower mandible, and the breast much spotted with brown ;—scapularies and greater wing-coverts tipped with triangular fulvous spots ascending through the shafts of the feathers. This during the summer months is one of the commonest birds in the hills, especially about 5,000 feet, where their nests are numerous.

No. 25.—“*Myophonus Temminckii*.” (Vigors. Gould.)

*M. metallicus*. (Hodg.)

On the 16th June, I took two nests of this bird, each containing 3 eggs,—and another one containing three nearly fledged young ones. The nest bears a strong resemblance to that of the *Geocichlæ* above noticed, but is much more solid, being composed of a thick bed of green moss externally, lined first with long black fibrous lichens, and then with fine roots. Externally the nest is  $3\frac{1}{2}$  inches deep, but within only  $2\frac{1}{2}$  inches ; the diameter about  $4\frac{3}{4}$  inches, and the thickness of the outer or exposed side is 2 ins.

The eggs are 3 in number, of a greenish ashy, freckled with minute roseate specks, which become confluent and form a patch at the larger end ; shape ordinarily, and rather gracefully, ovate ; diameter  $1\frac{6}{16} \times \frac{1}{16}\frac{5}{8}$  in.

The elevation at which the nests were found was from 4,000 to 4,500 ft., but the bird is common, except during the breeding season, at all elevations up to the snows, and in the winter it extends its range down into the Doon. In the breeding season it is found chiefly in the glens, in the retired depths of which it constructs its nest ;—it never, like the Thrushes and *Geocichlæ*, builds in trees or bushes, but selects some high towering and almost inaccessible rock forming the side of a deep glen, on the projecting ledges of which, or in the holes from which small boulders have fallen ; it constructs its nest, and where, unless when assailed by man, it rears its young in safety, secure alike from the howling blast and the attacks of wild animals. It is known to the natives by the name of “*Kuljet*,” and to Europeans as the “*Hill Black bird*.”

\* The female of this race is utterly undistinguishable from that of *G. dissimilis*, nobis, J. A. S., XVI, 144.—E. B.

The situation in which the nest is placed is quite unlike that of any other of our Hill Thrushes with which I am acquainted, and the habits of the bird render it far more deserving of the name of *Petrocosyphus* or "*Rock blackbird*," than those to which, in the Catalogue of Mr. Hodgson's Collection, Mr. Gray has assigned that name. Indeed, as applied to the two preceding species, it is altogether a *misnomer*, for they are, in the first place,—not *Blackbirds* or *Merulæ*, as the Greek word "*Cossyphus*" implies,—and in the second place, they are not *Rock* lovers at all, but true forest birds, building in trees and taking their food upon the ground, where they find it in berries and insects among the withered leaves which they expertly turn over with their beaks, and hence the reason why the beak is almost invariably clogged with mud or other dirt. I have never seen these *Geocichlæ* *except in woods*,—whereas "*Myophonus Temminckii*" is as often found in open rocky spots on the skirts of the forest, as among the woods, loving to jump upon some stone or rocky pinnacle, from whence he sends forth a sort of choking chattering song, if such it can be called,—or with an up jerk of the tail, hops away with a loud musical whistle, very much after the manner of the British Blackbird (*M. vulgaris*).<sup>\*</sup> On the southern side of the range at Jerrepanee, elevation about 5,000 ft. the forest is open and scattered among immense bare blocks of stone;—on the northern side of the same range, the forest is dense and contains much underwood. It is remarkable that while the *Geocichlæ* above noticed, are strictly confined to the close forest tracts of the northern side,—*Petrocosyphus cinclorhynchus* (Gray's Cat.) affects the rocky southern forest; I have however occasionally seen the latter on the northern side also, but I cannot call to mind a single instance in which I have seen either *Geocichla citrina* or *G. unicolor* on the southern side. This fact will at once show how little applicable to the latter birds is Mr. Gray's name of *Petrocosyphus*. Mr. Gray may possibly reply to my criticism by asking—"what's in a name?" To which I must respond that in natural history, as with man, a *good name* is most important, and *ought* as much as possible to convey some idea of habits,

<sup>\*</sup> The sweet songster to which Mr. Vigne alludes, as being heard by him, was not this bird, whose song, if such it can be called, is nothing but a subdued grating chatter, as if singing to itself; the song heard by Mr. Vigne was that of *Merula bulboul*, by far the sweetest songster in the Hills.

manners, or markings, so as to assist the naturalist not only in the identification of species, but also lead him to the places where he might expect to find them. But who would ever dream of seeking in the forest's gloom for birds whose name pointed to the fact of their delighting in rocky situations? Yet, if misled by the generic name *Petrocossyphus*, the naturalist should venture to some rock-bestudded mountain in search of the species "*citrinus*" and "*unicolor*"—he would have nothing but his trouble as his reward, for those species are procurable only amidst the boughs and thickets of the forest.

No. 26.—"*Copsychus saularis*," (L.)

*Gryllivora intermedia*, Swainson.

*Dahila docilis*, Hodgson.

Arrives on the hills up to 5,000 ft. and perhaps higher, in the beginning of April. It returns to the Doon and plains in early autumn. It breeds in May, on the 19th of which month I took a nest from a bank by the road side; it was composed of green mosses and lined with very fine roots. Eggs 4; carneau cream colour. Somewhat blistered at the larger end. Diameter  $\frac{1}{8} \times \frac{5}{8}$  ins.

This species delights to sit on the topmost branches of a tree, generally selecting some dry and leafless branch, from whence it utters a pleasing song, which is replied to by another individual at no great distance; when on the ground it hops with the wings half open or drooping, and at each hop it stops to spread and flirt the tail.

No. 27.—"*Stoparola melanops*," (Blyth.)

*Niltava? melanops*. (Gray's Cat.)

*Muscicapa melanops*. (Vigors. Gould.)

This is a common species throughout the mountains up to about 12,000 ft. during summer, arriving about the beginning of March. It breeds in May and June, making a neat nest of green moss in holes of trees, in stumps, and in the holes of banks by the road side. The eggs are 3 to 4 in number, dull white with faint rufous specks at the larger end and somewhat inclined to form a ring.

The bird has a pleasing song. Gould figures this species very faultily, —as the *black* of the lores *does not* pass beyond the eye, as he represents it, and the under tail coverts instead of being uniform pale greenish, are dull blue green, each feather apically barred with dull white. In the winter it leaves Mussooree.

No. 28.—“*Cyornis rubeculoides*.” (Blyth.)

*Niltava rubeculoides*. (Hodg.)

*Phænicura rubeculoides*. (Vigors.)

*Chaitaris brevipes*. (Hodg.)

Arrives in the neighbourhood of Mussooree in April, and breeds in June, on the 13th of which month I took a nest from a hole in a bank by the road side in a retired and unfrequented situation: I afterwards found another nest in a hole of a rock, also in a retired spot. The elevation was about 5,000 ft. Externally the nest is composed of green moss, and lined with black fibrous lichens like hair. The eggs are 4 in number, of a dull and pale olive green, faintly or indistinctly clouded with dull rufous or clay colour. Diameter  $\frac{1}{8} \times \frac{9}{16}$  ins. The male has a very pleasing song which he warbles forth from the midst of some thick bush, seldom exposing itself to view, like *Stoparola melanops*, which delights to perch upon some high exposed twig.

No. 29.—*Sibia capistrata*. (Hodg.)\*

Remains at an elevation of 7,000 ft. throughout the year, but I never saw it under 6,500 ft.;—its loud ringing note of *tittéreeé—tittéreeé twééyó*, quickly repeated, may constantly be heard on wooded banks during summer. It breeds at Mussooree in May, making a neat nest of coarse dry grasses as a foundation, covered laterally with green moss and wool, and lined with fine roots. The number of eggs I did not ascertain, as the nest was destroyed when only one had been deposited, but the colour is pale bluish white freckled with rufous. The nest was placed on a branch of a plum tree in the botanical garden at Mussooree.

No. 30.—“*Dicrurus longicaudatus*.” (A. Hay.)

This species, the only one that visits Mussooree, arrives from the Doon about the middle of March and retires again about September. It is abundant during the summer months, and breeds from the latter end of April till the middle of June, making a very neat nest, which is placed in the bifurcation of a horizontal branch of some tall tree, usually oak trees; it is constructed of grey lichens gathered from the trees, and fine seed-stalks of grasses, firmly and neatly interwoven; with the latter it is also usually lined, although sometimes a black fibrous lichen is used;—externally the materials are kept compactly together, by being plastered over with spiders' webs. It is altogether a light and elegant

\* *Cinlosoma capistratum*, Vigors, v. *Sibia nigriceps*, Hodgson.—E. B.

nest. The shape is circular, somewhat shallow and diameter within 3 inches. The eggs are 3 to 4,—generally the latter number, and so variable in colour and distribution of spots, that until I had shot several specimens and compared them narrowly, I was inclined to think we had more than one species of *Dicrurus* here. I am however now fully convinced that these variable eggs belong to the same species. Sometimes they are dull white with brick red spots openly disposed in form of a rude ring at the larger end; at other times the spots are rufescent claret with duller indistinct ones appearing through the shell;—others are of a deep carneous hue, clouded and coarsely blotched with deep rufescent claret; while again some are faint carneous with large irregular blotches of rufous clay with duller ones beneath the shell. Diameter varying from  $1 \times \frac{1}{6}$ ;—to  $\frac{1}{6} \times \frac{1}{6}$  ins.

No. 31.—“*Campephaga fimbriata*.” (Temm.)

*Campephaga lugubris*. (Gray’s Cat.)

*Cebblephyris lugubris*. (Sundevall.)

*Volvocivora melaschistos*. (Hodg. Gray.)

*Graucalus maculosus*. (McClelland.)

This too is a mere summer visitor in the hills, arriving up to 7,000 ft. about the end of March, and breeding early in May. The nest is small and shallow, placed as in the last in the bifurcation of a horizontal bough of some tall oak tree, and always high up; it is composed externally almost entirely of grey lichens picked from the tree, and lined with bits of very fine roots or thin stalks of leaves. Seen from beneath the tree, the nest appears like a bunch of moss or lichens, and the smallness and frailty would lead one to suppose it incapable of holding two young birds of such size. Externally the nest is compactly held together by being thickly plastered over with cobwebs. The eggs are two in number, of a dull grey green closely and in parts confluent dashed with streaks of dusky brown. Diameter  $\frac{1}{6} \times \frac{1}{6}$  ins.

The bird has a plaintive note which it repeatedly utters while searching through a tree, after the manner of *Collurio Hardwickii*, for insects.

No. 32.—“*Abrornis schisticeps*.” (Hodg.)

*Culicipeta schisticeps*. (Gray’s Cat.)

*Phyllopneste xanthoschistos*. (Hodg.)

A common species at 5,000 ft. and commences building in March. A pair of these birds selected a thick China rose bush trained against



the side of the house, and had completed the nest and laid one egg, when a rat destroyed it. I subsequently took two other nests in May, both placed on the ground in holes in the side of a bank by the road side. In form the nest is a ball with a round lateral entrance and is composed externally of dried grasses and green moss, lined with bits of wool, cotton, feathers, thread and hair. In one I recognized more than one lock of my own child's hair, which had been cut not long before, and had been appropriated by the bird. The eggs are 3 in number and pure white. Diameter  $\frac{1}{16} \times \frac{7}{16}$  ins.

No. 33.—“*Cryptolopha cinereocapilla.*” (Vieillot.)

*Cryptolopha ceylonensis.* (Strick.)

*C. poiocephala.* (Swain.)

*Platyrrhynchus ceylonensis.* (Swain.)

I took a nest of this species on the 18th April in a deep and thickly wooded glen at an elevation of about 4,500 ft. It was placed against the moss-covered trunk of a large tree, growing by the side of a mountain stream, and was neatly and beautifully constructed of green moss fixed in the shape of a watch-pocket at the head of a bed, to the mosses of the tree, (with which it was completely blended,) by numerous threads of spiders' webs. The lining was of the finest grass stalks, no thicker than horsehair,—and beneath the body of the nest depended a long bunch of mosses fastened to the tree with spiders' webs, and serving as a support or cushion on which the nest rested securely. Within this beautifully constructed fabric were 4 small eggs of a dull white colour, with a faint olive tinge and minutely spotted with pale greenish brown, and having a broad and well defined ring of the same, near the larger end. The eggs were set hard. Diameter  $\frac{9}{16} \times \frac{8}{16}$  ins. Shape bluntly ovate.

No. 34.—“*Parus erythrocephalus.*” (Vig.)

Common at Mussooree and in the hills generally throughout the year. It breeds in April and May. The situation chosen is various, as one taken in the former month at Mussooree, 7,000 ft., was placed on the side of a bank among overhanging coarse grass; while another taken in the latter month at 5,000 ft., was built among the same ivy twining round a tree, and at least 14 feet from the ground. It is in shape a round ball with a small lateral entrance, and is composed of green mosses warmly lined with feathers. The eggs are 5 in number,

white with pinkish tinge, and sparingly sprinkled with lilac spots or specks, and having a well defined lilac ring at the large end. Diameter  $\frac{8}{16} \times \frac{6}{16}$  ins.

No. 35.—“*Parus xanthogenys*.” (Vig.)

Common in the hills throughout the year. It breeds in April, in which month a nest containing 4 partly fledged young ones was found at 5,000 ft.; it was constructed of moss, hair and feathers and placed at the bottom of a deep hole in a stump at the foot of an oak tree; the colour of the eggs was not ascertained.

No. 36.—“*Acrocephalus montanus*.” (Gray’s Cat.)

*Salicaria arundinacea?* (Hodg. Gray.)

This species arrives in the hills up to 7,000 ft. at least, in April, when it is very common, and appears in pairs with something of the manner of *Phylloscopus*. The note is a sharp “*tchik-tchik*,” resembling the sound omitted by a flint and steel. It disappears by the end of May, in which month they breed, but owing to the high winds and strong weather experienced in that month in 1848, many nests were left incomplete, and the birds must have departed without breeding. One nest which I took on the 6th May, was a round ball with lateral entrance; placed in a thick barberry bush growing at the side of a deep and sheltered ditch; it was composed of coarse dry grasses externally and lined with finer grass. Eggs 3, and pearl white, with minute scattered specks of rufous, chiefly at the large end; diameter  $\frac{10}{16} \times \frac{8}{16}$  ins. (The high winds which prevailed in May, destroyed an incredible number of the nests of various Doves, *Treron sphenura*, *Garrulus lanceolatus*, &c.)

No. 37.—“*Zosterops palpebrosus*.” (Temm.)

*Z. annulosus*. (Swain.)

*Motacilla madagascariensis*. (Gm.)

*Sylvia madagascariensis*. (Lin. Lath.)

*Motacilla maderaspatana*. (Lin.)

*Sylvia palpebrosa*. (Tem.)

*S. leucops*. (Vieillot.)

*S. annulosa*. (Swain.)

*Zosterops maderaspatana*. (Gray’s Cat.)

These beautiful little birds are exceedingly common at about 5,000 ft. during summer, but I never saw them much higher. They arrive

from the plains about the middle of April, on the 17th of which month I saw a pair commence building in a thick bush of *Hybiscus*? and on the 27th of the same month the nest contained 3 small eggs, hard set. I subsequently took a second from a similar bush, and several from the drooping branches of oak trees, to the twigs of which they were fastened. It is not placed on a branch, but is suspended between two thin twigs, to which it is fastened by floss silk torn from the cocoons of "*Bombyx Huttoni*" (Westwood) and by a few slender fibres of the bark of trees or hair, according to circumstances. So slight and so fragile is the little oval cup, that it is astonishing the mere weight of the parent bird does not bring it to the ground; and yet within it three young ones will often safely outride a gale, that will bring the weightier nests of Jays and Thrushes to the ground. Of seven nests now before me, four are composed externally of little bits of green moss, cotton, seed down, and the silk of the wild mulberry moth torn from the cocoons, with which last material moreover, the others appear to be bound together; within, the lining of two is of the long hairs of the Yák's tail (*Bison pöepagus*) two of which died on the estate where these nests were found; and the third is lined with black human hair; the other three are formed of somewhat different materials, two being externally composed of fine grass stalks, seed down and shreds of bark, so fine as to resemble tow; one is lined with seed down and black fibrous lichens resembling hair; another is lined with fine grass, and a third with a thick coating of pure white silky seed down. In all the seven, the materials of the two sides are wound round the twigs, between which they are suspended like a cradle, and the shape is an ovate cup about the size of half a hen's egg split longitudinally. The diameter and depth are respectively  $2 \times \frac{3}{4}$ ; and  $1\frac{1}{2}$  ins. The eggs usually 3 in number, of a very pale whitish green; diameter  $\frac{8}{16} \times \frac{6}{16}$  ins. The young continue with the old birds for some time after leaving the nest, and are often mixed up with the flocks of *Parus erythrocephalus*. They appear to feed greedily upon the small black berries of a species of *Rhamnus* common in these localities. They depart for the Doon about the end of October.

No. 38.—"*Orthotomus longicauda*." (Gm.)

*O. Bennettii*. (Sykes.)

*O. suthorius*, v. *ruficapillus*, v. *sphænura*. (Hodg. Gray.)

*Motacilla longicauda.* (Gm.)

*M. sutoria.* (Gm.)

*Sylvia guzuratta.* (Lath.)

*O. lingoo.* (Sykes) young.

*O. sepium.* (Skyes) young apud Blyth.

*O. sphænurus.* (Swain.)

*Sylvia ruficapilla.* (Hutton.)

It is very evident from the accounts given both by Mr. Hodgson and Captain Tickell, of the colour of the eggs of supposed *O. longicauda*, that there must either be more than one species confounded under that name, or that they have erroneously attributed to it the eggs of some other species. In the J. A. S. No. 22, for Oct. 1833, I described the nest and eggs of true *O. longicauda*, under the name of *Sylvia ruficapilla*, and similar nests and eggs agreeing in every respect have since fallen under my observation ; in all of these the nest was composed of cotton, wool, vegetable fibre and horsehair, formed in the shape of a deep cup or purse enclosed between two long leaves, the edges of which were sewed to the sides of the nest in a manner to support it, by threads spun by the bird ;—the eggs are 3 to 4, of a white colour, sprinkled with small specks, chiefly at the larger end, of rufous or tawny. Captain Tickell gives the eggs “pale greenish blue, with irregular patches, especially towards the larger end, resembling dried stains of blood, and irregular broken lines scratched round, forming a zone near the large end.” These cannot be the eggs of *O. longicauda*, any more than the “unspotted verditer blue eggs” mentioned by Mr. Hodgson, P. Z. S. 1845. p. 29.

The true *O. longicauda* occurs in the Doon along the southern base of the mountains, but does not ascend even in summer.

(Note.—I fear that in many instances Capt. Tickell has trusted solely to native information, in which case the chances are he has often been deceived ;—I have noted no nest that I did not either take myself, or examine before I allowed it to be touched.)

No. 39.—“*Drymoica criniger.*” (Hodg.)

*Suya criniger.* (Hodg.)

This little bird appears on the hills at about 5,000 ft. in May. A nest taken much lower down on 22nd June was composed of grasses neatly interwoven in the shape of an ovate ball, the smaller end upper-

most and forming the mouth or entrance ; it was lined first with cottony seed down and then with fine grass stalks ; it was suspended among high grass and contained 5 beautiful little eggs of a carneous white colour, thickly freckled with deep rufous, and with a darkish confluent ring of the same at the large end—Diameter  $\frac{11}{16} \times \frac{8}{16}$  ins.—I have seen this species as high as 7,000 ft. in October. It delights to sit on the summit of tall grass or even of an oak, from whence it pours forth a loud and long continued grating note, like the filing of a saw.

No. 40.—“*Pyrgita indica.*” (Jard. Selb.)

This, if really distinct from the European Sparrow, does not appear to be a common bird on the heights,—nor is it nearly so common at 5,000 ft. as it is in the Doon ; yet it cannot be called scarce. It breeds in the caves of buildings and in bushes, making a loose slovenly nest of a round form with lateral entrance ; it is of large size and constructed chiefly of dry grasses or hay externally, and plentifully lined with feathers, bits of cotton and wool. The eggs are pale ash colour, *moderately* sprinkled with specks and dashes of neutral tint, clustering rather thickly at the large end. Diameter  $\frac{13}{16} \times \frac{9}{16}$  ins. Eggs usually about 6 in number. Breeds several times in the year.

No. 41.—“*Francolinus vulgaris.*” (Steph.)

This is a common bird in the Doon, and by no means rare in warm cultivated valleys far in the hills ; it breeds in the hills in June ; and a nest taken by a friend on whose accuracy I can rely, and who shot the old bird, contained 6 eggs of a dull greenish white colour ; the egg appears very large for the size of the bird, and tapers very suddenly to the smaller end ; diameter  $1\frac{1}{2} \times 1\frac{3}{16}$  ins.

There is no preparation of a nest, the eggs being deposited on the bare ground. Called “*Kala-teetur*” by the natives.

No. 42. “*Euplocomus albocristatus.*” (Vigors.)

This species, the “*Kalich*” of the hill men, is found in the hills at all seasons, and is common at every elevation up to the snows. It breeds in May and June. In the latter month I found a nest, by the side of a small water course, composed merely of a few dead leaves and some dry grasses, which had very probably been accumulated by the wind and tempted the bird to deposit her eggs upon them. The spot was concealed by large overhanging ferns, and contained the shells of 8 eggs of a sullied or faint brownish-white like some hens’ eggs ; the tops of all

were neatly cut off as if by a knife, showing that the young ones had escaped, and singular enough I had the day before captured the whole brood, but knowing the almost impossibility of rearing them, had allowed them again to go free. The diameter of the egg is  $2 \times 1\frac{6}{16}$  ins.

In Mr. Gray's Catalogue of the Collection presented to the British Museum by Mr. Hodgson, this and *Phasianus Hamiltonii* are given as synonymes of *Gallophasis leucomelanos*. In this there appears to be some degree of error, for the species are distinct. Mr. Blyth in *epistolá*, writes that "there are" 4 true races and 2 hybrids. Of the former, one is *albo cristatus*; crest rarely very white, the white on the rump always well developed, and found *exclusively* westward of Nipal. *Melanotus* (Blyth), has black crest, and no white on rump; common at Darjeeling; and the Nepalese *leucomelanos* is certainly a cross between these two. *Cuvieri* of Assam, Sylhet, &c. has white on rump, but underparts wholly shining black; and this has produced a mixed race with *lineatus* of Arracan.\* If such be the case, the name of *leucomelanos*, belonging only to a hybrid, and not to a true species, must give place to Gould's name of *albo cristatus*. *Phasianus Hamiltonii* of Gray's Ill. Ind. Zool. looks very like an immature male of the present species, but being from Nipal, is probably an immature hybrid. In the neighbourhood of Mussooree and Simla, we have only *Euplocomus* (*Gallophasis*) *albo cristatus* (*verus*) the others all occurring more to the eastward, as correctly observed by Mr. Blyth. The long white crest is seldom or perhaps never found except in fully mature birds, it being generally of a dirty or dusky hue like that figured in Gould's Century; every place however is now so thoroughly poached over by native shikarrees, that an old white-crested bird is extremely rare.

No. 43.—"*Pucrasia macrolopha*." (Gray's Cat.)

*Phasianus pucrasse*. (Gray. Griff. An. King.)

*Gallophasis pucrasia*. (Hodg. Gray.)

For the eggs of this species I am also indebted to a friend who took them in June from the ground, where there was no other symptom of a nest than a slight scratching away of the leaves and grass. The eggs were 5 in number, of a sandy brown, sprinkled over with specks, and

\* Since the above was written, I have seen the series of specimens of these birds preserved in the Society's museum, and fully concur in Mr. Blyth's opinion.

large spots and blotches of deep red brown resembling dried blood. The diameter was  $2\frac{1}{16} \times 1\frac{7}{16}$  ins. Shape ordinary, and altogether a very close miniature of the egg of *Lophophorus Impeyanus*. This bird occurs in the hills at all seasons, from Mussooree to the snows, and bears several names, such as “*Plass*” at Simla, “*Koklass*” at Mussooree, and “*Pocrass*” farther to the eastward.

No. 44.—“*Phasianus Wallichii*.”

*Lophophorus Wallichii*. (Hardw.)

*Phasianus Stacei*. (Vigors.)

This beautiful species is likewise truly a hill bird, being found at all seasons. Its egg is pure white and of the ordinary shape, but the number not ascertained. It is known as the “*Cheer*,” and “*Buncheel*.”

No. 45.—“*Lophophorus Impeyanus*.”

*Phasianus Impeyanus*. (Lath.)

*L. refulgens*. (Temm.)

These birds do not occur so low down as Mussooree, but are found in abundance on the next range; in days of yore they were found at Simla, but civilization has of late years banished them to the less disturbed localities. It makes no nest, but lays its eggs on the ground; the number not satisfactorily ascertained, as one nest contained 3 and another 4 eggs of a pale brown or sandy hue, thickly sprinkled over with reddish brown spots and dashes.

The diameter  $2\frac{1}{2} \times 1\frac{1}{16}$  ins. Shape ordinary. Called “*Monaul*.”

No. 46.—“*Tragopan Hastingsii*.” (Vigors).

A pair of these birds kept in confinement produced 2 eggs in June, both of which were destroyed by the male; the colour was pale rufous brown like what are usually termed in this country (India) “game hen’s eggs.” These birds are only found on the loftier hills along the confines of the snow. They lived contentedly in confinement and became exceedingly tame. In the catalogue above referred to, Mr. Gray gives *Satyra melanocephala* of Hardwicke’s Ill. Ind. Zool. Plates 46, 47, 48. as synonymous with Gould’s *Tragopan Hastingsii*. This is again erroneous, for the plates quoted, unless intended as caricatures, can never represent *T. Hastingsii* in any state of plumage. Plate 46. gives what is termed “the adult male” and although agreeing pretty well in other respects with *T. Hastingsii*, it is represented with “ochreous yellow

wattles' whereas in living specimens of the latter species, the wattles are of a *bright metallic ultramarine blue* ; those on the head are usually concealed beneath the feathers, and are only occasionally exerted when the bird is excited, but never erected as represented in plate 46. Again Plate 47 represents no phase of plumage of *T. Hastingsii*, while Plate 48, purporting to be a female, is in all probability the young male of some other species,—but is assuredly not the female of *T. Hastingsii*, which is correctly figured by Gould in his *Century of Himalayan Birds* ; a comparison of his plate with that of Mr. Gray's *Ill. Ind. Zool.* will, I think, be sufficient to convince any one of the total distinctness of the birds represented. I therefore reject Gray's *Synonymes in toto*, and retain *T. Hastingsii* as an undoubtedly good species, peculiar to the snowy regions of the *North Western Himalaya* ; while *Satyra melanocephala*, if it be a species at all, must be sought for farther to the *Eastward* of the range.\* At Simla called "*Jahjee* ;" at Mussooree "*Jwire* ;" by Europeans the "*Argus Pheasant*."

\* We doubt altogether the existence of more than two Himalayan species of this genus, *Hastingsii* in the N. W., and *cornutus* in the S. W. A third exists in the Chinese *Temminckii* ; and fine specimens of all are in the Society's Museum.—E. B.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR DECEMBER, 1848.

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The usual monthly meeting was held at the Society's House on Wednesday evening, 6th December.

The Hon'ble the President in the chair.

The minutes of proceedings of the November meeting were read, and the accounts and vouchers for November submitted.

The following gentlemen, duly proposed and seconded at the November meeting, were ballotted for and unanimously elected :—

*T. A. Anstruther, Esq.* Madras, C. S.

*Rev. J. Richards*, Chaplain, Madras Establishment.

*Wm. Macintosh, Esq.* was proposed by Mr. Alex. Mitchell, seconded by Rev. J. Long, as a candidate for election at the January meeting.

Letters were read—

From Dr. Jameson, withdrawing his name from the list of members in consequence of an application made to Mr. Jameson, by the Librarian, for a book supposed to have been in his possession.

From F. J. Halliday, Esq. Officiating Secretary to Govt. of India, Home Department, dated 25th November, transmitting a list received from Capt. Kittoe, of the pieces of sculpture presented by Government, as recorded in the Proceedings of last meeting.

*List.*

1. Large erect figure of Sakhya, with kneeling attendant.
2. Large erect figure with six arms, holding the attributes of Brahma.
3. Large seated figure of Buddha on lion and elephant throne, with a figure of a female dancing on a prostrate Gunesha ; height 5 ft.
4. Large seated figure of Buddha ; 4 ft.
5. Six-armed figure seated ; same attributes as No. 2 ; height 3 ft.
6. Erect figure of Buddha and attendants ; 3 ft.

7. Female figure of Pudmavati, or Mahamaya on lion throne, inscription ; 3 ft.
8. A very elegant erect figure, 2' 6".
9. A small Buddha seated ; 2 ft.
10. An erect (female) figure, two attendants, with inscription—"Sri Balchundra," 1' 10".
11. A Budhiswata or prince, 1' 8".
12. Small four-armed male figure, 8".
13. A small figure of Budhiswut with inscription ; 2'.
14. A remarkable fragment of a figure of a fat man seated on lotus-stool ; 3.
15. Figure representing the Nirvan or death of Sakhya, beneath the two trees, with his disciples lamenting, and heavenly musicians playing.
16. Fragment of a beautiful miniature Chaitya (not sent).
17. Ditto of a Chaitya figure of Budhiswatus and inscriptions (not sent).
18. Shiva and Parbutti ; the Siva has six arms ; from the Chaitya at Poonaha.
19. Siva and Parbutti and ten Avatars, from the Chaitya ditto.
20. A Guryogh in two pieces ; in shape of a monster with a trunk.
21. A seated figure of Buddha in two pieces with attendant figures ; 3'.
22. A large erect figure of Sakhya with royal umbrella, attendants ; 4' 6".
23. A broken figure with six arms ; in two pieces.
24. Seated Buddha on lion throne ; 3' 6".
25. Large figure (erect) of Mahamaya ; 6 ft.
26. A small pillar.
27. Seven small Chaityas.

(Sd.) M. KITTOE, Capt.

*Archæological Enquirer.*

(True Copy)

FRED. JAS. HALLIDAY,

*Offg. Secy to the Govt. of India.*

From H. A. Harland, Esq. M. D. Genl. Secretary Honkong Branch of Royal Asiatic Society, forwarding a copy of the Transactions of the Society for the past year.

From the Secretary Royal Asiatic Society, London, dated 1st Sept., calling for payment of subscription to the Oriental Translation Fund for 1847-48, (£21.) Payment directed accordingly.

From Henry Vincent Bayley, Esq. dated London, August 19th, requesting co-operation in the preparation of a revised edition of his Bengal and Agra Gazetteer. The Librarian was directed to afford the information required.

From Dr. Campbell, Darjeeling, communicated by the Hon'ble the President, giving a summary report of Dr. Hooker's progress in the eastern Himalaya.

From Dr. Campbell, forwarding, with a chart, a note on some of the results of Colonel Waugh's operations in the Great Trigonometrical Survey of the Himalaya near Darjeeling.

From B. H. Hodgson, Esq. Darjeeling, forwarding a paper entitled 'Anatomy of Ailurus, Porcula, and Stylocerus, with sundry emendatory notes.'

From the same, on the Aborigines of India.

From Capt. Newbold, Madras Army, forwarding notes on the rocks of the Mokattam Chain and of the eastern desert of Egypt, by Hekekyan Bey, Honorary Member Asiatic Society.

The Secretary then read the following extracts from a Report from Oriental Section :—

*To Dr. W. B. O'SHAUGHNESSY, Secretary to the Asiatic Society of Bengal.*

*Dated Asiatic Society, the 2nd Dec. 1848.*

SIR,—By direction of the Oriental Section I have the honour to acknowledge the receipt of your letter, dated the 6th ult., requesting the opinion of the Section on several subjects of reference.

1. With regard to Mr. Kœnig's books, I submitted a report to the Section, on the strength of which I recommended the immediate purchase and despatch of the books asked for by Mr. Kœnig, the money to be gradually repaid by the sale of Mr. Kœnig's publications. The Section, however, are against the purchases alluded to, without receiving further explanation as to the source whence the expenditure on behalf of Mr. Kœnig is to be defrayed, or some certainty that the Society will not be a loser by the measure. Nor do they think that the Society are at all called on to act in the matter. At any rate they wish the case to be submitted to a general meeting of the Society.

Among Mr. Kœnig's books, there are some of great value, which ought to be in the library of every Oriental scholar, for instance : "Westergaard's Radices Sancrit," "Koregarten's Pancha Tantra," "Bœthlink's Panini," "Lassen's Indian Antiquities," etc., and I have no doubt that the books will sell soon, if their prices be reduced. I submit for the approval of the Section and the Council a list at reduced prices.

2. The Section have not expressed their opinion about the arrangement of the sculptures, referred to in Mr. Bushby's letter.

3. The Section approve of the reduction in the prices of the Society's books, and submit a list recommending a still greater reduction of the prices.

4. The Section approve of the proposition to publish the Kámanduk Níti Sha'stra, in the Oriental Journal.

5. The Section would recommend the Society to subscribe to at least 20 copies of Mr. Corcoran's work.

6. The Section consider Mr. Laidlay's translation of Fa Hian, with its numerous original notes, a valuable addition to Oriental Literature, and recommend to subscribe to at least 30 copies.

7. I take this opportunity to invite the attention of the Society to a work of the highest importance for Oriental literature, viz. Lassen's "Indische Alterthumskunde" (Indian Antiquities). It is of a very comprehensive character, embracing the political, religious and social history of India. In fact it contains the result of the previous researches in India, and is founded on the most diligent study of the various branches of Hindu literature, monuments, inscriptions, etc. as well as on the information of the adjacent nations and of travellers in India. The work is dedicated to the Asiatic Society in very flattering terms. I add a translation of the dedication for the information of the Society.

8. The books and original enclosures are herewith returned.

I have the honour to be, Sir,

Your most obedient servant,

E. ROER,

*Secy. Oriental Section of Asiatic Society.*

*To the Secretary Asiatic Society.*

SIR,—I beg leave to bring to the notice of the Asiatic Society a rare and interesting manuscript lately received from Capt. Kittoe, and respectfully suggest, if it shall meet with the approbation of the Oriental Section, to publish it in the 'Bibliotheca Indica.'

The work is entitled the "*Polity of Kámandaki*" (कामन्दकीय नीतिशास्त्र) and was composed about the end of the fourth century before Christ, by a disciple of the celebrated minister—Vishnugupta. It treats of the duties of man as a member of society; of the principles and form of civil government as prevalent amongst the Hindus; of the rights and privileges of kings and ministers: of the art of fortification; of the principles of military tactics;—in short, of all the branches of political science, which engaged the attention of Hindu statesmen at the time of Chandragupta. It is perhaps the only work of its kind that is known to exist, and considered with reference to the state of civilization in India about the time of Alexander's expedition, possesses a strong claim upon the attention of the Society.

It comprises twenty chapters, which together with an English version, and notes, would occupy about 120 pages of the Oriental Journal.

I am, Sir

Your obedient Servant,

RAJENDRALAL MITTRA.

*Asiatic Society, 1st Nov. 1848.*

*To the Secretary to the Asiatic Society of Bengal.*

SIR,—Being of opinion that the sale of the Society's Oriental Publications would be greatly promoted if the enclosed reduced scale of prices were adopted, I beg to submit it to you for your approbation and recommendation to the Society.

I am, Sir,

Your obedient servant,

RAJENDRALAL MITTRA.

*Asiatic Society, 25th Oct. 1848.*

*Names of Books.*

|                                                                  | <i>Present price.</i> | <i>Proposed reduction.</i> | <i>Proposed price.</i> |
|------------------------------------------------------------------|-----------------------|----------------------------|------------------------|
| Mahabharata, an Epic Poem, 4 vols.4to.                           | Rs. 40                | 8                          | 32                     |
| Index to ditto, 4 vols. 4to.                                     | 6                     | 2                          | 4                      |
| Naishada Churita, or adventures of Nala Raja, 1 vol. 8vo.        | 6                     | 2                          | 4                      |
| Susruta, 2 vols. 8vo. ; vol. I. pp. 368 ; vol. II. 562 pp.       | 8                     | 2                          | 6                      |
| Harivansa, 1 vol. 4to. 563 pages.                                | 5                     | 1                          | 4                      |
| Rajatarangini, 1 vol. 4to. pp. 440.                              | 5                     | 1                          | 4                      |
| Fatawe Alamgiri, 6 vols. 4to.                                    | 48                    | none                       | 48                     |
| Ináyá, 3 vols. 4to.                                              | 24                    | none                       | 24                     |
| Khazunat ul Ilm, a Treatise on Mathematics, 1 vol. 4to. pp. 694, | 8                     | 4                          | 4                      |
| Jawame ul Ilm ul Riázi, 1 vol. 4to. with 11 plates, pp. 168,     | 4                     | 1-8                        | 2-8                    |
| Anisul Mosharrahín, 1 vol 4to. pp. 541.                          | 5                     | 2                          | 3                      |
| Sharaya ul Islam, 1 vol. 4to. pp. 641.                           | 8                     | 3                          | 5                      |
| Istallahat e Sufia, 1 vol. 8vo. pp. 168.                         | 5                     | 3                          | 2                      |
| Tarikh e Nadiri, 1 vol. 4to. pp. 386.                            | 8                     | 4                          | 4                      |
| Tibetan Grammar, 1 vol 4to. 256 pages,                           | 8                     | 2                          | 6                      |
| Tibetan Dictionary, 1 vol. 4to. 373 pages,                       | 10                    | 8                          | 2                      |

Much discussion having ensued on the presentation of this report, regarding the purchase of the books required for Mr. Kœnig—

It was proposed by W. Seton Karr, Esq. seconded by Capt. Latter, and agreed unanimously,

“That in the case now before the Society, Mr. Koenig has a right to expect that the books furnished to him in March, 1847, be forwarded, and that the Society do procure and despatch them accordingly as soon as possible, but also that for the future the Society do abstain from disbursing or pledging itself to disburse sums in the purchase of works *not* published by the Society, for individuals in Europe, which sums are only to be prospectively repaid by the sale of works received from such individuals, the Society not considering themselves in the light of purchasing agent for any parties.”

The other recommendations of the Section were unanimously agreed to, as well as a subscription for 100 copies of Mr. Laidlay’s version of the travels of Fa Hian.

The Hon’ble the President then brought to the notice of the Society the loss they had sustained in the death of their distinguished Honorary Member, Mr. David Hiram Williams, and proposed the following resolution, which was unanimously agreed to:—

“Resolved, that the Society desires to record its sense of the loss which this Society, as well as the public service, has sustained by the premature death of DAVID HIRAM WILLIAMS, Esq., the Superintendent of the Geological Survey, and an Honorary member of the Asiatic Society of Bengal.”

“Resolved, that the above resolution be communicated by the Secretary to Mr. Williams’ family.”

The Curators and Librarian having submitted their usual reports, the meeting adjourned to January, 1849.

(Signed) W. B. O’SHAUGHNESSY,  
*Secretary.*

*Report of the Curator Musuem Economic Geology for the month of November.*

*Geology and Mineralogy.*—I can do but little more this month than record what has been received, having but just restored this department of the Musuem to some order.

From Captain H. L. Thuillier—Deputy Surveyor General. Eight Coloured Lithographic Impressions of Captain Sherwill’s Geological Map of Zillah Monghyr and Bhaugulpore.

W. Bracken, Esq. C. S.—A specimen of Fibrous Gypsum from America.

I have put into the form of a paper for the Journal my notice of the magnificent mass of Meteoric Iron now exhibited, which is the gift of our indefa-

tigable associate and contributor Capt. Sherwill, B. N. I. and refer our readers to that paper for full details of the examination of it.

*Economic Geology.*—From the late D. H. Williams, Esq. Company's Geologist, we have received specimens of two new beds of Coal, the exact locality of which is not given, but the one is stated to be from a new locality 15 or 20 miles to the south-east of Hazareebagh, and the other from two new beds in the Damooda Coal field; and specimens of Iron ore, also from the Hazareebagh and Burdwan districts.

From Messrs. Jardine, Skinner and Co. a specimen of Coal from Newcastle, N. S. Wales, from which part of the world we hitherto had no specimens for comparison if required.

From J. Homfray, Esq. some small but highly curious specimens of the Ball Coal from the Seetarampore Colliery in Burdwan, of all sizes, from that of a walnut to a small Cheshire cheese. Mr. Homfray has also presented the Museum with another splendid specimen, which appears to be the carbonised and flattened stem of a tree, the first tree stem, I think, of any kind, which has been found in the Coal in this country.

Mr. Homfray's letter is as follows:—

MY DEAR MR. PIDDINGTON,—I have now the pleasure to send you some specimens of the "Boulders of Coal" from a new Colliery opened upon the same vein of Coal as that to which my printed notice refers. The largest boulder I think very unique, and some of the small ones still more so, but you will observe that in some pieces I have sent there are 2 small boulders or nodules close to each other, and imbedded in the circumjacent Coal remarkably—the boulders having their concentric layers of Coal, whilst the masses in which they are imbedded has the layers *horizontally* disposed.

There is one specimen which has the appearance of the stem of a tree, as though it had been cut across. The layers of Coal are also concentric, just similar to those in the stems of trees—this specimen was originally about 3 feet in height, but broke across in its carriage from the Colliery to this place. I am still very undecided what to say about the formation of the balls, the manner in which they originally increased by additional coats of carbonaceous matter, or, if you please, Coal. About 175 feet above the Coal vein are found the Ironstone measures 43 feet in thickness, and having several veins of Ironstone, some of which are what we call *ball Ironstone*. In my survey of the Palamow Coal July 1837) recorded in the Coal Committee's Report, (page 159, and section, p. 162,) the Ironstone thence alluded to contains beautiful "Ball Ironstone," and in page 163 you will see the allusion to the existence of pebbles and rounded conglomerates in the sandstone overlying one of the veins of Coal. I mention these to call your attention to the fact of its having been

now eleven years under notice. I had occasion to send home some copies of my printed Coal Survey reports to Glamorganshire, and it has been the means of arousing attention to the same circumstances as to Boulders of Coal being found in veins of Coal which have *horizontal layers*. An old acquaintance, Mr. Benson of Swansea, an extensive Coal Miner and Copper Smelter, at the late meeting of the British Association, read a paper on the Boulder Coal found in a vein of Coal. I send you the paper, which is interesting enough, but I must not be deprived of my priority of its public notification, which now stands as recorded in the Society's Journal, as well as in my printed reports of 1842.

I beg you to take care of the paper, not having any other Copy, and request you to return it as soon as you conveniently can.

1st Nov. 1848.

Your's truly,

J. HOMFRAY.

P. S. It may be interesting to some persons to know that the locality of this new Colliery whence these Boulders are taken, is situated *less* than one mile from the site of the *oldest* Colliery in that district opened by Mr. Heatly near Aytura village, and upon the same vein.

*"The following is an extract from Mr. Benson's paper."*

"Mr. Benson next read a communication on a boulder of Cannel Coal found in a vein of common bituminous Coal.

About ten years since, Mr. Logan noticed the frequent coal and iron stone conglomerates occurring in the sandstones of the Town Hill, near Swansea. His attention was first awakened to the subject from the discovery of an undoubted boulder of Cannel Coal above the seam of common bituminous coal, called the Five-feet Rock Vein, at Penclawdd. The series of coal measures included in the Pennant rock are easily traceable throughout the South Wales Coal field, from the greater hardness of their sandstone, and their elevation as a nearly continuous range of hills. It would appear that whilst the sandstones and slabs of the coal measures below the Pennant rocks have been deposited or formed in comparatively quiet water the sandstones of the Pennant series contain frequent conglomerates of coal and ironstones, drifted plants, and occasionally small boulders of granite, with other proofs of drift to a considerable extent having occurred during the period of their formation. Bivalve shells are also found in considerable masses in the shales below the Pennant group, both on the north and south outcrop, evidently showing that they now repose unmoved from their original beds, whilst the only shells I have yet seen on the Pennant were at a short



distance from the Penclawdd seam, which is one of the lowest in that series. During the present year another boulder of cannel coal, was discovered in the Penclawdd seam, which the workman who found it positively affirms to have been in the vein of bituminous coal. The boulder is 13 inches long, 7 wide, and 3 thick, one corner having been broken off after it had become rounded by attrition, probably a short time prior to its arrival at the spot in which it was found; a siliceous cement has coated a part of the surface of this fracture, has filled the cavity caused by another fracture and also attaches a piece of rock to the boulder. The Penclawdd five feet vein, is about 300 yards in geological position below the quarries of the Town Hill sandstone, and throughout this depth there would appear to be frequent instances of drift and false beds of coal: in some specimens the pebbles of the older or drift coal having from their greater hardness, penetrated into and distorted the drift plants, which have since become coated with the newer coal. One or two other pieces of cannel coal have been found at Penclawdd, but as these were discovered in the heap of bituminous coal, after it had been raised to the surface, and from exposure to the air had heated, and slacked, they may have originally formed parts of large boulders, and their present angular form is no certain proof of their having been derived from other beds in the immediate locality. In the subjacent measures of the South Wales coal field, some seams associated with regular seams of cannel coal are known to exist about 700 yards below the Penclawdd vein, and laying conformably with it. In alluding to the boulder he discovered Mr. Logan remarks:

“To suppose that the boulder is derived from the lower seams, after they had been indurated, converted, and crystallized, would, it is apprehended, be carrying the age of the whole deposit to the extent that has never yet been conceived and is perhaps inadmissible for it is not easy to account for any mode in which a fragment of them, without a disturbance of the stratification, which yet exhibits none of a requisite order, could be displaced and conveyed to the newer beds whilst forming. It is therefore, safer to refer the boulder to some anterior deposit of coal, perhaps no longer in existence.\* To attempt to determine whether these boulders of cannel coal are derived from the lower measures, or from some anterior deposit, I have not been able to collect sufficient data, but some pieces of the top stone of the Penclawdd vein may be interesting, as they show that a conglomerate of small pebbles of ironstone, apparently identical in quality with the large deposits of ironstone of the lower measures, has been deposited within a few inches of the top of the Penclawdd vein of coal. If the boulders have been derived from the lower veins of the

\* See Journal for January, p. 60, in which, with reference to our Indian Ball Coal, the same view is expressed.—H. P.

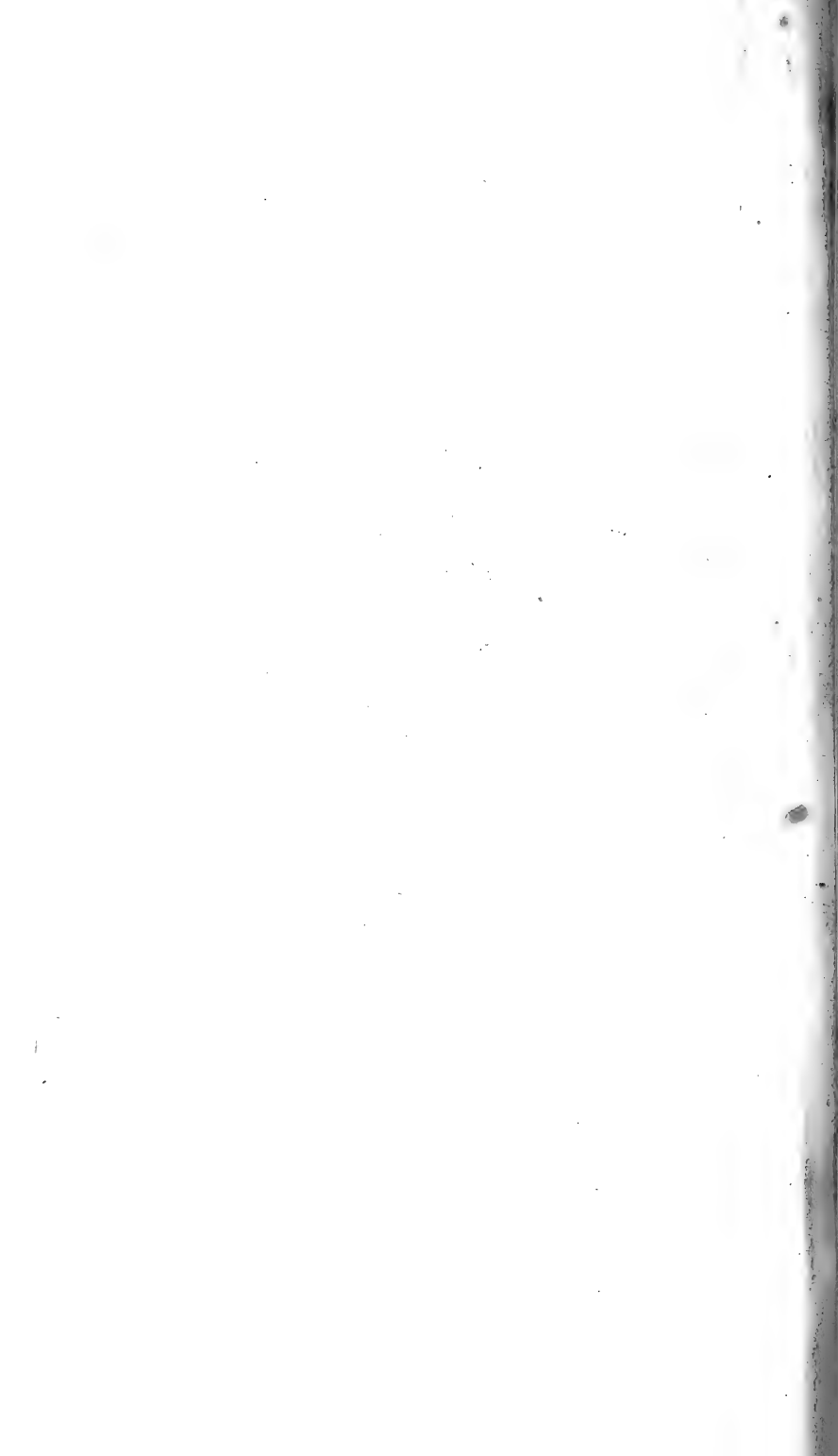
series, they may probably have been supplied from partial destruction of the lower measures at the south-west corner of the basin, previous to the formation of the veins included in the Pennant series of sandstones. It may have occurred, that during the gradual subsidence of the land beneath the estuary or basin in which the successive strata of coal, sand, and shale have been deposited, communication between such basin and the larger seas have been formed or enlarged, and that the detritus of the lower measures, thus exposed to the action of the sea, has from time to time supplied the boulders and drift during the formation of the Pennant series. The greater coarseness of the Pennant sandstones, and the frequent conglomerates and marks of drift, infer that these deposits have occurred frequently under the action of the rough sea, rather than of the quiet lake, and if the boulders of granite should, upon examination, be found to be equivalent to that of Pembrokeshire, it would rather point to the line of drift. The destruction of a portion of the lower beds before the deposit of the higher, might, as I have ventured to suggest, have been effected without disturbing the conformity of the lower and Pennant measures on the existing portions of the coal field. The question whether a large portion of the coal measures has or has not been cut off by the anticlinal line of Cefu Bryn, would not affect the suggestion; as this upheaving of the old red sandstone equally distorts the higher and lower measures, and probably occurred when the present coal field was again raised above the level of the waters. But if the suggestion is admitted as deserving of further enquiry, namely, that these boulders are derived from the lower veins of the same coal field, the inference (and a question of considerable interest it is) would follow, that sufficient time has elapsed between the deposit of each vein to allow the perfect crystallization and formation of the vein below it. It also yields information interesting with reference to the ascertaining of the manner of the formation of the coal; as it would infer, that the material of which, in this instance, the bituminous vein was formed, was originally too soft and yielding, notwithstanding its present hardness and density, to fracture the boulder during the period of pressure necessary for its formation, and also that the chemical agents acting, or escaping during the formation of the bituminous coal, do not appear to have in any way affected the cannel coal deposited within it."

It will be noted that Mr. Benson speaks of boulders of *Cannel Coal*, which renders these facts still more extraordinary. I have not been able to examine our boulders, yet having some other researches on hand which are not yet completed.

H. PIDDINGTON.

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SKETCH MAP  
 OF THE POSITIONS  
 OF THE BRITISH AND SIKH ARMIES  
 IN THE  
 BATTLE OF CHILLIANWALLA  
 NEAR THE JELUM, HYDASPES  
 13<sup>th</sup> JANUARY 1819

FOR THE JOURNAL OF THE ASIATIC SOCIETY OF BENGAL



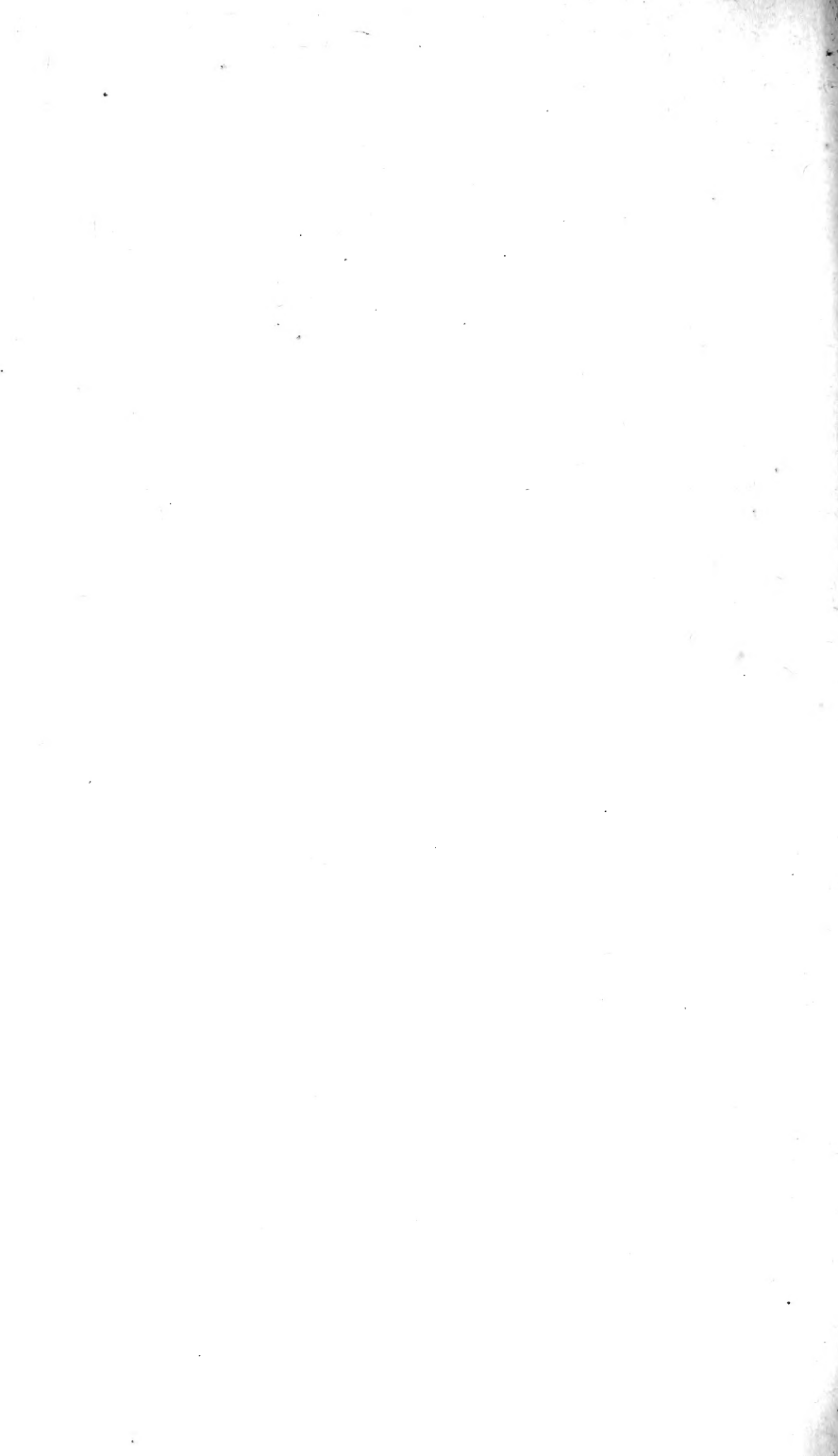












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