

he would have lost his power. "Horses and hawks," he wrote back, "are to be found with rich nobles at the courts of kings; I a poor Zemindar have nothing of the kind, but I can send you a fat cow if you please."

Futteh Khan left several children, but the three eldest (who are by one mother) alone claim notice.

The first, Mokurrib Khan, the present chief, will be described in another place. He was on bad terms with his father, and for eight years before the death of the latter had lived apart from him.

The second, Alum Khan, is a good looking, well disposed, intelligent lad, under twenty years of age, and was the favourite of his father, who, a little before his death, sounded his friends as to the possibility of setting aside in his favour the claims of Mokurrib Khan to the succession. He was checked by the honest bluntness of his Cazi, who exclaimed before them all, "Death to your house!—would you murder both your children?"

The history of the third son, Mudduh Khan, gives a curious picture of the state of society among the Eusofzyes. He is now about fourteen years old; at the age of eleven he drew his sword on his tutor, who had struck him, and ran away from his father's house, to which he could never be induced to come back. He found refuge with Mokurrib Khan, who resided independent of Futteh Khan in a fort some eight miles from Punjtar, and having (in the manner related of Nadir Shah,) formed into a band several children of his own age, he carried on a sort of war with his father, plundering his sugar-canes, and otherwise annoying him. Futteh Khan would never allow the name of the boy to be pronounced in his presence. A few hours before his death, when he was distributing his property among his children, the Cazi ventured to remind him of Mudduh Khan: "Who names that infidel?" said the dying man, "he is no child of mine."

Of the minor chiefs of the Sum, who deserve notice here, the principal is Arsilla Khan of Zaideb, who, having been on bad terms with his neighbours of Punjtar, was in a manner forced to save himself from ruin by seeking the protection of the Sikhs, strengthened by whom, he is now the most powerful of the chiefs of the plain. The Komalzyes have two chiefs of influence, Khadir Khan of Gooroo Mejar, and Ahmed Khan of Hatti Murdan; of the latter, mention is made in the narrative.

Mir Khan of Sudoom, known generally by the name of the Mir, is the most powerful of the Amazyes. His experience, firmness, and courage have gained him much respect, and enable him to rule with a stricter hand than the Eusofzyes will in general submit to. The Muchehi family (mentioned in the narrative) have however scarcely less influence among the Amazyes. Besides these, there are a few chiefs, who will be mentioned in the sequel, who have lately been turned out of their possessions by the Sikhs and Arsilla Khan.

It is easier to learn the general character of the chiefs above named, than to form a just conception of their power and resources. Mokurrib Khan's influence, for example, may be said to extend over a great part of the Sum, but his actual authority is limited to about seventy villages, (in these the smaller ones called "Bandas" are not included) from most, if not all of which he draws the "Aoshr" or tithe, with this, and the produce of his lands (the return from which is however but trifling) the "Jizeea," or tax on the Hindoos, the tax on the fakeers (or villains) and now and then some plunder from the Sikhs, he is able to maintain an efficient body of 1,500, or perhaps 2,000 foot men; and 5,000 of his tribe will rally round him on emergency. To his soldiers he gives but three rupees a month; but living is very cheap in this frugal country, where flesh is rarely eaten, and a fowl is a luxury. Mokurrib Khan has but few horsemen; he was endeavouring to raise a corps when I left him. His father is said to have left about 30,000 rupees in cash, besides valuable property in shawls, &c. the accumulated plunder of years. Arсила Khan keeps up more horses than any other chief of the plain, but if the Sikhs left the country, he would sink into insignificance, and would be obliged to make terms with Mokurrib. Ahmed Khan and others are well inclined towards him, (for he is a liberal man, and bears a fair character) and would not permit him to be altogether crushed by the Punjtaris.

Of the military strength of the other chiefs, it is not worth speaking; each of them keeps up from two to six hundred followers, horse and foot, chiefly the latter, and they have the power of raising their clans, and have much influence in the "Jeergas," or public meetings, which assemble, to discuss all the more important questions.

The Eusofzyes, as before remarked, are not the only inhabitants of the Sum. Leaving for the present the original possessors of the country, who are now reduced to the condition of Helots; the other tribes are the Gudoons, the Khuttuks, the Baezyes, and the Mamunzyes (the Mahomedzyes of Elphinstone); but these last may be considered as separate from the Sum, and will not be further mentioned here.

The Gudoons, called also Gudans, and east of the Indus, Judoons, are a Kaukur tribe, who migrated into these parts, perhaps two centuries ago. They are divided into two great branches, Salar and Munsoor, of whom the first are settled to the east of Punjtar, and the rest in Drumtourt. The Salars are said to have 64 villages, and to muster 6,000 matchlocks; their government is a democracy, more-rigid than that even of the Eusofzyes. I was nearly causing a quarrel at Grenduf, their chief town, by inadvertently asking who was their head Mullik. We were much struck by the appearance of wealth and comfort of their villages, which are large and populous,

and the Hindoos seemed to be more numerous and thriving amongst them, than in any part of the country we visited.

The Khuttuks occupy the left bank of the Sundi,⁷ from below Noushera to Jehangiri. They have not more than fifteen or twenty villages; and their position has forced them to pay obedience to the Sikhs.

The Baezyes, whose numbers I have heard rated at 12,000 fighting men, are also Khuttuks, but they have for a long time been a separate and distinct tribe. Of their history I know nothing. They are always spoken of as the richest people in the country, and many of the Hindoos settled amongst them are said to possess great wealth. This is not improbable, as one of the principal roads from the north to Peshawar runs through their territory, and an active commerce is carried on, on either side of them, in salt, cloths, &c.

Like the Gudoons, the Baezyes are governed by petty Mulliks, and have always preserved their independence against all foreign enemies. Of the population of the Sum, I can only form a guess of the probable amount, some data I had collected on the subject having been carried off by the Khyberees, but it may not perhaps be very inaccurately rated at one lac of fighting men. All the tribes above mentioned have the same manners and customs, and (including the Eusofs) may, without hesitation, be pronounced the best irregular soldiers in Afghanistan. Their cavalry, which are so few in number as scarcely to deserve notice, are from their mode of training and equipment rather Hindostanee than Afghan. The mass and strength of the Eusofzyes is infantry. Most of the soldiers, and every man is a soldier, are armed with heavy matchlocks; others have long spears, which they use with singular dexterity, either on horse or foot; a few are clothed in chain armour; and some use even bows and arrows of formidable size. They generally avoid close fighting, though if forced to it, they have the character of being excellent swordsmen.

It is said, that they have some idea of opposing cavalry by forming into close masses, or "Goles," with their spears extended; but this I have never seen, and am inclined to doubt. At whatever time of the day or night the "Nakara," or drum is beat in a particular measure, every man able to bear arm snatches them up, and hurries, ready for action, to his particular "Hoojra," or public meeting room, of which there are from eight to twenty in every village; and from thence, in distinct parties, under separate flags, they proceed to the scene of action, and despising the protection of walls, advance singly into the plain. A total want of discipline and order now distinguishes them. They have no head; each party, or "Hoojra," acts independently; and even those under one flag, will not always obey one leader.

We have here the strength, and weakness of the Eusofzyes: their number and alertness, their courage, sharpened by incessant fighting, and ex-

pertness in the use of their weapons, render them formidable to the irregular troops, but their peculiar mode of warfare incapacitates them from contending against a regular army. It is evident that a body of disciplined cavalry could, with the greatest facility, put to rout and cut up a herd of men scattered here and there over a level plain, totally ignorant of tactics, and without unanimity. We need no further proof of their incompetence to contend on the plain with even semi-disciplined troops, than is afforded us by the battle of Noushera, in which though stimulated to the utmost by religious enthusiasm, they were defeated by less than a third of their numbers.

Of the Kohistan, my information, is, I must confess, very imperfect, and will be here limited to nearly a barren detail of names.

The tribes of Booneer and the neighbouring hills, may be said to have no chiefs of any importance, the only individuals possessing influence being a family of Syuds, the descendant of Peer Baba, a celebrated saint, who lived in the time of the Emperor Humaioon.

Of this family, there are three principal branches amongst the Eusofs. The representatives of the elder and most influential branch are, Syud Azim and Syud Meeah of Tukhtabund, the capital of Booneer, who may be compared to the Abbot Boniface and Subfriar Eustace of the novel; Syud Azim, the elder, a good-natured, indolent character, having willingly resigned his authority to his more active and talented brother. The second branch is Syud Akber Meeah, of Sitana on the Indus; and the third, Syud Rusool of Chumla.

Chumla, only separated from Booneer by a low range of hills, is nearly in the power of the latter; however, unless when some popular question is agitated, it is able to maintain its independence. It is divided among three proprietors. A colony of Komalzyes occupy the west portion; Noagee the chief town is the property of Syud Rusool; and the rest belongs to Mahomed Khan, a relation of the Punjtär family, on which indeed he is in some degree dependent.

The tribes of Swat differ from those of Booneer in paying more obedience to their Khans, and being less under the direction of their Syuds. Their most influential, religious character, is Mooreed Sahebzadeh of Oochoond, near Thanneh; but the respect paid him is variable and unequal.

In Upper Swat there are four principal chiefs. The most northerly is Pshuh Khan of Sundi, of whom I only know the name; next to him in position is Mudar Khan of Mingoweer, below whom are Kashun Khan, the son of Arsilla Khan of Bandeh (whose family were at one time of much consequence among the Eusofs) and Khadir Khan of Hodigram.

Lower Swat has but two chiefs who deserve mention. One is Zydoollah Khan, who was originally in joint power with Passund Khan at Thanneh,

but the latter has lately been turned out and reduced to insignificance by his elder brother; the other chief is Khyroollah Khan of Alla Dund. He has only lately succeeded his cousin Euayutoollah Khan, who submitted to the Sikhs, and went to Lahore to pay his respects. The indignant tribe, deposed him in favour of his son, but the son has also been turned out by Khyroollah.*

Of all the Eusofzyes, the most powerful is Ghazan Khan of Deer², but he is perfectly aware of the delicate tenor on which he holds his authority, and in consequence is anxious to form connections with any power which may strengthen him in his rule. He intrigues with this view with the Douranees and with the Sikhs, and he is fast friends with the Bajore chief, and with the rulers of Cashgar and Chitrane. But the two first he would willingly betray, and the last he plunders whenever he gets an opportunity.

There is one chief who, though not an Eusofzye, yet from his position in the midst of, and intimate connection with, the Eusofzyes, and his singular history and character, must not be omitted in a description of the Eusofzye country.

Paieendah Khan, of Tanawul, is a Mogul of the Birlas tribe, the same from which the Ameer Timoor was descended. All record of the first settlement in Tanawul of his family is lost, and it has long ago broken off all connection with the other branches of the Birlas, which are still to be found in Turkestan.

The Tanawulees, who from their dialect, a corrupt Hindoostani, seem to be of eastern origin, are divided into two "tuppahs," the principal of which is Pulal, the other Hindowal, and these two divisions are, or were, respectively governed by two branches of the Birlas family.

Paieendah Khan is descended from the junior branch, the Khans of the Hindowal, who had little power till the time of Nawab Khan, (father of Paieendah) whose father having been killed by the chief of the Pulala, set himself up against them. Nawab Khan had the advantage of possessing the Douranee road, and enriched himself by a toll on all who travelled his way. The Douranees were constantly passing and repassing to and from Cashmeer, and their pride, as may well be conceived, could ill brook paying tribute to a petty tribe like the Tanawulees; much quarrelling and heart burning was the consequence. The celebrated Noorjehan, more commonly known by the name of Adè, or *the mother*, the Baumizye mother of Futteh Khan vuzeer, was *en route* to Cashmeer, on a visit to Mahomed Azeem Khan, the governor. Toll was as usual demanded, not of her however or her party, who out of respect were to pass free, but of some people who followed her camp for protection. At this even the haughty lady took umbrage, and other causes of offence not being wanting, an army was sent under Jubar Khan to punish Nawab Khan. That chief had no option but to give himself up. He was re-

ceived courteously, promises of favour and protection were showered on him, and he was requested to send for his family, when a maintenance and a place of residence would be fixed for them.

This last request opened the eyes of the prisoner to the intentions of his captors; he pretended compliance, however, with their wishes, and requested only that "Jam pans" (litters) might be sent with his son Paieendah Khan (then a lad, 17 years old) to bring the ladies. As the cortege was starting, Nawab Khan took his son aside, and whispered in his ear, "Take care of yourself, consider me as a dead man, and give me your prayers." When the party reached the Tanawul territory, Paieendah Khan broke the fine "Jam pans," and stripping the servants of Azeem Khan, sent them back to their master with the message—"My father is in your hands—do what you please with him; me, you will never get into your clutches again."

A heavy stone was tied to Nawab Khan, and he was thrown into the river. From this time, Paieendah Khan has been a sort of wild man, at war with all around him. Driven from his home, east of the Indus, by the Afghans, the Sikhs, and the Pulals, who had partially submitted to Runjeit Singh, and whose chief, Surbulund Khan, is now at Lahore, Paieendah Khan took possession of Am, on the right bank of the Indus, which originally belonged to the Pulals, and from thence, for twenty six years, has never ceased to carry on a series of depredations on the Sikhs and all who submitted to them. He boasts that he has four different times raised an army of Ghazis, who have all fallen martyrs in the cause. Of his first band only three men are alive, and they are literally one mass of wounds. Am is a small nook of land, only a few hundred yards square, shut in between the deep and rapid Indus, and the lofty chain of the Mabeen¹⁰ hills, which close in upon it in a crescent.

The only road to it from the south, is over a difficult path cut in the face of the rocks which over hang the river. This and a somewhat similar spot higher up, called Chutter bai (where his son resides), and a few villages on the left bank of the Indus, are all the lands of which Paieendah Khan can now boast. The aggregate return from them is said not to exceed two thousand rupees a year, but by his forays on the Sikhs, he is able to maintain 1,000 paid soldiers; and he is openly and secretly assisted by 3,000 or 4,000 of the Tanawulees.

He seizes Hindoos, from the wealthy of whom he extorts money; some he forces to labour in chains; others he compels to become Mussulmans, and if they are refractory, he ties a stone round their necks, and flings them into the river;—no oaths or ties bind him. He takes money from a village as exemption from plunder one day, and plunders it the next. His own brother even he has stripped of every thing. The Sikhs have numerous forts on the opposite bank of the river; they dare not leave them; his very grass-

cutters insult them every day with impunity. One of these forts commands that in which Paen Khan himself resides. I pointed this out to him; "Would you like to see me take it," said he, "I will do so in half an hour."

In fact the Sikhs are only there by his sufferance; he derives a revenue from them; they paying, that their supplies may not be intercepted; as his band passes under their forts on a plundering expedition, the Sikh soldiers salute him from the walls, and wish him good luck.

The Sikhs some years ago bought off his forays by a jageer; but his cruelty and exactions were such, that the whole country rose, and Runjeit Sing was obliged to send word to him that he would give him the amount of his jageer, but must resume the land itself. Paieendah only answered by levelling with the ground the nearest Sikh village, and retiring again to his fastness. Since Runjeit Singh's death, Paieendah Khan has been more active than ever, and his excursions would certainly extend to the Jhelum, but that his neighbour the Syud of Sitana is his enemy, and the Eusofzyes and Chogurzyes, who inhabit the hills above him, threaten his family, whenever he is known to have left them for more than a few days.

Were there any revolution in the Punjab, to distract the attention of the Sikhs, I should not be surprized at hearing that he had ventured on Cashmeer. He is well acquainted with the road, which is not difficult, and the petty Mussulman chiefs between Tanawul and the valley, would be rather inclined to favour him, than to offer him any opposition.

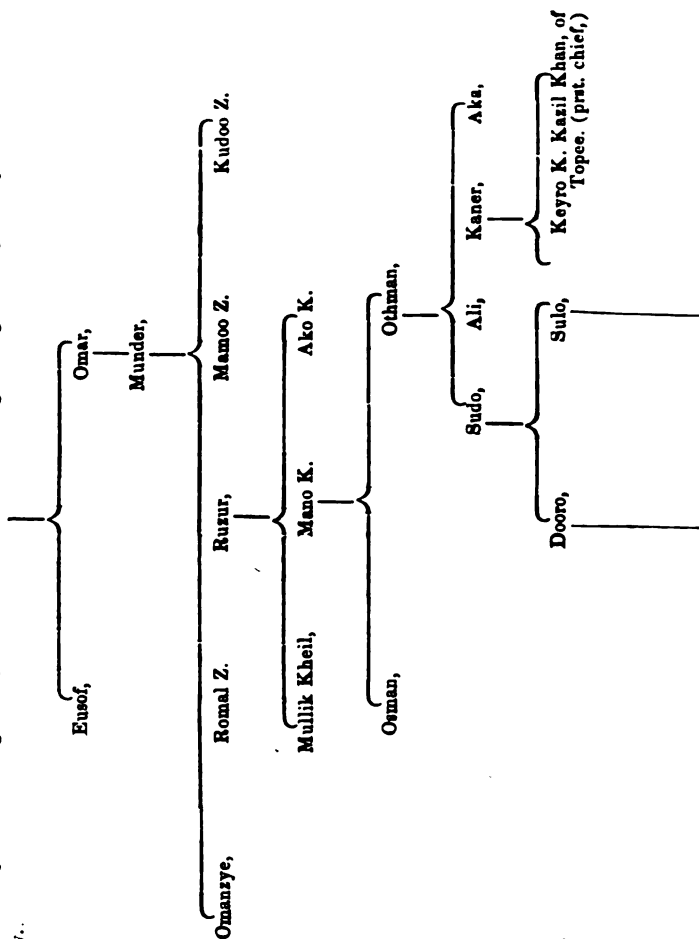
Having thus given a sketch of the principal political features of the country I traversed, the narrative, to which I now proceed, will be more readily understood."

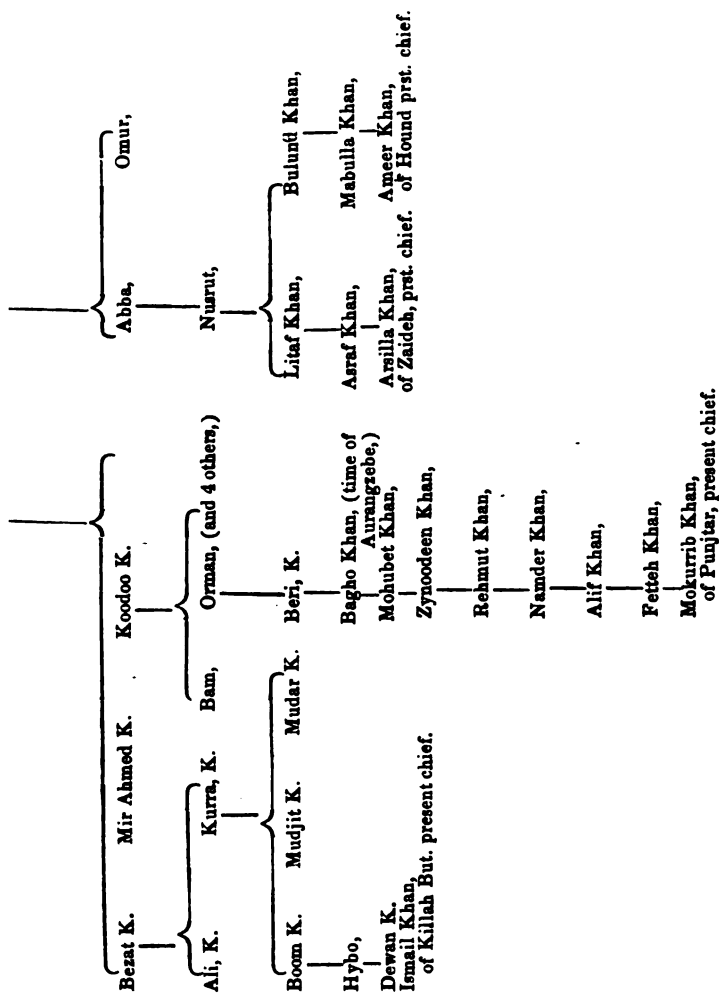
NOTE.—It will be seen from the conclusion of the above paper, that it was but the intended commencement of a series. My poor friend Conolly sent it me with the heading "Part I. Introductory," his object being to follow it up with a Narrative of his Journey in the Eusofzyes country, in January 1840. I was awaiting the completion of the papers to publish them in serial order, when I heard of his death. The information however contained in this paper alone, is of itself not unimportant; and I therefore give it publication as it stands.

It is much to be regretted that we have lost the aid in Afghanistan of so intelligent an observer as the author of this short notice: the similar fate which befel Mr. Lord has deprived us of the result of that gentleman's intimate acquaintance with the character and habits of the Oosbeks, an unfinished narrative of his residence with Meer Morad Beg of Koondooz, written for this Journal, having been found among his papers. Will no one consent to supply what they have left incomplete?



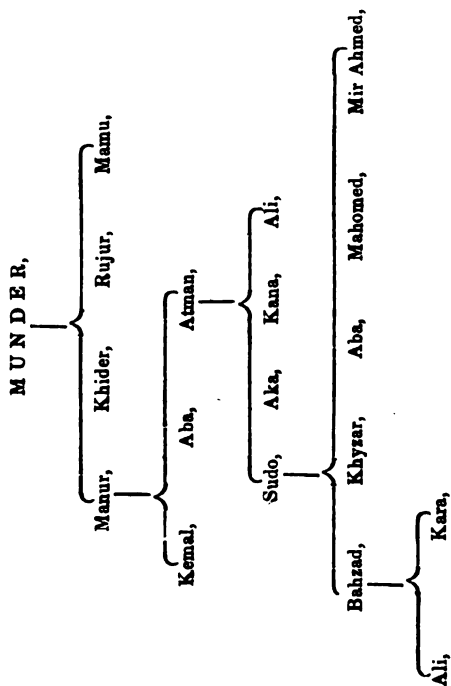
Note 2.—"The whole Munder nation resides in Sammah, which in Persian is called "Hamwareh," situated about Langer Kot," (Kholassat ulanjab, quoted by Dorn). The following Table, collected viva voce from the Eusofzyes, many of whom are proud of their genealogical lore, is useful in rendering intelligible the present political divisions of the country..





Note 3.—This is confirmed by the "Kholasat Ulanab," which mentions Malik Taj Oodeen, the grandfather of Mulik Ahmed, whose descendants are the Malikzyes (Dorn, page 126, notes.)

Note 4.—The Beri Kheil are also, as will be seen by the Table "Sudozyes." The "Makhzen Afghani" gives the following Table of descents from Munder in which the Khanhip is assigned to a different family of the Sudozyes.



[time of Sheer Shah.
Khan Khaju, (who was the chief of the nine lacs of spears of the Eusofzyes in the

Note 5.—Of whose history, a sketch will be given, in the sequel.

Note 6.—The Booneeries (or Booneer wal, as they are more generally called) were the principal sufferers at that battle. Blinded by religious fury, and an undue estimate of their own strength, their only desire was to cut off the retreat of the Sikhs. They are said to have fought rather like devils than men. Moullas, boys, and unveiled women, mingled promiscuously in the fight. For days before, the whole Sum had been a moving mass of men, hastening from the upper country to join in the great struggle which was to vindicate the honour of Islam. Each man carried ten days' provision. No correct estimate has ever been formed of the number of the "Ghazis," which name, in anticipation of victory, they had assumed; the greater part only shared in the flight. Had they delayed one day more, they would have been joined by the Swat army, which never reached the field. But it was impossible to hold them back. The Booneeries, distinguished by their black turbans with a bright yellow border from the rest of the Eusofzyes, who are generally clothed in white, first rushed forward, and by thus precipitating the contest, lost the day their courage deserved to gain. But their reckless valour was of no avail. Their scanty stock of ammunition soon expended, they fought with arrows, spears, swords, stones; one man scrambled up behind the elephant of Phoolra Sing, the real leader of the Sikhs, and cut down that chief with his "silaweh," or long knife. Repeatedly driven back by the steady fire of the Sikhs, they were as often rallied to the charge by the shrieks and curses of the women, and the "Allah ho Akbars" of the maddened Moullas. At last, but not till they were decimated, and every house in Booneer had to mourn its martyr, they broke and fled, cutting through the Sikhs whom they had wished to intercept, and from that time, broken-hearted, they have scarcely ventured to leave their valley. After the battle, dead Booneeries were found lying on dead Sikhs, their teeth still clutching the throats of their adversaries. Though seventeen years have elapsed since the fatal day, so deeply do they still feel their loss, that when unusual merriment has by chance prevailed in a "hoojra," a white-beard has been known to check them with—"Is this a time for laughing, when the bones of your brothers are whitening Noushera?"—Noushera is the common topic of conversation among the Eusofzyes, and the favourite theme of their songs. I was particularly struck with one which commenced,

"Ah Mahomed Azeem, where is the blood of our children you sold at Noushera?"

Chorus, between every line,

"Wae! Wae! Wae!" [b]

Note 7.—The Cabul river, between Peshawar, and the Aba sin, or Indus.

Note 8.—Since this was written, Evayut Oollah has returned from the Punjab, and is struggling to regain his authority. Having money, which his rival has not, he has succeeded in bringing over half his tribe to his side, and a furious civil war is raging. This trip to Lahore has been most disastrous to him. It cost him not only his country, but his eye-sight; a clumsy doctor at the Durbar having under pretence of couching, blinded him.

Note 9.—The history of the father of this chief will be found in Elphinstone.

Note 10.—In the name "Mabun," we have evidently a corruption of "Mea Maha Bun," or the great forest; a title sufficiently appropriate, on account of the pines which cover the mountain.

Note 11.—Of the map which accompanies this memoir, all that can be said, is, that it is better than any one hitherto published of the same country; but our every motion was so watched and misconstrued that we could only take a bearing by stealth, and some important bearings were lost in the Khyber Pass.

[b] I have taken some liberty with the chorus, which is really "wae wae," and which, however melancholy it may sound when chaunted in a low solemn tone by the Afghans, could only appear ridiculous in English characters. It is the most usual chorus of the songs of the eastern Afghans. Mahomed Azeem it is well known (see Conolly and Burnes) shamefully deserted his friends at the battle of Noushera.

Extract from Proceedings of the Numismatic Society of London, 1837-38.

"A Lecture, by Mr. Williams, on the mode of taking casts in sulphur, from coins, medals, and Oriental cylinders, illustrated experimentally.

"The following is the process, as ingeniously described by Mr. Williams:—

"A number of slips of paper, about an inch in width, and of a length sufficient to go somewhat more than once round the coin, or medal, should be first prepared; and also a number of slips of card, not quite half the width of those of paper. The coin is then, to be oiled with a piece of cotton wool, dipped in sweet oil, and as much of the oil as possible wiped off with another piece of wool. The edge of the coin should next be placed about half way at one end of the slip of paper, and the paper rolled round it, a little stiff paste being previously put upon the opposite end of the slip. This will cause it to adhere firmly, and thus form a hoop round the coin, which will be suspended about midway by the edge, and must be retained in that situation by means of one of the slips of card, bent round, and placed beneath it, within the hoop of paper. The object of this arrangement is to cause the opposite sides of the mould to be as nearly as possible of the same size. A little water is then to be poured into a cup, or other vessel, and a sufficient quantity of the finest plaster of Paris lightly sprinkled into the water, leaving sufficient of the latter to cover it. A slight effervescence will take place as soon as the bubbles have ceased rising. The superabundant water is then to be poured off, and the mixture stirred with a spoon. The plaster is now ready for use. A thin coating of plaster is then to be laid on with a small brush, having moderately stiff hairs, over the face of the coin, and the mould filled up to the rim with the spoon. The use of the brush is to prevent bubbles from forming upon the surface of the coin, as these would entirely spoil the mould; and, in order to prevent the accumulation of bubbles in the plaster, which is afterwards poured in, it is advisable to raise the hoop with the coin and plaster in it, about an inch, and let it drop upon the table two or three times. This, of course, must be done immediately after the pouring in of the plaster. The whole is now to be left until the plaster is set, which will usually be in about twenty minutes.

"When this is effected, the under side is to be turned up, the strip of card removed, and any plaster that may have found its way between the edge of the coin and hoop of paper cleared away. The operation of mixing and applying the plaster, must now be repeated; and in about half an hour the plaster will be sufficiently set to allow of the moulds being separated from the coin. The paper must be removed, and great care taken in pulling off the moulds; as, unless they are taken off perfectly straight, they will be injured, in consequence of some of the deeper parts being broken off by the twisting of the mould. Should the mould not yield readily, the bottom of it may be dipped into water, when it usually will very easily come off. Should this however fail, heating the bottom of the mould before the fire, after having wetted it, will frequently have the desired effect. These precautions are necessary, as a gentle force being sufficient to remove the mould, some adhesion may be suspected where more than that appears to be required, which the methods pointed out will usually remove. Any superfluous plaster about the mould must be carefully removed, avoiding all injury to its surface.

"When these moulds are used for making a cast, the bottom must be placed in water so shallow as not to cover the face of the mould. They will imbibe a considerable

quantity, and when they appear to be uniformly damp, they are ready for use. They must now be evenly placed at the proper distance, and in their right position, with a strip of paper passing rather more than three parts round, and held firmly in the fingers, the marks on the mould, made by the end of the hoop of paper in which they were formed, being the guide for their right position. The sulphur having been melted in a proper vessel (the one used by Mr. Williams being a pastry-cook's pattie-pan, with a handle, and a kind of spout made to it,) is now to be poured between the two sides of the mould, by means of the aperture left in consequence of the paper not coming completely round. As the sulphur cools, which is very soon, it shrinks; and the vacancy thus left must be immediately filled up,—this being repeated until the edge is perfectly solid. The moulds are to be removed with the same precautions as when they were taken from the coin, and the edge of the cast carefully pared, and then rendered smooth by being rubbed with a piece of fine sand-paper. Should they be required nearly of the colour of the sulphur, nothing further is requisite, except a slight polishing with a piece of cotton wool, or a soft brush. For his own casts, Mr. Williams has considered it advisable to use an artificial colour, which is given by applying black lead in powder to the casts, with a soft brush, and then covering them with a varnish composed of a solution of dragon's blood in spirits of wine, which gives them a fine dark, bronze appearance.

"Some precautions are necessary to be observed in using the sulphur. When melted, this substance is at first very fluid; as it gets hotter it becomes thick and ropey, and a still greater degree of heat renders it again comparatively fluid. It is, however, fit for casting in the first of these states only, and if employed in the other cases, usually either destroys the mould, or produces a bad cast. The best criterion is to observe when the sulphur begins to solidify round the edges of the vessel in which it has been melted; it may then be used with safety. It also often happens that the first cast taken after the mould has been moistened is a bad one, in consequence of there being too much water upon its surface. A second cast taken immediately, without wetting the mould again, will usually be a good one; and not more than three should be taken without repeating the moistening; for, should the mould be too dry, it cannot be separated from the sulphur without injury. It is also a good plan to place the wetted moulds upon blotting-paper, as it quickly absorbs the superfluous moisture; but this requires some experience, as the mould often gets too dry to be used without subsequent wetting; and the other method is perhaps the safest for beginners. It is often necessary only to dip the fingers in water, and apply it to the back of the mould, to give it the necessary degree of dampness. These are matters, however, for which a little practice and experience are the best guides.

"In the casts made from moulds formed in this manner, it is obvious that the thickness depends upon the resemblance, or the fancy of the caster. Should the exact thickness be required, the following method of making the mould may be resorted to:—

"Here, the coin having been oiled, as in the former case, must be placed with the side which is least raised upon a flat surface, such as a piece of glass, or a slate, which has also been previously oiled. The plaster is applied to the upper surface of the coin with the brush, as before, and the whole is then to be covered with as much of the plaster as may be required. When set, this will separate from the surface upon which it has been placed, and exhibit the coin embedded in the mass. It must be

carefully cleared of the superfluous plaster, leaving a slightly shelving depression round the edge of the coin; and hollows must be made in the flat surface of the surrounding plaster with the point of a knife. This must now be covered with soap-suds, the coin being carefully retained in its place. The operation is now to be repeated upon this surface, as in the first instance, the liquid plaster being poured over the whole of the flat surface of the surrounding plaster. When set, the two parts of the mould will be easily separated, the soap preventing the surface from adhering; and, the coin being taken out, a channel must be cut to the outer edge of the mould, for the passage of the sulphur. When prepared by moistening, as in the former instance, and put together, the raised knobs corresponding with the small hollows made with the point of the knife, will keep all steady; and, the sulphur being poured into the mould through the channel cut for it, a cast of the coin will be produced, exhibiting an exact facsimile of the original.

"From this process, it is not difficult to perceive how casts of small objects of different kinds may be taken; for example, moulds of the cylinders from Babylon or Persepolis. These require to be taken in at least three parts. Having oiled the cylinder, it is to be surrounded with a wide strip of paper, and the portion enclosed taken, say one-third. Having removed this, and carefully trimmed the edges, made hollow in the sides, as in the coin-mould, and soaped them, it is to be replaced upon the cylinder, and another portion taken, say another third, by hooping with paper, &c. as before. This after being separated from the first portion, trimmed, &c. as before, is once more, with the first portion, to be applied to the cylinder hooped with paper, and the third portion taken. When used for casting, after moistening and putting together, a piece of doubled paper may be applied to one end, which may be kept in its place by a finger placed beneath it, and the sulphur poured in at the other end, until the hollow left by the contraction of the sulphur disappears. When cool, the mould is to be removed, and the cast trimmed, cleared of the marks of the junction of the mould, and, if thought fit, black leaded and varnished, as in the case of the coins.

"Mr. Williams concluded with a few words respecting the purchase of plaster of Paris. Of this article there are several qualities; that procured at the oil-shops being the commonest. That which is known by the name of *Super* is the only kind which should be used for moulds; and it is not generally to be obtained except from the actual manufacturers. The best he has met with is prepared by Grande and Sons, Bedford Street, Liqueurpond Street; and sold at the rate of one shilling and sixpence per bag of fourteen pounds; or wholesale at seven shillings per cwt. A bag of seven pounds may, however, be procured.

NOTE.—I have extracted and published this, in the belief that the account of the process may be useful to coin collectors in this country.



*Proceedings of the Asiatic Society.**(Wednesday Evening, 13th January, 1841.)*

The Honorable H. T. PRINSEP in the Chair.

The following gentlemen were proposed as Members:—

Capt. R. FITZGERALD, of Engineers, by the Officiating Secretary, seconded by Lieut A. BROOME of Artillery.

C. B. TREVOR, Esq., C.S. by T. S. TORRENS, Esq., seconded by the Officiating Secretary.

RAJA KHAN BEHADOOR, Khan of Gyah, by the Honorable H. T. PRINSEP, seconded by the Officiating Secretary.

The following gentlemen, have been elected Office-bearers for the current year—

President :

The Honorable Sir EDWARD RYAN,

Vice-Presidents :

The Honorable Sir J. P. GRANT,

—— Sir H. SETON,

—— H. T. PRINSEP,

—— W. W. BIRD.

Committee of Papers :

Major W. N. FORBES,

C. HUFFNAGLE, Esq.,

E. STIRLING, Esq.,

Lieut. A. BROOME,

N. WALLICH, Esq., M. D.

Dr. J. J. HÄBERLIN,

H. H. SPRY, Esq., M. D.

Baboo PROSOONOCOMAR TAGORE.

Professor W. B. O'SHAUGHNESSY,

Library and Museum.

The following books were presented:—

Lardner's Cabinet Cyclopædia—England; vol. 10th,	1
Ditto ditto—Greece, vol. 7th,	1
Madras Journal of Literature and Science, No. 27 April—June, 1840.	1
Edinburgh New Philosophical Journal, by Professor Jameson, No. 57 April—July, 1840.	1
London, Edinburgh, and Dublin, Philosophical Magazine and Journal of Science, 3rd series, vol. 17th, No. 108, August, 1840.	1
Journal des Savants, Juin, 1840,	1
The Calcutta Monthly Journal, 3rd series, No. 71. October 1840,	1
Descriptive Catalogue of the Chinese Collection in Philadelphia, 1839, 8vo. 1	
Transactions of the American Philosophical Society, vol. 6th, pt. 3rd; New series, Philadelphia, 1839,	1
Laws and Regulations of the American Philosophical Society, Philadelphia, 1833,	1
Proceedings of the American Philosophical Society, vol. 1st. Nos. 7, 8, 9, 10, 11, for 1839-40,	5

Transactions of the Geological Society of London, 2nd series, vol 5th, pt. 3rd, London, 1840, 4to.	1
Memoir of a Geological Map of England, by G. B. GREENOUGH, London, 1840, 2nd Edition,	1
Geological Map of England and Wales, by G. B. GREENOUGH, 2nd Edition,	7
Agulhal Light Fund,	1
Oriental Christian Spectator, vol. 1st, No. 10, 2nd series, October 1840,	1
Map shewing the Routes from Jubbulpore to Umurkuntuk, by P. A. Reynolds,	1
Lardner's Cabinet Cyclopædia—Taxidermy,	1
Archæologia, or Miscellaneous Tracts relating to Antiquity, London, 1840, vol. 28th, 4to.	1
Report of the British Association for the Advancement of Science for 1839, 8vo.	1
Wilson's Translation of Vishnu Purana, a System of Hindu Mythology, London, 1840, 4to. (two copies.)	2
Journal of the Royal Asiatic Society of Great Britain and Ireland, London, 1839, No. 10, 8vo.	1
Edinburgh New Philosophical Journal, by Professor Jameson, 1839 and 1840, Nos. 54 and 55, 8vo...	2
Transactions of the Medical and Physical Society of Bombay, 1840, No. 3, 8vo.	1
The Calcutta Monthly Journal and Repository of Intelligence, November 1840, Nos. 62 to 66 and 72, 8vo.	6
Magazine of Natural History, New series, No. 38, February 1840, London,	1
The Athenæum, London, 1839, pt. 144.	1
Annals of Natural History, or Magazine of Zoology, Botany, and Geology, August and September 1840, Nos. 33 and 34.	2
London and Edinburgh Philosophical Magazine and Journal of Science, 3d. series, July and September 1840, No. 106, vol. 16th, and Nos. 107 and 109, vol. 17th,	3
Proceedings of the Geological Society of London, 1839 and 1840, Nos. 66, vol. 3d, and No. 65, vol. 4th,	2
Proceedings of the Numismatic Society, London, 1837-38.	1
History of British Birds, by W. Yarrel, London, 1840, pt. 20th.	1
Figures of Indian Plants, or "Icones Plantarum Indiæ Orientalis," by R. Wight, Madras, 1840, Nos. 17 to 21, (stitched together,) 4to.	1
Annales de Chimie et de Physique par MM. GAY, LUSSAC et ARAGO, Table des, Tomes 31, à 60, Paris, 1840, 8vo.	1
Journal des Savants, Mai et Juillet, 1840, Paris,	2
Korte Beschrijving van het Zuid-oostelijk Schiereiland van Celebes, &c. Door J. N. VOSMAER, 8vo.	1
Gelehrte Anzeigen, No. 170, August 1839, (2 copies)	2
Gelehrte Anzeigen Herausgegeben von Mitgliedern der K. BAYER. Akademie der Wissenschaften, Munchen, 1835 to 1839, 4to.	9
Über die indischen Verwandtschaften im Ägyptischen, Von O. FRANK... . .	1
Verhandelingen van het Bataviasche Genootschap, Batavia, 1838, vol. 17th, pts. 3d to 8th,	1
Ueber die indischen Verwandtschaften in Ägyptischen, &c., Von O. FRANK.	6

Ueber das Bild des Weltbaumeisters, Visvakarman, in einem der Felsentempel bey Illora in Indien. Von O. FRANK. 1
 Molluscorum species, &c. Resensuit, Dr. J. R. ROTH. Dissertatio Inauguralis. Monachii, 1839, (presented by the author.) 1
 Kshetratatvadipika, (in Sanskrit) 1

The Officiating Curator submitted his Report for the month of December, 1840, from which the following is an extract:—

“*Osteological Department.*—We have here added two skeletons (Pelican and Flamingo), and we shall I hope soon be provided with almirahs for the smaller skeletons.

“*Mammalogical Department.*—Nothing new.

“*Ornithological Department.*—A pair of Flamingoes, a Pelican, and a Pigeon have been added.

“*Reptiles, Fishes &c.*—Nothing new.

“The total of additions to the Museum this month have been—

“1. A bat *Vespertilio* (*Murinus* ?) Presented by D. GLEGG, Esq.—preserved in spirits.

“2. A Pigeon (*Columba* — ?) Mr. F. M. BOUCHEZ—stuffed and mounted.

“3. A small tortoise, (*Emys* ?) Mr. NICOLAS; skeleton—mounted.

“4 Two Pelicans, (*Pelicanus onocrotalus*,)—purchased. 1 skeleton, 1 stuffed—both mounted.

“5. Three Flamingoes, *Phœnicopteros* (*Indicus* ?) purchased. 1 stuffed,—1 skeleton, mounted.

“In conclusion, I beg to recommend to the Committee, that the printing of the nine Catalogues, occupying the 40 pages of the book herewith sent, be commenced; preceding this series of our Museum books with an introduction, somewhat after the proposed one annexed, for correction to this report. We shall thus, as we are framing, and placing collections, be proceeding with the Catalogues, and every series so arranged is then available to the student; and is placed, as far as human care can extend, beyond the risk of oblivion and loss.”

The proposition contained in the Report was concurred in, the Honorable the President, remarking on it—

“The Report of our acting Curator shews great attention to the duties entrusted to him, and I quite approve of his proposal to print the Catalogue sent round with his Report.”

The Officiating Curator reported that a considerable number of duplicate specimens, principally of Birds, &c. were available for transmission to Europe; and he moved, that as many specimens of great interest to naturalists might be collected, prepared, and sent to England at a small expense, it was worthy the attention of the Society whether such might not be prepared, and sent to the Honorable the Court of Directors, as due to them, from the Society.

The Officiating Curator was instructed to prepare the duplicate Ornithological Spe-

cimens and Reptiles; as also the duplicates of Capt. HUTTON's Spiti Valley Geological collections, for transmission to the Honorable the Court of Directors, through the Government.

The Officiating Secretary read to the Meeting, the following note from Mr. John JAMES MIDDLETON, who had undertaken to furnish notes on Major E. POTTINGER's Astrolabe.

"I have much pleasure in returning Major POTTINGER's Astrolabe, and your very valuable book.* It may be gratifying to you to know, that from the observations of Ulugh Begh, I have without difficulty ascertained the forty-two stars, given on the face of the Astrolabe.

"I have not yet succeeded in getting the plates finished, but they will soon be so. I have had them all done three times, and yet not quite to my mind; the lithographers *will* think for themselves, instead of confining themselves to mere imitation of my drawings, and you may imagine the consequence. I send you the drawing of the back of the instrument, which is the best I have got; yet it has some defects, on account of which it must be redone. I expect them all to be completed in the course of a week however; and as all the materials for my notes are ready, you may expect the whole soon."

Read a letter from Dr. OTHMAN FRANK, Professor of the University of Munich, recommending to the notice of the Society, Dr. ROTH, whose intention to visit India is to enrich his natural knowledge; and presenting to the Society the following Treatises of his own, viz.—

1. On the image of Visvakarman.
2. On the image of Hari-hara.
3. On the relations of India to Egypt.

Read a letter from M. C. VISSCHER, Secretary to the Batavian Society of Arts and Sciences, forwarding for presentation to the Society, the 3rd, 4th, 5th, 6th, 7th, and 8th parts of the 17th vol. of Dissertations, published by the Batavian Society, accompanied by a Chart and 15 Illustrations.

Read the following paper on the Mythological connection between Artemis and Nana, by Dr. W. E. Carte, 61st Regiment N. I.

"On the Mythological connection between Artemis and Nana.

"NANA NANA PAO. This deity has been identified as the Grecian Artemis, the Ceres or Diana of the Latins, but as the analogy is as yet incomplete, an endeavour will be made to establish it; with this view, each of the words (Artemis and Nana) will be considered separately as to their etymology, in the hope of arriving at some degree of certainty, on so difficult a subject.

"First then, as to APTEMIS. The commonly received etymology of this word is ἀνρ-τεμνω, the air cleaving, but as the Greek adjective αεροτομος exists, had

* The tables of Ulugh Beg, with Latin translation.

her name been derived from this source, it would have been written *αεροτμα*, and not *Αρτεμις*, for this reason probably Donnegan, in his *Lexicon*, omits this derivation altogether, nor does he supply another. The coin of the Emperor Commodus (see Brewster's *Edinburgh, Encyclopedia*, Art. Numismatology, Fig. 7. Pl. 423.) gives a delineation of the Artemis of Ephesus, where her principal temple was situated. She is here represented in a cereal character, as the producer of food, in fact the words of Virgil—

‘—— Vos ô clarissima mundi
Lumina, labentum cælo qui ducitis annum,
Liber et alma Ceres,’

prove, that the Moon and Ceres were one and the same; further, to show the influence the moon was supposed to possess over the vegetation process, the same author has—

‘ Ipsa dies alias alio dedit ordine Luna,
Felices operum.’

and again

‘ Ipse Pater statuit quid menstrua Luna moneret,’

“And Horace addresses her as—‘*Prosperam Frugum.*’

“But to return to the coin; as before remarked, the Moon, under the name of Artemis, is represented on it in her cereal capacity; the lower part of her body is immersed in the *αροθνηκη* or panarium, or receptacle for bread. She has many breasts,* betokening her fecund influence; her hands are expanded to denote liberality, and her head is surmounted by the Modius, or grain measure, and a harrow (possibly the symbol on the Nana coins) is attached to her by chains. All these are undoubtedly cereal diagnostics, and do not all assimilate with Artemis as derived from *αηρ-τεμνω*; but if the words *Αρτος* food, bread, and *ιημι* to send forth, produce, be taken, a compound word will be formed, which exactly coincides with her functions, *Αρτεμις*, the producer of food; a parallel etymology is afforded in the word *Ανθεμις* (from *Ανθος*) a plant remarkable for the profusion of its flowers.—The star on the coin is probably Arcturus, from its supposed influence in causing rain and storms, and the stags were assigned to draw her chariot.

“2—NANA—Nan, نان in the Persian language signifies bread; and Nan-i-khur-chung نان خورچنگ the Moon; † *khurchung* taken as one word, means a tortoise, from the shell of which animal the Lyre was originally formed, but if divided into two separate words, viz. *Khur-chung*, the signification will in that case be ‘Sovereign (of the) Lyre.’ Nan-i-khur-chung will therefore be ‘Nan, Sovereign of the Lyre.’ Here then is NAN in a cereal capacity, and also connected with the Lyre, which instrument frequently accompanied representations of Diana as sister of Apollo.—The name of the Latin goddess may therefore be Dea Nana, or Diana, instead of originating from *Dies-dianus*, (an adjective which has no existence in the Latin, except in combination,) as is commonly conjectured.

* /s these supposed breasts are without nipples, they may represent the cakes of bread mentioned when treating of Nana, further on.

† Wilkins' Richardson's Dictionary word نان.

"To the above, it may be added, that on several of the Nana coins, the figure on the obverse bears a stalk and ear of corn in one hand, and what appears to be one of maize in the other, while in front and under it, occur round symbols representing probably cakes of bread. See J. A. S. vol. v. plate 3. figs. 2, 3, and 5, also plate 36 (same vol.) figs. 1, 2, 3, and 5.

"In the Hindu Mythology, there is also a goddess named 'Anna Purna Devi,' (vide J. A. S. page 345, No. 54, for June 1836,) whose name is deduced from the Sanscrit words 'an' *food or grain*; and Purna (pronounced poorna) to *fill or cause to abound*, being synonymous with Artemis; this goddess is merely an alias of Luchmi, the Hindu Ceres. The similarity of Nan and An, is also obvious.

"From what has been above brought forward, it will not perhaps be thought unreasonable to conclude, that Artemis, Nana Rao, and Anna Poorna Devi, were identical, as well in name as in office; PAO being a Sanscrit word (meaning sovereign) and not being easily resolved by its adopters into a feminine termination, may account for its retaining the masculine one.

Read a letter from Lieut. R. PIGOU of Engineers, communicating through Col. D. MACLEOD an account of the Topes of Darouuta, and Caves of Bahrabad, of which the following is a copy.

"I have the pleasure, herewith, to forward two boxes and some coins taken from the Jullalabad Topes; the third box I had previously promised to Dr. Atkinson, to whom it is now made over; it was similar in shape to the box No. 1, but not quite so large. I regret that the small gold box, with its contents, has been stolen, as it was the greatest curiosity of all; but the precious metal excited the cupidity of my servants, who have made away with it. The marble slab is too heavy to send down by Dāk, and I have not got it with me; indeed I am not sure that it has not been lost, but it is possible that it may have been left in my hut at Jullalabad. I also send you a rough sketch of the Bahrabad Caves, which will give an idea of the place; I am sorry I have not time to make a more elaborate drawing, but must forward it rough, just as it was sketched. Want of time must also plead my excuse for the bareness of the few remarks I have penned, but no doubt your talented Secretary will be able to draw up a paper on the subject, should he deem it worth while."

The boxes with their contents, coins, and a small piece of rock crystal perforated were shown to the Society, and Lieut. PIGOU's paper upon his discoveries read to the meeting. Lithographs of the boxes with Lieut. PIGOU's paper will be, the Officiating Secretary informed the meeting, published in an early number of the *Journal*, in connection with a paper by Mr. BIRD on the Kanari Topes opened by him.

For the presentations and contributions the thanks of the Society were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

Extracts from the Journal of an Expedition into the Naga Hills on the Assam Frontier. By Lieut. GRANGE, Assistant Political Agent, undertaken by order of Government in the beginning of 1840, (taken by permission from the records of the Political Secretariat under the Government of India.)

Leaving Nowgong, agreeably to instructions, on the 3rd of December 1839, I proceeded to Dhoboka, which I reached on the 5th of the same month. The country to that point being well known, requires no further description.

I left Dhoboka on the 6th of December, at about 7 A.M., and arrived at Oopur Jumonah, at about 11 o'clock. First crossing the Jumonah river about half a mile above the Dhoboka village, we entered Tularam Senaputtee's boundary line. The route lay through a forest, called Rungaghora, from whence most of the villages on the banks of the Jumonah procure their fuel. There has been an attempt at a clearance in the forest, but much difficulty is experienced by the Ryots, from the great number of wild animals which infest this part of the country; viz. elephants, tigers, rhiuoceroses, buffaloes, and hogs. The path the whole way is tolerably good. Oopur Jumonah is a hamlet of about twenty or thirty houses, scattered along the banks of the Jumonah river; it is fast decreasing in number, in consequence of the people having suffered much from the destruction of their crops by the wild animals in the neighbourhood.

7th December.—Marching at about 7 A.M., I reached the Cacharee village of Nermolea, the distance being about ten miles. One hour's

marching brought us to the Ha,our Ghaut, which we crossed to the Cacharee village of the same name in the Nowgong district. The Jumonah river is navigable for small boats at all seasons of the year to this village. The crops between Ha,our and Nermolea had suffered much from the high rise of the river Jumonah, which overflows its banks nearly the whole length of its course.

8th.—Departing from Nermolea, and passing considerable cotton tracts, we reached the village of Bokolea, four miles distant, where I found some of the lime burnt by Mr. Martin for Government, in store. The country along the banks of the river between this village and Ramsa (a small village six miles west of Mohong) is uninhabited, and is composed of large grass wastes with patches of forest at intervals; the greater part of the low lands below the falls of the river, are liable to inundation. Passing through Bokolea, we continued on till we came to the huts erected for us, on the Tutra river, a small stream, which issues from the Mikeer Hills. To this point most of the Kyahs and other traders trafficking in cotton come in the cold season; there is high ground about it for a Haut (or fair), and there is a Mikeer village two miles inland. A short way above is the Oogeroo Chokey, established by Tularam, who exacts a toll from all his Ryots who frequent the Tutra mart.

9th.—Leaving the Tutra encampment, and passing through forest and grass jungle, we came to some low, undulating, grassy hills, from whence a tolerable view of the surrounding country is obtained, which became more overspread with hills, chequered by the ancient cotton cultivations of the Mikeers. These migratory agriculturists seldom remain longer than two years in one locality, and only very fine land induces them to determine on a three years' residence; by which time a deep rooted grass springs up, which drives them to fell more forest for their staple crop, not being able to use the ploughshare to eradicate the roots, on account of the nature of the ground. Passing over these hills, we gradually came on the rumbling of the cataracts, which increased, as we approached, into a stunning din; the river at this part is confined by low hills on both sides, and the quantity of water that rushes over the falls in the rainy season, must be very considerable; the height I was shown as that of the ordinary rise, cannot be less than 100 or 150 feet. Two paths lead over the hills on either side, and all

cotton boats are obliged to be unladen at this point, and a change of boats takes place. Above the fall, on the right bank of the river, is a stratum of chalk. Proceeding by the path on the right side of the river, we came to a small rivulet at the base of the hill, in the bed of which, I was shown the stratum of coal that had been excavated. I was informed by Lieut. Brodie that it lay to the right of the path, and was comprised in a space of about fifteen or twenty feet long, up to the junction of the streamlet with the river Jumonah. The water is about two or three inches deep, and the coal bed is visible six or eight inches above the surface of the water; the superficial part of the seam is composed of a soft black substance, which on being cut away produced shale, or black slate, and further excavations showed servicable coal. Above the coal formation lies a thin stratum of red sandstone; above this is a greyish soil, two feet deep, the surface of which produces the forest and underwood usually found in the vicinity of hills in Assam. The bed of the rivulet is about six or seven feet broad, by four or five deep; on either side of the coal-bed I found chalk. The only difficulty in working this seam would be the rise of the streamlet in the rains, and the expense that it would take to carry the coals to below the falls. The former difficulty might however be removed by leaving a wall of the coal itself, and opening the vein a few yards inland. A short way further on are two more rivulets, in both of which I found chalk rocks; one description contained small globular, dark grey substances, resembling decayed pebbles. The distance from this locality to Ramsa is about one mile. The rock from which the lime was cut for Government, is situated in a small river below the falls called Mayong Deesa, in Tularam Senapattee's country. The coal found by Ram Doss Mohurer is a short way from Ramsa (half an hour's march) in a N.W. direction; it is in a small streamlet called Bongrong, which is almost dry in the cold weather.

10th.—Left Ramsa, and marched through fine open forest; three miles distant crossed the Jumonah into Tularam's country; one mile further on recrossed it, and in half a mile reached Mohong.

11th.—The Nagas of the village of Gafaga came in, and gave me the following account of themselves:—They formerly belonged to the tribe of Nagas called by them *Chokanneu*, and by the Cacharees *Dewansa*, living

south of the Sumoogoding range, and on account of the frequent quarrels and oppression they had been subjected to from their own tribe, they had been obliged to emigrate : they first took possession of the high hills on which the present village of Tokophe is situated, but even there, not being free from the attacks of their persecutors, they again fled to the lower hills upon which they are now. The following is the information I have been able to pick up regarding the wild tribes here about. The villagers of Gafaga, Mezattoo, Badolasong, Kola, Muzala, Tooroofen and Gesinga, are all of one tribe, and have separated into a number of villages in consequence of quarrels amongst themselves ; not acknowledging any regular chiefs, and every man being his own master, his passions and inclinations are ruled by his share of brute force, his dexterity with the spear, to which arm they have immediate resort for the adjustment of the slightest quarrel, and in consequence, villages are continually at feud. In addition to this, the Tokophen Nagas, who are of a different tribe, and speak another dialect, in league with the Nagas about the Sumoogoding range, pay them occasional maurauding visits, and take advantage of their flight on their appearing, to pillage their villages. The Nagas of the village of Gesinga, or as it is called by some Rengma, are at feud with those Nagas on the eastern bank of the Dhunsiri, in the Jorhat division, called by the Assamese, Lotah. The former village is under charge of an half Assamese and half Naga, Gesinga Phokun, who exercises some rule over the village. The latter tribe, from the different accounts I have heard of them, appear to be of a more civilized character than the Nagas on the west bank of the Dhunsiri, having regular chiefs, whose orders they regard, and trading largely with the Assamese at Cacharee haut. The Tokophen Nagas came in, and declared that they had no evil inclinations towards the Majuttee and Gafaga Nagas, but that they had heard that the Dewansas intended making an excursion against them at the full of the moon. I gave them clearly to understand, that if they persisted in their present mode of life, and would not leave off their maurauding habits, they would be punished severely, and not allowed to remain in their present locality ; and nothing more of the intended excursion was heard. It is a common practice with Nagas, when they are going to make an excursion against a village, to set reports afloat that other villages or tribes intend an excursion against the same village,

which blinds the villagers of the place attacked as to who the real assailants are, as their excursions are generally performed at night. The Nagas here about procure their brass ornaments from the village of Gesinga, and their spears and daws from the Dewansa or Chokannev Nagas. Their villages are of inconsiderable size, and they have but few domestic animals; some cows of the hill breed, pigs, and fowls, for the purpose of sacrificing to their gods.

They acknowledge the power of three gods, viz.

1st. Zanghuthee, or Janthee, the most powerful, to whom they sacrifice cows, bullocks, or bulls. His power prevails in all serious illnesses, and can kill or cure.

2nd. Hyeong, to whom they sacrifice fowls only, his power is of alighter extent.

3rd. Dherengana, to whom they offer hogs.

The two latter are the tutelar gods of the village of Gafaga, each village having different ones; some of them think it necessary to sacrifice at one time, for any great worship, a cow, or bullock, a hog, and a chicken a few hours old; the former are eaten, but the latter is thrown away. Zanghuthee is acknowledged by all of them. Goats are not allowed as offerings. The physiognomy of the Nagas about here partakes a good deal of that of the Cacharee, in consequence of the admixture of the two tribes. I saw some Assamese who had been kidnapped when young, and who had become so accustomed to the idle, uncouth life of the Nagas, that they refused to leave them.

Matrimony amongst these Nagas is a civil contract, unattended by any religious ceremonies. The damsel is courted, and is presented with fowls, dogs, and spirits, according to the fortune of the lover, and after her consent and that of her parents (for they have the right of refusing) is obtained, the accepted lover gives a feast to all her relatives. A day being appointed for the union to take place, the whole of the villagers are feasted; they in return are obliged to present the new married couple with a new house in the village. Any breach of marriage vows is punished by a fine of a cow or hog, by the counsel assembled for trial of the culprits. One of the most singular customs is, that after the birth of the first child, the parents and relatives of the new married couple are prohibited from touching any other villagers, or any other villagers from touching them, for two or three days; should a villager

infringe the rule, he is obliged to remain two or three days in the house of the parents and not to mix in society; but if the relatives of the party are in fault, they are punished by a fine of a feast.

On the occurrence of a death, they howl their lamentations, feast, and bury the corpse, placing the deceased's spear in the grave, and his shield, and a few small sticks like forks, with some eggs and gram, on the grave, as an offering to ensure them good crops. I could get no reasons from them why their doing so would ensure them fertility of the soil.

They are not very martial at present, having been generally the party attacked and subdued by the other Nagas. They have very little trade, and not much inclination that way, being too fond of idleness to exert themselves for their own improvement; they cultivate small quantities of cotton, and exchange it for salt. Many of them have taken refuge in the Mikeer villages, and may in time adopt the industrious habits of those cultivators, but their unruly, independent inclinations would be a great obstacle to any attempt at improving them. Mohong Dejira now consists of about 50 or 60 houses; in former days it enumerated about 300. The emigrants have formed the villages of Bokolea and Nerondlea, and many are gone to Dhurumpore. The cause of their flight, it is stated, was owing to some Nagas a few years ago having killed two of their tribe; that may be partly the reason, but the itinerant character of the Cacharees, may have influenced them greatly. The Cacharees here, till within two years past, have been obliged to pay tribute to the Nagas of Sumoogoding, to preserve peace. The tribute consisted of a cow or bullock, and one maund of salt per annum.

The lands about here are of the finest description, some yielding very rich crops of grain, and can be irrigated at pleasure by a small rivulet which issues from the hills to the N., but the indolent disposition of the villagers (who are an admixture of Assamese and Cacharees) prevents their taking advantage of the fertility of the soil, large sheets of which remain uncultivated, which were formerly well cropped; but since the reduction of the village, and their union with the Assamese they have become great opium-eaters, and merely cultivate sufficient rice, &c. to afford them the means of subsistence. Some traders extend their traffic up to this village, and procure a tolerable supply of cotton from the Dhejuah Cacharees. There are few Indian products that could not be reared on the low lands around this part of the country, and the presence

of lime, coal, and chalk about the vales, might prove of the utmost use to any manufacture or plantation which might be established, as the country becomes known and settled. Regarding the climate, I cannot say much from experience; but the diseases both amongst cattle and men, which have proved so fatal to those attacked by them in the northern parts of the Nowgong division, have not been known here, and this may allow one to conclude, that this part of the country is more salubrious than other parts.

No grain having arrived till the 13th, I was unable to move forward; when thirteen mannds having accumulated, I proceeded with half of the Shan Detachment (leaving the remainder to follow when more grain came up, as I expected its arrival every moment) to Dhemapore Nigger to which place I had requested Tularam Rajah to cut a road, having heard of the existence of the ruins of an old Cacharee fort on the Dhunsiri on my return last year, which nobody (with exception perhaps of one or two very old Cacharees belonging to Tularam) had seen. Crossing the Jumonah a mile or two distant from Mohong, we reached the Dhealow river, on which sheds had been erected for us, and were obliged to encamp, as I was told the second sheds were too far for us to reach that day, having started late, from the non-arrival of the coolies. The Dhealow is about ten or fifteen yards broad, and like most hill streams, shallow. The path was excellent, over a slightly undulating country; we passed a few clearances which had been deserted several years back, on account of the Naga feuds; the distance to this is about six miles; the appearance of the country wavy, with small rich alluvial plains at intervals.

14th.—Passed through the same description of country as yesterday, and was obliged to encamp at the second sheds, eight miles distant, on the Pikrong Deesa, the distance including our present march from this to Dhemapore, being too great for the coolies.

15th.—Passing over a small plain and some wavy ground, we found the path excellent till we reached the Looree, a small river, in the bed of which our route lay for three or four miles to within a league of Dhemapore; when we left it, and got upon some high country, which led us to the fine bund road skirting the walls of the ancient city. I was very much astonished to find so fine an old place, totally lost sight of by the Cacharees themselves, an oral tradition of which was merely in existence; but they attribute it to the fear they have always felt

of going into these forests, which since the desertion of the place, have been overrun by wild beasts, and frequented only by plundering Nagas.

The remains of Dhemapore Nugger consist of some pillars of various patterns, a gateway, the ruined tower, or palace wall, and a small fort to the north, besides tanks both within and without the walls. The fortification is surrounded on three sides by a dry ditch, of about thirty feet broad, a bund, or camp, and a second ditch. The gateway is in a tolerable state of preservation, but the inner passage, or guard room, has given way, and lies a heap of ruins, on which the Nagaser and other trees grow. The pillars are in three parallel rows, two of which are of a circular form, and one square; there are ten in each row of the former, and twenty in the single row of the latter; many of them have been split asunder by trees falling on them, and shrubs growing from out of them; in one spot a large banian tree has entwined its roots over a fallen one; some of them have been worn smooth by the wild animals (elephants, rhinoceroses, hogs, &c.) rubbing themselves against them. One of the pillars appears as if it had been an instrument for the punishment of criminals. It resembles two long square pillars joined at the base, and gradually increasing in distance from each other, from two inches at the bottom, to several feet at the top. The form of the town, or palace enclosure, is an oblong square, lengthways facing the river, which is about 200 yards off. It was built by Chokradoz, 4th Rajah of Cachar,* but long subsequent to the erec-

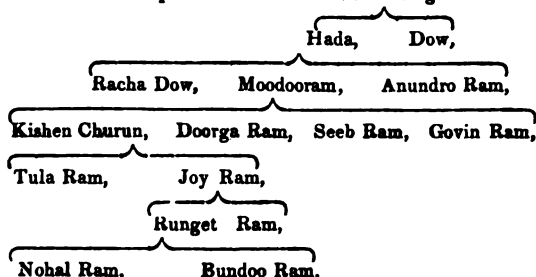
*RAJAHS OF CACHAR.

- 1 Oodi Bhim; the founder of the House;
his son,
- 2 Kartrick Chundro;
his son,
- 3 Beerdurpo;
his son,
- 4 Chokradoz;
his son,
- 5 Manik Chundro;
his son,
- 6 Phalgoo Durpo;
his son,
- 7 Hurrick Chundro;
his son,
- 8 Narionee Chundro;
his son,
- 9 Madub Chundro;
his son,

tion of Ghergong in the Jorhat district, the first residence of the Cachar Rajahs. It is stated that after being driven from Ghergong by the

-
- | | | |
|----|-----------------------------------|--|
| 10 | Oodok Narion ; | |
| | his son, | |
| 11 | Indra Bol ; | |
| | his son, | |
| 12 | Moyurut Doz : his brother, | { Nychinggra,
his son,
Krete Chundro, |
| | his son, | |
| 13 | Goorood Doz ; | |
| | his brother, | |
| 14 | Ordoa Detee ; | |
| | his brother, | |
| 15 | Mokorod Doz ; | |
| | his brother, | |
| 16 | Tamruz Doz ; | |
| | his son, | |
| 17 | Sooroo Durpo ; | |
| | <i>End of regular line</i> | |
| 18 | Krete Chundro ; | |
| | his son, | |
| 19 | Ram Chundro ; | { Hurree Chundro being an
infant at the death of his fa-
ther, Ram Chundro, his uncle,
assumed the royal power. |
| | his brother, | |
| 20 | Lukee Chundro ; | |
| | his nephew, | |
| 21 | Huree Chundro ; | |
| | his son, | |
| 22 | Kishen Chundro ; | |
| | his brother, | |
| 23 | Goovin Chundra, murdered in 1830. | |

Tularam claims descent from Soroodurpo, the 17th Raja of Cachar, thus
Soroodurpo—his brother—Ghumber Sing.



NOTE.—Lieut. Grange does not inform us whence he derives his list of the Cachar Rajas. His description of their ancient abode will not fail to interest the readers of the Journal. It is curious to note this instance of singular change in the political and social condition of the Naga country, in connection with the discoveries lately made of the former existence of civilization in tracts now among the wildest in India. It is only thus that the difficulties which beset the antiquary and the historian in this country, can be appreciated. The materials are now in course of slow accumulation, which will assist some future Gibbon in giving such a history of India, as must, I fear, remain for years a desideratum in literature.

Assamese, Chokradoz settled on the Dhunsiri river, and built Dhemapore, but hearing of the approach of a famous Hindoostanee warrior, called Kala Par, who had been converted from the Brahmin caste to the Mahomedan faith, and had become a great destroyer of Hindoo images, he fled with the image of the tutelar god of the house of Cachar to Myhong, in the hills, where he built a fort. Kala Par not finding his foe, pillaged the place, and withdrew to his country. On his retirement the Ahoms,* or Assamese, came to take possession of Dhemapore, but Chokrodaz not fearing his new enemy came down from his retreat in the hills, and meeting an Ahom Phokun, inquired of him the reason of the Ahomean invasion, to which the Phokun replied, that they had merely come to look at the country, and that the army had withdrawn, which answer satisfied the Raja; when however, in fancied security he and his people laid aside their arms and proceeded to encamp and cook, they were attacked by the Assamese who had been laying in ambush, and not being ready to receive their treacherous foe, were put to immediate flight. The Rajah, with the remainder of his men, succeeded in effecting his escape to Myhong, where he remained, and Dhemapore was deserted. He died at Myhong, as did several of his successors, and the court was afterwards removed to Kaspore in the plains. The country round Dhemapore has all the appearance of having been at a prior period well populated. On the right bank of the river are three large tanks, two of which were excavated by the Rajah and Ranee; they are twenty cubits deep, and with the exception of a break in one or two places in their banks, are quite perfect, and hardly a weed is to be seen on their surfaces; they abound with fish. The banks are heavily wooded, and I found several kinds of citron growing on them. The wild elephants and rhinoceroses had taken up their abode upon them, and use the tanks as their baths. The whole country in the vicinity is covered with forest, containing very fine timber of the following descriptions—Cham,¹ Tetachapa,² Ghunsiri,³ Rata,⁴ Toon,⁵ Awal,⁶ Hullok,⁶ and Nagaser.⁷ I am informed by Tularam

* Rather the conquerors of the Assamese (vide Asiatic Society's Journal No. 104) these warriors devastated Assam simultaneously with the Musselmans.



¹ Artocarpus Chaplasha ? ² Laurus ? ³ Laurus Sassafra ? ⁴ Cedrela Toona. ⁵ Mesua ferrea.

No. 3 is I believe a species of Camphora.—[N. W.]

and others, that the Nagas west of the Doyang river derive their origin from an union of the Cacharee and Naga tribes, and that in former days the Nagas were far away beyond the Doyang river. The Nagas themselves acknowledge an origin from the Cacharee tribe, and on that account they used not to decapitate the Cacharee prisoners they made, to obtain ransom (?) which they invariably did with the Nagas that fell into their hands. Their unusual custom of not acknowledging any regular chief amongst themselves, tends greatly to confirm that statement, as the Lotah, Nimsang, and other Nagas on the east of the Doyang river, I am informed, have regular chiefs, besides a chief over a number of villages. The scantiness of the present Cacharee population may therefore be accounted for by their having been partly absorbed in the surrounding tribes, and their emigrations to all parts of Assam.

The Cacharees attribute the desolation of their country to (what they call) their innocence and simplicity of character, and the superior cunning of the Ahoms, of whose magic powers they have many traditional stories; certain it is, that Dhemapore must have been the seat of a considerable population in former days.

The appearance of the lands about, are of the richest description, and they have been much extolled by all persons who have seen them. The country is high, and not liable to be inundated by any rise of the river, with undulations and small hillocks at different places; there are a few marshes and low lands on the banks of the river, which are very rich, and well adapted to low land crops; but the products most likely to be suited to the higher growers, are tea, coffee, sugar, tobacco, cotton, wheat, &c., and all kinds of vegetables. There are a great number of animals of all descriptions about Dhemapore, and those that came under my observation, were the elephant, rhinoceros, tiger, buffalo, hog, and deer; there is also a great number of birds of many varieties of plumage, and several kinds of lizards.

There is a Mora Dhunsiri a short way to the south-east, along which we discovered by the cut twigs a wild animal's track, used by the Nagas, leading from Sumboogoding towards Tokophen, by which it is evident that they have hitherto been in the habit of communicating with that village, and no doubt have been one of the parties engaged in annoying the Rengma Nagas. The latter complain both of the

Lotahs and Dewansas, but more particularly of the former, whom they call Chokanneu, and the latter Choquenneu. The Dhunsiri river contains gold of a dark colour. I succeeded in procuring a few grains, through means of a gold-washer I took up with me, but the quantity procured held out but little inducement for him to continue washing on his own account. The depth of the river was not sufficient in the cold season to admit of canoes reaching Dhemapore, though no doubt they can do so at other seasons of the year. The breadth of the river within its banks up there is 160 feet. There are many deep holes in different parts of it, which contain many descriptions of very fine fish, and the Cacharees kill great numbers of them with a poisoning creeper they call "*Deo Biñ*," which they bruise and wash in the waters.

Having received intimation that no grain had arrived at Mohong since my leaving it, and the quantity I had brought on with me not being sufficient to authorize my moving forward (only a day's grain being in camp), I returned to Mohong to urge on the large quantity which had been despatched from Raha in November, but which from unforeseen difficulties had been detained at Sil Dhurmpore. I reached Mohong in two days, and returned to Dhemapore on the 17th, and grain arriving on the 19th, I was enabled to start from Dhemapore on the 21st, but not having a sufficient number of coolies to take the whole of the party on, I was obliged to leave the Assam Militia which had arrived from Jorhat behind, to follow me up when I sent back the coolies for them. The distance from Dhemapore to Sumoogoding I should say, in a straight line, would be about fifteen miles, but by the route I followed, not less than twenty-two or twenty-four miles, which I accomplished in $2\frac{1}{2}$ days.

Having built a stockade independent of the villagers, and part of the Jorhat Militia having arrived under their Subadar, I left them in post here to guard any grain that might come up, and quitting Sumoogoding on the 2nd February, reached Razapamah or Jykamee that day, the distance being but six miles. We did not pursue the route followed by Captains Jenkins and Pemberton, but descended to the southern foot of the Sumoogoding ridge, and went along the stony bed of the Desem Unurue, or Kooki river, till we reached the eastern base of the low ridge on which Razapamah or Jykamee is situated. As we reached the village which stood about a quarter of a mile from the river Keruhee, an influen-

tial chief came down with all his war accoutrements on ; upon my inquiring the reason of his being thus equipped, he said, had we intended any harm, they would have fought us. They had piled up stones on their small circular towers, by the path side, to throw at us as we advanced, which proves how ignorant they still are, some of them, of the effects of fire-arms. He offered me his house, and several houses of his party for the night. He informed me that the village was divided into two parties, and that he could answer for the peaceful intentions of his own party, but not for the other. He said he had suffered much since I had last seen him, having quarrelled, fought, and found his match in a fellow villager, who had burnt his house and grain, and made him almost a beggar. In the evening, over a brisk fire, I succeeded in obtaining some of their martial ideas ; bringing his shield, which was covered over with the hair of the foes he had killed, and carefully unwrapping a cloth off two pieces of ratan covered with the hair of his sisters, he placed them on each side of his shield, and commenced springing about with very great agility, spinning his spear round all the time. He then showed me, with an air of very great pride, the two ratans covered with hair, and said that they could only be worn by warriors who had killed many of their enemies, and brought in their heads, who are then entitled to receive some locks of hair from each sister, tied on ratan, which they are obliged to wear on their shield, in the manner above described. They consider certain Nagas their natural enemy, over whom gaining any advantage would be great honor. On my inquiring who his enemies were, he very innocently replied, the Beren Nagas, and those about Simkir ; his feud with the Beren Nagas having arisen from a quarrel he had had with some of the Nagas of that village, at the salt wells near Sumoogoding. On my telling him that I had come up on purpose to suppress the aggressions committed in that quarter, he replied that he was aware of it, and had not been out since I was last up on their hills, and that he had assisted the Dāk wāl, who had foolishly gone up after me. The latter case was true, but whether the former was, or not, was impossible to say ; though as no aggressions from this quarter have been heard of this year, it is probably true. Leaving Jykamee on the 3rd, we followed the route by which Captains Jenkins and Pemberton came, for a short way, and then turning to the left, entered the villagers' cultivations, on which we found the tea tree growing in the

most luxuriant manner, uncared for, and unknown; in the rice fields it springs up in all directions in fine bushes, from the roots of old trees which had been cut down by the Nagas in clearing their lands for cultivation; the leaves of the plants found in the rice fields were much broader, and of a deeper green colour (some leaves tinged with yellow) than those obtained in the forest. It grows in many places on the low hills in this neighbourhood, and appears a very hardy tree. The greatest size which the trees I saw attained, were from two or three inches in diameter and fifteen or fifty feet high; the jungle causing them to run up this way to get at the air and light. The country it is found in, is very like that about the environs of the falls of the Jumonah, where there is but little doubt that tea would grow equally as well as it does on the Naga hills. I am informed by a Burmese who was formerly on the frontiers of China, that in the districts of Taongbine and Taongmah, the Polong inhabitants cultivate nothing else but the tea tree, and that from one description alone four varieties of tea are obtained, which he described in the following manner—First kind, from the buds, called in Burmese *Shuabee*. Second kind, when two leaves only have shot forth, called *Kugengoo*. Third kind, when five and four leaves have shot forth, called *Kugeyenka*. And the fourth kind when in five and six leaves, called *Kyeot*. The latter is drank only by the common people. In appearance it is exactly the same as that found about Jykamee. The hills on which the Polong people live, are much higher than those we discovered the tea on in the Naga hills.

Passing over these low hills, we came to a small plain, on which we found ginger growing wild. It was quickly dug up by the Shans for medicinal purposes, who said it was to be found growing in the same state, only in the Singpho country. Crossing several feeders of the Desem or Unurue river, we ascended to the village called by the Munipoorees, Ookusuha, and by the Nagas about this part, Terriamah, or by the Nagas on the Cachar hills, Umponglo. The villagers, as they did last time I passed their village, offered us no opposition, but showed us a place to encamp upon, and assisted to clear away the jungle for that purpose, for which I gave them presents. There is no good ground near the village for encamping on, but before ascending to it there is a small stream on which Captains Pemberton and Jenkins formed their camp, which is a good place for halting at coming

from Jykamee, and prior to crossing the great range. There is also another spot beyond the ridge Terriamah is situated on, which is immediately beneath the great range on the Desem or Unurue river.

4th. February. Ascended the great range by the path followed by Captains Jenkins and Pemberton. The ascent was extremely steep and harassing to the coolies, and we did not reach the small river beneath the Haplongmee, till 3. p. m. Haplongmee is called by the Nagas about here Konomah, which is equivalent to the Sinpalo of the Nagas about Beren, and the Cachar hills.

5th. We started from Haplongmee in search of the Muniporee detachment, which was to have met us there, and encamped on the Tobool or Tzupfoo river, in the fence erected by the Munipoorees on their return route; but my party only taking up one quarter of the ground they did, I was obliged to make the fences much smaller. I calculated the force of the Muniporee detachment at 400 men, judging from the extent of ground it covered. The Nagas after promising to show us the route to the place where we might find the Munipoorees, or at any rate to the next village, began to slip off one by one, after we had moved a short way from their village.

6th. Passing a short way up the bed of the Toobool, or Tzupfoo river, we turned to the right, and ascended a slight ridge. The country about this is extremely rugged and repulsive in appearance, being composed chiefly of high rocky ranges, with but little flat ground at their bases. The sides of the ridges are covered with low bushes, and small quantities of grass, and here and there a stunted fir or two. I saw some apple trees which had been planted by the Nagas; also, in the vale in which we encamped, willows growing along the ditches, as in parts of Europe. The climate I should say was good, it was moderately warm in the day, and cold at night, with sharp hoar frosts on the ranges. All the water in our mugs and pots was thickly frozen during the night we remained at this place.

7th. Not thinking that I should find the Munipoorees by advancing further, after the misrepresentations we had received, I turned to retrace my steps to Konomah or Haplongmee, hoping to be able to make a detour and visit Ikare and Singpatee; and proceeded down to our former encamping ground on the Toobool, or Tzupfoo river. The fences and huts had been destroyed by the Haplongmee Nagas, but we soon erected others.

8th. Advanced to the heights before entering Hoplongmee. I found some difficulty in procuring information regarding the customs of the Nagas of these parts, on account of their suspicious character, and fear of answering my questions, which they think might tend to discover some of the exceeding cunning habits which they possess. They are very fond of argument, and have recourse to it immediately they become aware that they are not able to cope with their enemy *viet armis*, and do not scruple to resort to the most absurd falsehoods to try and intimidate their opponents.

They are, like most mountaineers, very uncleanly, and their habitations are seldom or ever cleared of the filth of ages. The houses are large, and are generally divided into two apartments, in which they live and keep their grain, animals, &c. One family only resides in one house. When not obliged to work, the men are lazily inclined, and spend their mornings generally in sipping a species of fermented liquor, but when pushed to labour, they are very active, and work very cheerfully to some merry song. Their reaping song in particular struck me as being exceedingly wild and pretty. They form a line of men, women and children, and advance together, singing in chorus and cutting down the crop. They cultivate several kinds of vetches and peas, and have four or five species of rice, some grown on the mountains, and some in the vales. The latter are produced on lands that have been shaped out in steps and are irrigated by the innumerable streams, rivulets, &c. found at the base of nearly all the mountains.

They breed cows, pigs, goats, fowls, and dogs, and eat of nearly every living animal; in fact I do not know of a single exception, rats, snakes, monkeys, tigers, elephants, being all equally tasteful to them. I was informed that Konoma, or Hoplongmee, is composed of 300 houses, half of which are Angamee and half Dewan Nagas, but they unite and join in all pillaging expeditions with the two Angamee villages of Mozomah (Ikaree) and Khamona (Impagee), both of 500 houses strong. The three villages, to keep up their tie of alliance, are required to give a united feast once a year, each village sending a cow and other articles for the occasion. The villages at the northern base of the great range are an admixture of the Angamee and Dewan tribes. The Angamees are known to the Nagas by the name of *Khunomah*, and the tribe known by the Cacharee name of Dewansa, is called *Thungeemah*; a difference must be observed between the

names of Khunomah and Konomah, the latter being the name of the village of Hoplongmee, and the former of the Angamee tribe and of an Angamee village. I could not obtain any accounts of the origin of this singular tribe, who appear to have been a small colony established in the midst of a number of tribes, who, from their daring and martial character, have held all the surrounding tribes in awe, and after increasing itself into three or four villages, has completely gained a supremacy over its neighbour, and although the latter boasted of a much greater number of villages, though not so large as the Angamees, and a larger tribe, they are not able to attack them in return, from their want of unity and confidence. The attacks of all these wild tribes are looked upon in no other light than authorized martial exploits against their natural enemies, which singular to say, they consider all Nagas not of their own tribe. Now however that they are attacked by them in return, they are becoming less inclined to continue their former distant maurauding expeditions, and confine themselves merely to the revenge of any injury they may have, or fancy they have, received. The Dewan tribe, I imagine has obtained that name from having formerly either resided on, or come from beyond the Dooyang or Dewan river.

From the village of Yang, another tribe springs up, whose dialect is different from either the Angamee or Dewan Nagas, and who are called by the former tribe *Zamee*. Beyond the Doyang, other large tribes of Nagas exist; Lotah, Nemsang, &c. &c. these tribes I am informed differ from those to the west of that river, and are under their respective chiefs, whose authority they acknowledge, which is contrary to the system of the Thuggeemah (Dewan) and Angamees. The latter tribes when about to undertake any expedition, assemble the aged and fighting men of their villages to discuss the matter over, and the greatest bullies generally succeed in getting their wishes adopted.

The Nagas of these parts acknowledge the power of three gods. The first is known by the name of *Rapoo*, to whom they sacrifice cows and bulls only. He is the chief, and has the power of killing or curing. The second is called *Humaadee*, to whom they sacrifice dogs; and the third *Rampaow*, to whom they sacrifice cocks and offer liquor. They said, they had all three the power of killing or curing in different diseases. Their marriage ceremony is nearly the same as that of the Rengma Nagas.

Landed property is hereditary, and is cultivated for ages by the proprietors. In building houses, neighbours are required by custom to assist each other, for which they are feasted by the person whose house they are building. On deaths of fathers occurring, the property is divided, and all the family share, the house going to the eldest son, unless he has one of his own, when the mother retains it.

The barter value of different articles at the village of Hoplongmee was as follows, a cow is valued at 10 or 12 conch shells.

A pig	„	„	2 ditto.
A fowl	„	„	1 packet of salt.
A goat	„	„	2 conch shells.
A male slave	„	„	1 cow and 3 conch shells.
A female ditto.	„	„	3 ditto, and 4 and 5 ditto.

The children of slaves are slaves.

The climate of Hoplongmee is in the month of February very fine, the days are mild, and the nights very clear and cold, and a strong hoar frost rests on the ground till 8 A.M.—I found wild raspberries growing on the hills in the vicinity, and some nettles resembling those found in Europe. The hills are of considerable altitude, and those in the immediate neighbourhood of Hoplongmee covered with stunted grass, with wooded patches on their sides. The alpine scenery is extremely fine, and few sights could exceed the grandeur and fearful appearance of a storm rolling slowly through these mountain chains. We experienced some very high bleak winds on them.

The Nagas have several ways of prophesying the success of any expedition they are going on. One is by cutting a soft reed with their spear head into flat pieces, and if the slices fall to the ground one way, success is sure to fall in the opposite direction intended; according to the number fallen that way, so will be the proportion of ill luck; success by another mode is by the means of the flight of a cock. If he flies strong and far, it is a favourable sign; but if, on the contrary, he should fly weakly, and to no distance, ill luck is sure to ensue. In going on an expedition, if a deer cross their path they return, and defer their trip till some other day. This same superstition prevails also amongst the Shan tribes, with the slight difference, that if a deer cross their path from right to left, they proceed, but if in the opposite direction, i. e. from left to right, they return immediately, considering it a warning not to proceed upon any expedition.

Leaving about 9 A. M., we crossed the great range, and after a very fatiguing march, did not encamp on the Unurue or Desem river till dusk of evening; we this day reached a stream, three miles to the south of Jykamee, the distance from that village to the base of the great range being rather too far for the coolies.

15th February—Quitting at 6½ A. M. an hour's march brought us to Jykamee. We encamped this day on the Desem river, at the southern base of the Sumoogoding hill.

We discovered the tea tree growing in the neighbourhood of camp in a very luxuriant manner, the country is of the same description of low hills, as found in the vicinity of Jykamee.

19th. Marched round the village, to avoid going through it, as the Nagas seemed to have much objection to it, and met some Nagas from other villages.

20th. Leaving Pepamee, and proceeding for about a mile, we came to some trees, in which I halted the party; we encamped upon a small stream about four miles from Pepamee. In the evening we observed their beacons alight (on high hills) in all directions, which I found out were signals of our position, and movements; the number of beacons burning at the same time, being the signal of our advance, retirement, or halting place; the path was very good, over a ridge of low hills.

21st. Our progress was very slow, and although the distance to Juppamah was four or five miles, we did not arrive there till 3 P. M. We entered the village through a narrow lane, with a stone wall on either side, and a bamboo trellis work over it, and a single plank of considerable thickness as a door. This village was a very old one, of about 300 houses, although report always augmented the number to 500; it is composed of half Angamee and half Dewan Nagas. Some of their stools or bedsteads were very large, cut out of a single tree, and they held them in great esteem; their iron instruments being of the most inferior description, it must have taken them considerable time and labour to cut out the trees. We found a great quantity of rice in the jungle, of four or five different kinds.

The Rengma river winds past the western foot of the hill this village is situated on. On a hill on its right bank, bearing from Juppamah 55½, is the village of Bephomee. The country about this is composed of good sized mountains, though of much less altitude than those of the

great range, averaging from two to three thousand feet high. The Sumoogoding range, after admitting the Desem river through it to the east of that village, continues in a north-eastern direction till it is again broken by the Rengma river passing through it, and it finally ends at the Doyang river; the hills on the eastern bank of the latter river extending down its course to about the parallel of latitude of Mohong Dhejooa. The mountain on which Juppmah is situated, overlooks the Sumoogoding ridge, and the whole country is visible up to the Rengma Naga hills, to the west of the Dhunsiri; the eye extending over a vast dark looking forest plain, with the course of the Rengma winding through it, till it is lost sight of in the distance. The hills to the east, between the Rengma and Doyang river, are of a far less height than those to the west of the former river, and run in parallel ridges, east and west. The largest mountains lay in detached ridges to the south of the great range.

It appears to me that the latter range would form a well defined boundary between Assam and Munipoor, running in an almost uninterrupted straight line from the Meghpoor valley up to the Rengma river, a slight bend only taking place to the southward, of not much consequence, about Berem.

I regret extremely I was not able to prosecute my examination of the country further to the eastward, which I was obliged to give up on account of the delay that I had been subjected to in the plains, and the lateness of the season at which I entered the hills. Sickness had commenced in camp, which made marching very harassing with the limited means I had of conveyance.

27th. After much difficulty in providing conveyance for the sick, I left this ground, and returned by the path we had come.

We encamped in our former fences of the 20th.

On the 28th, reached Meyepamah; and on the 29th, arrived at Sumoogoding, and found that the whole of the stockade, grain, and property left behind, had been destroyed by fire, through the carelessness of a sepoy.

2nd March. Deeming it imprudent to trust a post at such a distance from any civilized population with only a few maunds of grain in a weak stockade, and fearing the ill will of the villagers, I brought the whole party down to Dhemapoor, where we found 200 maunds of grain assembled.

A short Memoir of Mechithar Ghosh, the Armenian Legislator. By
 JOHANNES AYDALL, Esq., M.A.S. &c.

Armenia, that favoured portion of the globe, famed in the page of ancient and modern history both for its physical resources and political changes, is generally admitted to have been prolific in giving birth to men of vigorous minds, and no ordinary attainments, maugre the lamentable disasters consequent on the overthrow of the dynasties of its kings, and the invasion of the barbaric hordes, by which it was overrun in the various periods of its history.

The subject of this memoir, Mechithar Ghosh, was born in the Armenian era 592, corresponding with *Anno Domini* 1143, in the city of Ganzak, once the capital of Armenia Major, situated between the sea or lake of Gelam and the river Kúr, or Cyrus. While in his teens, he devoted himself to the study of the Armenian language and classical literature, under the able and paternal tuition of the learned friar Johannes of Tavúsh. His heart burned with a love of knowledge, and his whole attention was literally absorbed in the acquisition of the learning of his country. The death of his preceptor, which imbued his mind with a tinge of melancholy, and subjected him to a temporary dejection of spirits, was not allowed to cool his ardour in the pursuit of his favourite study. From an association with learned men of all ages and all grades, he derived an exhaustless fund of knowledge, and was thus enabled to enrich his mind with the gems of science and literature. Not content with the intellectual riches of which he was already possessed, he repaired towards the frontier of the Black mountain,⁽¹⁾ then the acknowledged centre of all Haican⁽²⁾ learning and science, and the reputed resort of all men of letters and genius, with the view of extending his mental acquirements, and attaining to the highest possible eminence amongst his contemporaneous literati of Armenia. Here he was received with the greatest kindness, and the most marked attention, by his kindred spirits; and ultimately had the gratification to see his laudable endeavours crowned with the most triumphant success. He had the merit

(1) Սեւ. Լեւան in Armenian.

(2) Haic Հայկ was the grand progenitor of the Armenians, who are also called Haics Հայք; after his name.

of ranking in the list of the most learned and erudite of his age, a consummation to which his whole ambition aspired ! The extent of his learning could only be equalled by the degree of austerity which he had imposed on the mode of his life. He was highly esteemed by all, for the urbanity of his manners, and rigidity of his moral discipline. After a stay of some years in the society of men eminent for their love and acquisition of wisdom, he went to the city of Carin,⁽³⁾ (the modern *Erzerúm*) preparatory to returning to Ganzak, the land of his birth. No sooner had he commenced tasting the sweets of the company of his relatives and nearest friends, after a long separation, than he had the misfortune to feel the disasters from the inroads of the Scythians, by whom that part of the country was cruelly harassed and devastated. This induced him to quit his native soil, and to proceed to the province of Khachen, where resided Vákhthánk, the prince of Hatherka,⁽⁴⁾ under whose protection he expected to enjoy comparative ease and freedom from the molestation of unbelievers. Here he meditated the propriety of devoting himself to a monastic life ; and having determined on this step, he bade adieu to his protector, and repaired to the province of Kain, where stood a convent, known by the appellation of Ketick.⁽⁵⁾ He took shelter within the precincts of this monastery, and joined its inmates with a full acquiescence in the rules of the institution.

On the demolition of that convent by the incursions of enemies, he constructed a new one on the spot, called the "Valley of Tanzút."⁽⁶⁾ He also built in this place a church, consecrated by the name of St. Gregory the Illuminator,⁽⁷⁾ and a small chapel dedicated to St. John the Baptist.⁽⁸⁾ Subsequently, on the increase of the population in that place, he erected another church of solid stone, and on a more extensive scale, which was consecrated by the name of the holy Deiparous. The erection of this sacred edifice was finished in

(3) Կարին Carin is the name of the city of Erzerúm, in the classical atlas of Armenia.

(4) Վախտանկ Իշխանն Հաթերքայ in Armenian.

(5) Գետիկ or Գետիկայ վանք in Armenian.

(6) Tanz Տանշ signifies *pear* in Armenian. The valley abounded in pears, and was therefore called Տանշուտ Tanzut, or *full of pears*.

(7) Սուրբ Գրիգոր Լուսավորիչ St. Gregory the Illuminator flourished in the third century, and evangelised Armenia.

(8) Սուրբ Եովհաննէս Մկրտիչ in Armenian.

the year 1191. The convent, newly constructed by him, received the name of Ketick,⁽⁹⁾ which appellation was afterwards applied to him, in commemoration of his being the founder of that monastery. He was also known by the cognomen Ghosh,⁽¹⁰⁾ which appellative was added to his Christian name, in consequence of his having very little, or no beard; this circumstance is corroborated by the testimony of his cotemporary and countryman, Kirakus⁽¹¹⁾ Ganzakensis, who had the honour and pleasure of his personal acquaintance and friendship.

Mechithar Ghosh is known to have been the author of numerous works of sterling merit. He wrote a book on human nature, in the shape of an address from Adam to his sons, and from Eve to her daughters. He also wrote several treatises on the Christian faith, and on the Communion of the Altar. His pastoral and admonitory epistles are also extant, and afford a proof of his unassuming piety and philanthropy. At the end of this epistolary work he says, "If I have ever erred in addressing these monitory letters to my countrymen, or unintentionally offended those whom I intended to benefit, I am most cordially penitent for my error, and readily ask their indulgence and forgiveness." He is also said to have written a commentary on the book of Jeremiah, and a great many sacred odes and poetical pieces. Some of the latter have been handed down to us, and are pronounced to be sufficiently elegant and sublime, to stamp him as a poet of no ordinary kind. His composition of "Choice Fables," is a combination of the *utile dulci*, and indicates his capacity to unite a great deal of instruction with much amusement. Of all the works of Mechithar Ghosh, the latter is the only one that has ever been printed. It was published by the Mechitharistic⁽¹²⁾ Society of Venice, on the 18th of January 1790. The chief recommendation of these Fables is, their originality, for which they are considered to be far

(9) The subject of this memoir was also called Մեթիթար Գեթիկ Mechithar of Ketick.

(10) Ghosh Գոշ in Armenian signifies Քարձ or Քայց, vulgo Քոսմի, and in English, *beardless*, or *one having very little beard*.

(11) Կիրակոս Գանձակեցի in Armenian. Kirakus is from the Greek word *Κυριαχός*, and its adoption as a proper name, is very common among the Armenians.

(12) This Society was founded by Mechithar of Sebastia, in the early part of the eighteenth century. Its members have been pre-eminently successful in promoting the revival of Armenian literature, and the publication of numerous works of considerable merit.

superior to the "Select Fables of Vartan," published at Paris in the year 1825, with a French translation, by that most indefatigable and highly distinguished orientalist, M. J. St. Martin, under the auspices of the Asiatic Society of that place.

But the crowning literary production of this great Leviathan of Armenian literature, is the Code of Laws which he concocted, framed, and promulgated, in the year 1184, and which has immortalised his name as a legislator and first-rate author, in the recollection of posterity. In the preparation of this law-book, he availed himself of the assistance of Frater Josephus and Frater Paulus, both equally distinguished in the page of our national history, for their literary attainments and deep research. The laws comprised in this Herculean work are both civil and ecclesiastical, and admirably adapted to the state of the Armenians of those days. Mechithar Ghosh shines more conspicuously in the character of a legislator than in that of a divine, a disciplinarian, an annotator, a poet, or a fabulist. I have treated, at great length of the code of this eminent legislator, in my "Essay on the Laws and Law-Books of the Armenians,"⁽¹²⁾ and furnished some specimens of the laws contained therein. I must here repeat, what I have already stated elsewhere, my deep regret at the total absence of a printed Armenian standard Code of Laws, to the great inconvenience and difficulty of the Armenians located within the pale of the Honorable Company's courts in this country. Authentic and genuine copies⁽¹³⁾ of the law-book of Mechithar Ghosh, are to be found in the extensive library of the Mechitharistic Society of Venice. Want of funds to meet the expenses of printing, if I am correctly informed, is the only cause of the non-publication of this valuable work of antiquity; which, if published, would unquestionably be considered one of paramount interest and utility to the Armenian nation in general, and to the Armenian colonists of Bengal in particular. If the Armenians living under the jurisdiction of the Zillah courts of this country, be really willing to promote the security of the property of their children, let them step forward with

(12) Which will shortly be published.

(13) Since writing the above, I have been credibly informed that correct and elegantly written copies of this book are also kept in the library of Etchmiatchin. It is to be hoped that the work in question will speedily be published, either at Venice or Etchmiatchin.

their purses unstrung, and, with a spirit of true patriotism, bestow this posthumous work of their renowned legislator of the twelfth century, as an invaluable boon on their expatriated countrymen of British India.

But to return to the immediate subject of this brief memoir. In almost all national meetings, and in all synodical proceedings, Mechithar Ghosh took a willing and active part. He was present in the grand council, convened in 1178, at Hiromclah,⁽¹⁵⁾ having for its object the formation of a union between the Armenian and Greek churches. His presence was also considered to be indispensably necessary in the two synods, respectively assembled at Lori and Ani, in the province of Shirak, between the years 1205 and 1207, for the express purpose of reconciling differences and dissensions, provoked by uneasy and turbulent spirits. He was desired by a particular invitation, bearing the signatures of the principal ecclesiastical dignitaries, to favour them with his attendance. He attended the council of Lori, but sent an apology for his inability to be present in the synod of Ani. Advanced age, aggravated by bodily infirmities, was the unavoidable cause of his absence from that assembly. He sent, however, his vote in writing, expressive of his acquiescence in the proceedings of the majority of the meeting. Not quite contented with this, and unsuccessful in bringing the affairs of the meeting to a satisfactory termination, the assembled Bishops persuaded Mechithar Ghosh, by repeating their solicitations in writing, to honour the assembly with his presence. The meeting stood adjourned, waiting his arrival with no small degree of anxiety. "Hasten," said they in their letter, "to our succour, for we are sadly divided; and the division cannot be healed but by a sweet word from your lips. Your apology for your advanced age and bodily infirmities, is inadmissible. Should you be visited by death on your journey hither, we shall hold your memory in reverence by a suitable and lasting monument, worthy of the public virtues of the best of our divines. Only hasten to our succour!" Mechithar Ghosh complied with their wishes, however fatiguing and wearisome the journey to a valetudinarian of his age and description. His presence at the assem-

(15) Հիւրմուկ in Armenian. The etymological signification of Hiromclah is the *castle of Rome*. It was an impregnable fortress in the twelfth century, and belonged to the Count of Jocelyn during the days of the Crusaders.

bly had an electric effect. A short address from him, judiciously and temperately worded, calmed and soothed the assembled multitude. The differences and dissensions were buried in the waters of Lethe; peace and unanimity restored; and the assembly dispersed to the satisfaction of all parties.

Such a wonderful character was Mechithar Ghosh; and so universally esteemed, admired, honoured and respected by his countrymen, for his public and private virtues. The qualities of his mind kept pace with the qualities of his heart. He attained to a good patriarchal age, and terminated his earthly career, *Anno Domini* 1213, and his remains were interred in the convent of Ketick, with every demonstration of honour and affection becoming the memory of so great and useful a man.

He had a great number of pupils, several of whom survived him, and rendered themselves distinguished by their literary productions, and acts of public utility. I cannot better conclude the memoir of this very learned and truly excellent man, than in the words of his countryman and contemporary, Kirakus Ganzakensis:—

Զամանէ գրէ իբրակոս . “ Բազումք էին որք աշակերտեցան 'ի նմանէ “ վարդապետական բանին , քանզի համբաւ իմաստութեան նորա հաշ- “ կեցաւ ընդ ամենայն տեղիս , և դային առ նա յամենայն կողմանց . քան- “ զի ըստ անուան իւրոյ միսի(թարէք զամենեան բանք նորա աք- “ գիւնականք և լի շնորհօք . . . վասն այսպիսի համբաւոյ բազումք որք “ էին 'ի կարգի վարդապետ Յաճկէին զինքեանս , և դային 'ի կարգի “ աշակերտաց կալով . ուսանէին 'ի նմանէ , և առնուին վերստին հրաման : “ Եւ բազումք յաշակերտաց նորա հասին 'ի պատիւ վարդապետական : ”

“ There were many who availed themselves of the benefit of his indoctrination. The fame of his learning had spread far and wide, and attracted pupils from all parts of the country. He comforted them all, pursuant to the literal meaning of his own name !⁽¹⁶⁾ His words and instruction were beneficial, and full of merit and grace ! Owing to the celebrity of his name, many who had been invested with the degree of professorship, scrupled to acknowledge their own dignity, and went to him with the profession of pupilage on their lips. They were indoctrinated by him, and newly received order. Several of his pupils had the merit of being honored with the doctoral degree.”

(16) Mechithar Միսի(թարք etymologically signifies *comforter, comforting, comfortable, comfort*, in the Armenian language.

Letter, forwarding a paper on the formation of the Museum of Economic Geology of India, from Captain TREMENEER, Engineers, to H. TORRENS, Esq. Secretary to the Asiatic Society.

Calcutta, 27th January, 1841.

I have the honour to state for the information of the President and Members of the Asiatic Society, that the collection of specimens forming the basis of a Museum of Economic Geology, is placed in the room which the Society has been pleased to appropriate to that purpose.

I regret that my stay in Calcutta is so short that I shall be unable to complete the labelling of the specimens before my departure for Moulmein. The labels are, however, all prepared, and Mr. Piddington has kindly undertaken to place them near to each specimen, so as to render them distinctly legible. Corresponding printed numbers, which are also ready, are to be affixed to the specimens themselves, the numbers now attached being only of a temporary description.

To provide, as far as possible, for obtaining specimens of Indian mineral products, &c., and to explain the principles and objects of a Museum of this description, I have prepared a memorandum, in which I have endeavoured to describe the substances which it is considered desirable to collect, and the indications by which localities, which are likely to afford them may be traced in such a manner as to require little or no previous acquaintance with mineralogy or geology, to render contributions useful and illustrative.

A similar communication has been made to the Government of Bengal, with a view of increasing the collection of specimens suited to the objects proposed; and should your Society concur in the suggestions contained in the paper herewith enclosed, its communication to the corresponding members of your Society, may prove of service to the Museum of Economic Geology, now forming.

It is my intention, in compliance with a suggestion from Government to that effect, to maintain a correspondence, during my absence, with the Curator of your Museum, by which, and by personal communication, on any occasional visit which I may make to Calcutta, I shall be able to arrange for the disposal of specimens, which the Curator may receive, in furtherance of the views herein alluded to.

MEMORANDUM.

Numerous specimens of coal, and of ores of the useful metals, recently received by Government from the Court of Directors, have been placed, with the consent of the Asiatic Society, in one of the Society's rooms, at their house in Park Street, where they are arranged for public inspection. These specimens form part of a collection, to which it is intended that additions shall be made, until a complete series, exhibiting the mineral products of Great Britain shall be obtained; exemplifying at the same time, their modes of occurrence in rock formations, and the processes of converting the rough ores to the metallic state. With this view communications have been opened with the Director of the Geological Survey of England, for the supply and interchange of specimens suited to the objects proposed.

Simultaneously with these, it is proposed to collect, with the aid of Engineer Officers, Officers of the Revenue Survey, and by donations from individuals interested in the subject, specimens of similar products and processes of manufacture of this country, which will be arranged in a manner convenient for comparison with the foregoing, and for exhibiting at one view the mineral resources of India.

To these will be added specimens of soils, and other substances, showing the application of Geology to Agriculture; specimens of materials used for public buildings, and for roads; models of machinery adapted to mining and agriculture in India; and, lastly, records of mining operations which have been undertaken, or are still in progress.

Materials will thus be obtained, at no distant date, for a Museum designed to illustrate the application of geology to the useful purposes of life, to be entitled "The Museum of Economic Geology of India."

The Museum already possesses a series of specimens of British coal and ironstone from the South Wales and South Staffordshire districts, from the forest of Dean, and from Newcastle. In British tin and copper ores, chiefly from Cornwall, the collection may be considered complete.

The collection of specimens, exhibiting the various stages of metallurgical processes, comprises illustrative series of iron-smelting, and manufacture, as practised in South Wales; of the tin smelting of Cornwall; and of copper smelting, as practised at Swansea. To these, it is intended to add the Bristol mode of manufacturing brass and the

new and old methods of reducing zinc from its ores. Other mineral substances employed in the arts and manufactures will also be included, such as those illustrative of porcelain, common earthenware, pottery, fire bricks, and other manufactures from clays and their compounds, and of metallic oxides and earths employed as pigments, showing the mode in which they may be usefully and permanently associated with each other; as well as a series showing the important manufacture of glass.

In the agricultural section, specimens of Indian soils and subsoils, or subjacent rocks, will be collected, with information of the mode of treatment and usual produce of the land, together with the conditions of exposure and meteorological influences to which it is subject. By analyzing such specimens, the connection of agricultural products with the chemical and physical properties of the soil, as well the mineral and vegetable substances most fitted for increasing the fertility of the land, will be ascertained; and the results being compared with others similarly obtained in this, or in other countries,* correct principles will be established, either for the introduction of new products of cultivation, or for the improvement of those already existing. The substratum of soils being generally an element in their relative fertility, an inspection of these alone would lead to suggestions of much value to the cultivator, and to a knowledge of the geological character of the upper surface of the country from which they may be taken.

Another section will comprise stones, slates, marbles, porphyries, ornamental granites, and other building materials, as mortars, cements, and other artificial compounds, applicable to architectural and engineering purposes.

A focus will thus be presented, to concentrate all information relating to the Economic Geology of India, and it is considered that a collection of natural products, such as it will contain, may serve to point out localities which would be worthy of attention; and by exciting the in-

* We have learnt, while this Memorandum is passing through the press, that a far wider interest is taken at home in the improvement of India in connection with its agriculture, than has ever heretofore been the case. Our acting Curator, Mr. Piddington, having requested Mr. Stikeman the Secretary to the East India and China Association to procure for him some sugar soils from the West Indies, for comparative analysis with those of India, the Mauritius, &c, Mr. Stikeman applied to Lord John Russell, who, upon the recommendation of Sir John Cam Hobhouse, has kindly obtained an assortment of soils from the West Indies, and their arrival here is daily expected.—ED.

terest of the private speculator, tend to develop the mineral and agricultural resources of the country. An efficient means would also be afforded, of imparting instruction to native youths, whose services may be made available towards the gradual accomplishment of the objects proposed, with reference to the vast extent of territory which is open to investigation.

It will be perceived from the above, that this Museum is not intended for the reception of specimens of rocks or fossils to illustrate points of theoretical geology, but to exhibit those substances occurring occasionally in the solid crust of the earth and others, which are applicable to the useful purposes of life.

To those therefore, who may be requested, or who may be desirous
Mineral substances. to afford assistance in furtherance of the objects here set forth, it will be sufficient to state, that, any mineral or metallic substances, accompanied by specimens of the rocks in which they are found, with descriptions of locality and mode of occurrence, will be of service to a Museum of this description. The fissures and crevices of rocky strata, either along shores, or in vallies and ravines, should be examined, and indications will often be found in water courses and river beds, whereby metallic ores may be traced to the source from whence they have been abraded. Tin, gold, and platina are usually found in such situations; small rounded masses of the former, denominated stream tin, being scarcely distinguishable, save by their higher specific gravity, from common pebbles. The sands of rivers should be sometimes washed, as should also the alluvial detritus found in valleys or beneath the surface of level plains. Indications of copper are often afforded by a ferruginous and somewhat friable substance near the surface, specimens of which are desirable, as they serve often, with practised miners, to point the probable prospect of ore beneath. The vicinity of rocks, coloured green, blue, &c. may also be worthy of examination.

If with such specimens, the probable thickness of the stratum of rocks in which they occur, its dip, including the angle of inclination to the horizon, and direction of the beds by compass, be given, as well as the direction of any fissures that may be observed, it will enhance the value of the information afforded. A convenient size for specimens, is about three inches square, and about an inch in thickness, those of the accompanying rock, may be four or four and a half by three inches, and about

the same thickness. They should be carefully numbered, both on the specimens themselves, and on the envelope in which they are wrapped; one copy of the list to which the numbers will refer, should be transmitted by dawk, and another placed in the box with the specimens.

Specimens of slates, with the dimensions, quantity, and rate at which Building materials. they can be obtained; also of marbles, and building stones, cut into six inch cubes, will be desirable. The expense of quarrying and of transport to the nearest water conveyance should be detailed. One side of the cubes should be left to exhibit the exposed or weathered surface of the rock, the others roughly chiselled. The cubes of marble may be polished, except on their under surfaces.

The quality of water at the issue of springs, and the sediment deposited by them, should be particularly noticed, as they Examination of springs. rise to the surface, generally, at some fault or dislocation of the strata, and will probably be imbued with matter derived from the metallic bodies with which they may have been in contact. Thus, water percolating through a bed of coal has often its surface coated with a thin film of oxide of iron, derived from the decomposition of iron pyrites, diffused through the coal. When traces of coal are discovered, it would be very desirable to transmit pieces of the strata of rock with which it is supposed the coal is associated, stating the extent of surface which the deposit is believed to cover, and the depth at which it is found; accompanied, if possible, by a vertical section, with figured dimensions of the accompanying beds.

Descriptions of native mining operations, and complete series of Operations of mi- specimens showing the processes followed in the re-
ning and reduction of ores. duction of ores, in their various stages of progress, to the metallic state, will be highly valued, when accompanied by explanations of the modes of procedure.

Specimens of soils should always be forwarded in connection with communications, and inquiries of agricultural interest.

Soils being generally the upper decomposed portions of subjacent Soils. mineral substances, whether hard rocks of various kinds, or clays, marls, sands, &c., mingled either naturally or artificially with vegetable and animal matter, it becomes very desirable in collecting specimens of them, that they should be accompanied by others of the hard rocks, clays, marls, sands, &c., on which they rest;

so that by careful analysis of the whole, with due attention to climate and the other obvious conditions to which they may have been exposed, some general and useful results may be brought to light, respecting the soils best fitted for the growth of the various plants usually cultivated in this country.

In selecting soils for the Museum of Economic Geology, care should be taken to obtain fair average specimens of the localities whence it may be considered desirable to send them; and to insure the true sub-soil, subjacent hard rock, clay, sands, &c.; specimens of the latter should be obtained as near as possible beneath the spot whence the soil may have been so selected, for it sometimes happens, that the soil of a field varies in places, from resting upon different kinds of sub-soils.

The soil above hard rocks is not unfrequently separated from them by broken angular fragments, the half-decomposed portions of such hard rocks; specimens therefore of sub-soils, or subjacent mineral substances should, in such cases, be taken from the solid hard rocks beneath, and not from these fragments, which have commonly suffered too much decomposition to exhibit the real chemical composition of the rocks themselves. These angular fragments must not be confounded with gravels, sometimes overspreading hard rocks, to the depth of several feet, and chiefly or wholly composed of rounded pebbles, mixed with earthy, sandy, or clayey matter, the whole being often derived from a distance; for such gravels then form the true sub-soil, and the soil above them would partake of the character of the earth, sand, or clay, mixed with the pebbles, with the addition of the decomposed parts of such of the latter, as may disintegrate by the effects of the weather upon them.

The quantity of soil taken as a specimen, should weigh about a pound; it should be well dried and tied up in a canvass bag, labelled to correspond with a memorandum, in which the general agricultural produce of the spot, whence the specimen was taken, should be noted; the kinds of manure known to have been used upon it mentioned; the amount of grain or other crops per beegah stated; the dimensions of the beegah, and the best kind of produce which has been hitherto obtained from it, specified. A loose label should also be inclosed within the bag to guard against accidents. As so much depends on climate and position, the general character of the seasons should be pointed out, and the aspect of the ground, as regards exposure to

prevalent or hard winds, with any slope the ground may have, and its height above the sea should be stated, specifying if possible, the general temperature of the locality, and the degrees of greatest heat and cold annually experienced.

With respect to specimens of sub-soils, if of marl, sand, or clay, portions weighing about a pound, should be dried, tied up in a canvas bag, and labelled, to correspond with the respective soils above them. If the subjacent rocks be hard, a piece weighing also a pound, and fresh broken from the body of the rock, as nearly as possible beneath the spot whence any specimen of soil may have been selected, would suffice, and should be wrapped in strong brown paper, labelled to correspond with the soil above it. As specimens of many sub-soils may be rendered valuable for the purpose of illustrating those either well or ill suited to the growth of such trees as by their roots penetrate beneath the upper soil, commonly known as vegetable mould or humus, and which upper soil supports the great bulk of the plants commonly cultivated; it would be desirable to add a memorandum to any specimens which may serve to illustrate points of that kind. All specimens of soils should, if possible, be enveloped in wax cloth, and even packed in tin cases or cannisters, if any are at hand.

When a sufficient number of specimens in either of the departments here mentioned, has been collected, they should be packed in a box, and be sent by the cheapest, most efficient, and safe conveyance, directed—

On Service.

The Curator of the Museum of the Asiatic Society,

Calcutta.

*For the Museum
of Economic Geology.* }

At the same time a communication should be addressed to the Curator of the Museum of the Asiatic Society, under cover to

The Secretary to the Government of Bengal,

Fort William,

stating the conveyance by which the specimens have been forwarded, with copies of the memoranda attached to them, referring to numbers on the specimens, in order, as much as possible, to prevent their loss.

Calcutta :

22nd January, 1841.

I have printed with unfeigned pleasure, the foregoing memorandum, to the value of which no recommendation can add. Every friend to India, whether connected with the Society or not, will, it is earnestly hoped, aid in accomplishing the great ends, to which, by the liberality of the Court of Directors and of the Government of India, it may now aim; viz. the full development of the agricultural and mineral resources of the country. Since this memoir was read to the Society, the following contributions to the Museum of Economic Geology, in addition to the collections sent out by the Court of Directors, under the care of Capt. Tremenhare, have been received.

Mr. Piddington,
Acting Curator,
As. Soc. Museum.

Specimens of cotton, coffee, sugar, tobacco, and tea soils, &c. from India, the Mauritius, United States, Singapore, &c. of which many are analysed.

Specimens of Burdwan iron ores: analysed.

Specimens of the earths used in the curious red glazing of the native sugar pans.

Specimen of white clay from Rotasghur, which may be used like pipe clay for claying sugar.

I doubt not that we shall shortly be enabled to add many more to this list. To use the words of Mr. Piddington, "Our friends have only to recollect, that nothing pertaining to, or derived from the earth, if useful to man, can be unacceptable to our intended collection, and that even what may to them appear an every-day matter, and of no moment, may be fraught with important results in the hands of others."

I append to this valuable paper, further correspondence of interest to the Society, and to subscribers to the Journal on this important subject of Geological research, it having been put at my disposal by the Committee of Papers.



G. A. BUSHBY, *Esq. Secretary to the Government of India,*
SIR,
General Department.

Being authorised by the Honorable Court of Directors to deliver to the Government of India certain specimens illustrative of the mineral productions of England, I have now the honour to report my arri-

val at Calcutta, on the ship "Lord Hungerford," with these specimens under my charge. They consist of

- 43 Specimens of coal from the South Wales and South Staffordshire Coal districts; presented by Mr. H. T. De la Beche, F.R.S. &c., Director of the Museum of Economic Geology, under Her Majesty's Government.
- 10 Specimens of coal, and others of ironstone and limestone from the principal working beds near Birmingham; presented by J. S. Dawes, Esq.
- 50 Specimens of copper and other metallic ores, chiefly from Cornwall; presented by Mr. H. T. De la Beche.
- 119 Specimens of the ores of iron, copper, and tin, from South Wales, Cornwall, and elsewhere, collected by myself, amongst which are many specimens of copper ores; presented by Seymour Tremenheere, Esq.
- 24 Specimens illustrative of the process of tinsmelting, exhibiting each stage of progress, from the rough ore to the metallic state; presented by Thomas Bolitho, Esq. of Penzance.

Details concerning the above are entered in a book, which is forwarded herewith, on the plan followed at the Museum of Economic Geology, wherein it is intended to describe the mineralogical character and geological connection of each specimen, together with such information as may be useful in tracing indications of similar substances in India.

The form of this, as well as of books of other Departments, kept at the Museum, is given in enclosure No. 1.

In addition to the specimens which have been enumerated, others have been promised by gentlemen connected with mining and smelting establishments; and as arrangements were made at the India House for their immediate dispatch, they may be expected shortly to arrive. They include,

Specimens of the process of copper smelting, as practised at Swansea; by H. Vigors, Esq.

Specimens illustrative of the modes in which the Cornish copper, lodes, occur in rock formations.

Specimens of the coal beds, and of ironstone from the Penydarren works at Merthyr Tydfil, and of the process

of manufacture of different kinds of iron ; by G. Grenfell, Esq.

Specimens of the principal coal beds, and of the iron ore, worked in the Forest of Dean ; by — Protheroe, Esq.

Specimens of the principal working beds of the Newcastle coal field ; by Charles Bigge, Esq.

Together with others, if the Government should desire them, which Mr. De la Beche will, I have no doubt, with the consent of the Commissioners of Her Majesty's Woods and Forests, be able to forward from time to time from the Museum of Economic Geology ; many duplicates and spare pieces being often available for the purpose.

Some of the leading features of the mineral wealth of England, and the methods by which it is turned to the best advantage, will be thus represented, and will afford the means of comparison with similar products and processes in this country.

The mineral resources of India although more abundant, and more generally diffused than those of any other portion of the globe of equal surface, have hitherto attracted little attention ; and have been aided in a very slight degree by the means which are necessary to their proper development. The search for metallic ores has been unguided either by the principles of science, or by the practice of other mining countries and workings conducted without the skill and power required to prosecute them successfully, have been confined to within small distances from the surface. Hence the stores of useful metals which India is known to possess remain comparatively untouched, and present at this day, almost a maiden field for improvement.

Enclosure No. 2, represents in a tabular form, localities wherein ores of the useful metals have been worked, and others which have been observed and recorded. The following is an abstract of the paper alluded to, showing the number of places in each of the principal ranges of hills, which produce the undermentioned ores.

	Iron.	Copper.	Tin.	Lead.	Silver.	Gold.	Antimony.	Sulphur.
Himalaya range,	9	10	...	4	...	river beds.	...	4
Aravully,	6	10	...	5	1	...	1	...
Chittore,								
Vindhya,	17	...	...	1	...	...	...	...
Kasya,	3	...	...	...	...	...	...	...
Assam Territory,	1	...	...	...	...	river beds.	...	...
Tenasserim,	2	1	1	2	...	...	1	...
Malabar range,	31	6	...	2	...	river beds.	...	3
Coromandel,								
Total,	69	27	1	14	1	river beds.	2	7

The extensive distribution of iron ores of good quality, is the leading feature of Indian mineralogy. These are found in great abundance in every range of hills, in some of which they have been worked on a very limited scale, but with great success, for long periods of time. In several instances, beds of coal occur contiguous to them, as at Hoshungabad, Palamow, Sheregur in the Burdwan district, on the Adjai, seventy miles south of Boglepore, Serrareem, and Cherrapoonjee.

The iron districts, Marwar, Bundelkund, a portion of Malwa, Behar, and Sambhulpore,* are situated within the limits of the great sandstone formation with which the coal measures of India are associated. It extends in a broad band across the centre of Hindoostan, from the valley of Assam westward, to that of the Indus, and it is probable that coal will be found in various parts of this formation, and sufficiently near to these deposits of iron, to render them extensively available for economical purposes. In the districts of Sangur, Jabulpore, and in the valley of the Nerbudda, limestone also occurs, the connection of which is important, as upon the union of these three substances, the success of iron-works depends.

This extensive sandstone tract, presents also another source of interest. In it the diamond mines of Punnah in Bundelkund are situated, and the strata here are believed to be identical with those containing the diamond breccia of the Ellore district, and of Cadapah, on the Pennar. These

* Captain Ouseley discovered a rich field of excellent coal on the banks of the Hurdah (Hutsoc of the maps) in last November.



last have been traced as far north as Nagpoor, and other intermediate points of connection with the Bundelkund formation may also be found.

The Himalayas at Kumaon, the Aravully range at Shekawattee, and the hills of the Nellore district, are the only portions of country which have been worked for copper: very few other localities are yet known; but in such extensive ranges of primary mountains of similar character, it may be asserted that deposits of copper are not confined to these localities only.

The Aravully range is of moderate elevation, and appears to offer facilities for further examination. The Singhana copper mines are at the northern extremity of this range, where the disturbing forces have probably acted with less intensity than elsewhere, and there is reason to believe that the lines of fissure in other portions, especially near the junction of the stratified rocks with granite, may partake of the same cupriferous character. This range has been found to be productive of lead also.

There is no evidence of tin westward of the Bramahpootra, but it occurs in alluvial ground in many parts of the eastern peninsula, from Burmah to the extremity of Malacca, Sumatra, and Banca where the chief deposit exists; abundant sources therefore of this metal remain unexplored in the ranges of hills which diverge to the south-east from the great Himalayan chain, to form this peninsula, of which Sumatra and Banca seem but disconnected portions; and it will most likely appear that Assam, at the northern extremity of this stanniferous country, will also yield tin in its alluvial formations, derived from the Himalayas, by which it is bounded.

These ranges of hills, are likewise the repositories from whence the rivers of Assam, Burmah, Ava, &c. receive the gold dust with which their sands are charged.

(Signed) G. B. TREMENHEERE,
Capt., Engineers.

Extract from Letter No. 70, from the Secretary to the Government of Bengal, General Department, to Captain G. B. TREMENHEERE, dated the 13th January, 1841.

In reply to your letter and its enclosures of the 24th ultimo, I am directed to convey to you the acknowledgments of the Right Honorable the Governor of Bengal, for the information and suggestions

therein contained, and for the specimens of the mineral productions of England brought out by you.

A copy of your communication will be forwarded to the Asiatic Society, in whose rooms you will be pleased, agreeably to the accommodation which has been tendered by that body, to place the collection.

I am desired to observe, that if during your absence you will maintain a correspondence with the Curator of the Society's Museum, you may turn to servicable account the experience which you have acquired in England, for the formation of a Museum of Economic Geology, and the Asiatic Society will without doubt, upon any occasional visit which you may make to Calcutta, give you every facility of inspection, and allow such weight to your suggestions, as consistently with their rules may tend to the furtherance of the object in view.

It is the intention of the Right Honorable the Governor of Bengal to avail himself of your services and acquirements, in consequence of your appointment to the department of public works in the Tenasserim provinces, and to the superintendence of the Government forests, for the further prosecution of the inquiries commenced by the late Dr. Helfer into the mineral and commercial resources of the Tenasserim province, with a view to the development of the natural productions of that country.

Your particular attention will be directed in all your excursions to the practical geology and mineralogy of the Tenasserim territory, and you will report on the means and prospects of working any of the mines that have been, or may be discovered, and furnish specimens of all productions, in every possible case in duplicate, for the Government, and the Honorable the Court of Directors.

Note by Captain Tremenheere.

The following are suggestions concerning the mode by which the collection of geological specimens arrived from England, may be made useful.

By assigning for their reception a room in some public building, where they should be arranged in cabinets under glass, in a manner convenient for public inspection.

With them, or in an adjoining apartment, might be placed models of such machinery as is suited to the purposes of agriculture or mining in India.

A focus would thus be presented for the concentration of specimens of rocks, minerals, metallurgical processes, soils &c., from every locality, whereby a knowledge of the mineral resources, as well as of the capa-

bilities of any district, in an agricultural point of view, would be gradually obtained.

These specimens, with descriptions accompanying, might be prepared according to printed instructions of the Committee of the Royal Society, framed for the guidance of those employed in Magnetic Observatories, whereby accurate accounts, with specimens, may be transmitted by persons entirely unacquainted with the sciences of geology, mineralogy or agriculture.

The Engineer Officers, or those of the Revenue Survey, with whose departments the physical character of the country is nearly connected, seem to present the best means by which such information may be obtained.

The specimens on their receipt, might undergo comparison with those already arranged, and be subjected, if essential towards the elucidation of a proposed object, to chemical analysis, for which purpose the services of a chemical analyst would be necessary.

Localities would thus be indicated, which might appear to be deserving of more particular examination, and to which it would be desirable to send a person properly qualified for the purpose.

It is conceived, that information so obtained would not only be of service to the Government, but, as the fullest publicity is intended, might serve to encourage private enterprise.

If such a system were in operation, it would afford the best means of imparting instruction in these subjects, both by lecture and manipulation, to youths of the medical school, or others who might eventually be attached to Executive Engineers, or to Collectors of Revenue; serving thus as an efficient medium of communication between such functionaries and the natives on matters tending to develop the natural resources of the country.

The reception of mining records is another object which may be combined with the above one, of great importance at this period, since records of all operations hitherto conducted under European superintendence can now be easily obtained. The want of such records in England has been much felt, and has been the cause of much useless expenditure of capital in modern times.

A collection of standard books, treating on the subjects above referred to, should be by degrees provided for.

G. B. TREMENER.

Captain, Engineers.

FORM No. 1.

Ores of the useful Metals, Coals, and Mineral Mining Specimens, generally.

No.	Mineralogical description.	Locality.	Chemical composition.	How obtained.	Where obtained.	Donor's name, if presented.	Remarks.

No. 2.

Metallurgical Processes, and Manufactured Articles.

No.	Kind of substance.	Where manufactured.	By whom manufactured.	Composition of the substance.	How and where obtained.	Donor's name, if presented.	Remarks.

No. 3.

Specimens of Soils, and of the Rocks beneath them.

No.	Name of rock.	Mineral composition of rock.	General character of soil.	Analysis of the soil.	Character of agricultural produce of the soil.	Where and how obtained.	Name of donor.	Remarks.

No. 4.

Polished Granites, Porphyries, Marbles, &c., worked into columns, &c.

No.	Kind of substance.	Locality.	Form into which the specimen is worked.	Where, and by whom worked into form.	How and where obtained.	Donor's name, if presented.	Remarks.

No. 5.

Stones employed for Architectural or Engineering purposes.

No.	Kind of rock.	Geological series to which it belongs.	Locality.	Owner's name and residence.	Mineral composition.	Chemical analysis.	Specific gravity.	Resistance to pressure.	Resistance to frost.	Where employed & condition of buildings constructed of it.	Price per cubic foot or ton.	Where and how obtained.	Donor's name, if presented.	Remarks.

No. 6.

Museum of Economic Geology, Department of Her Majesty's Woods, &c. Return for the Quarter ending—

No.	Additions to the Museum.	When received.	Whether presented or purchased; if presented, by whom?	No. in Catalogue of Museum.	Number and description of analysis made for the Museum.	Number and description of analysis made for the Public.	Number and description of lectures delivered at the Museum.	Number of entries to the lectures.	Remarks.

Ores of the useful Metals found in India.

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Iron.	Dhamakot	Kumaon,	Himalaya,	Hematite,	An extensive bed, yielding from 30 to 60 per cent. of good iron.	Captain Herbert.
"	Rangar,	Kumaon,	Himalaya,	Micaceous,	Supposed to be connected with the above.	
"	Kutari,	Kumaon,	Himalaya,	Compact,	Yields the best iron in the province, & is accompanied with limestone.	
"	Chowgark,	Kumaon,	Himalaya,	Yellow oxide,	Contains some Manganese, and would afford a good steel.	
"	Sil,	Bishchir,	Himalaya,	Magnetic,	The iron made here is much in demand for sword blades. This and the Kutsari Mine are deemed worthy of attention.	
"	Kalsi,	Kumaon,	Himalaya,	Specular,	An extensive bed.	Dr. Royle.
"	Phagone,	Surmore,	Himalaya,		A large vein of Iron Ore.	
"	Chipal,		Himalaya,		In the descent to Deyrah in quantities sufficient to be profitably worked.	Sir John Malcolm.
"	Deyrah,		Himalaya,		Very abundant in the hills, which bound these provinces. Several foundries are established.	
"		Manvar,	Aravully,		Supplies iron to Indore.	Captain Dangerfield.
"		Mewar,	Aravully,		Ore of quality abundant, but from the imperfect mode of working the metal, is only valued for common purposes.	
"	Baug,	Malwa,	Vindhya,		An ore of good quality and abundant in this neighbourhood.	
"	Chandurgh,	Malwa,	Vindhya,		This iron is much esteemed.	Captain Franklin.
"	Kantcote,	Malwa,	Vindhya,		Beragur, Dangui, Baila, Fowri, Mygowa, Mogulla, Birainpoor, Deori, Kijoa, Banna, & Personah are other localities in this valley. An argillaceous limestone is near.	
"	Cheettakaree, ..	Malwa,	Chittore,		Iron is sold at these places, at 10 seers per Rupee.	
"	Gwalior,		Chittore,	Hematite,		
"	Gorakhpore,		Valley of the			
"	Sakri,		Nurbudda,			
"	Feerozepoor,		Aravully,	Hematite,		
"	Narnoul,		Aravully,	Hematite,		

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description,	Remarks.	Authority.
	Iron.	Hoshungabad, ..	Bhopal,	Vindhya,		Coal is said to accompany it on both banks of the Bhoorna.	Lieut. Finnis.
	"	Heerapore,	Bundelkund, ..			This iron ranks next to that of Gwalior	Capt. Herbert.
	"	Katola,	Bundelkund, ..		Hematite,	Dharmuni, Waldana, and Sorai or other localities contiguous.	
	"	Pannah,	Bundelkund, ..			70 miles south of this it occurs with coal on the Adjai. The hilly portion of this province is rich in iron.	
	"	Bogteopore,	Bahar,	Vindhya,		Occurs with coal. The ore is rich and abundant.	Mr. Glass.
	"		Palamow, ..			In great abundance.	
	"	Sircunda,	Rajmahl,	Rajmahl,		Affords a very superior iron, and is abundant.	
	"	Mesadhe,				Occurs with coal. The whole district affords valuable ores, which yield 50 per cent. of metal.	Mr. Jones.
	"	Sheargur,	Burdwan,			Coal is found here also on the river Towa.	
	"	Beradroog,	Goondwana, ..	Saulpore,		30 miles N.E. of Saugor, with limestone.	Mr. Rose.
	"	Amdeah,	Sumbhulpore, ..				Rev. R. Everest.
	"	Tuesnahl,	Saugor,				Dr. McClelland.
	"	Pandria,	Silhet,	Kasya,		Occurs with coal. 20 seers of iron are sold for a rupee.	Mr. Jones.
	"	Serrareem,		Kasya,		Occurs with coal.	Col. Watson.
	"	Cherrapoonjee, ..		Kasya,		Celebrated for its iron mines and steel.	Capt. Foley.
	"	Moulmein,	Assam,		Red iron clay, ..	Anthracite coal also occurs here.	Capt. Low.
	"	Tenasserim,			Oxide of iron, ..	Limestone also is near.	
	"	Tavoy,			Magnetic,		
	"		Orissa,				
	"		Hyderabad, ..		Hematite,	The ores are poor, and the iron expensive.	Dr. Voysey.
	"		Hyderabad, ..		Hydrate,	At Indore also.	Dr. Malcolmson.
	"	Doodgwana,		Sichell,			

Ores of the useful Metals found in India—(Continued.)

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Iron.	Rajamundry, ..	N. Circar, ...			In considerable quantity.	Dr. Heyne.
"	Ghettypore, ..	Mysore,	Malabar,		Steel is manufactured.	
"	Chittledroog, ..	Mysore,		Iron glance,	Near Sautgur. This ore is rich and abundant in the mountains of the Carnatic from Vellore to the Ghauts.	
"	Darnapararn, ..	Mysore,		Clay iron stone, ..	At Mangry there are many forges and a manufacture of steel.	
"	Yevogully,	Mysore,		Micaceous, ..	Ore can be obtained in any quantity, and in six other villages.	Dr. Heath.
"	Bangalore, ..				Also at Hurryhur, and Ruttegherry.	
"	Kudavigada,	Buddela,		Iron glance,	On the SW. coast there are extensive iron works.	
"	Ramanakapetta, ..	Ellore,			Extensive iron works established by Mr. Heath; steel also is made.	
"	Severndroog, ..	Koncan,			Celebrated for its steel called "Wootz," which is carried to Persia. The iron used in manufacture is in proportion of three parts from Mertpallee, and two from Condapoor. 110 Rupees weight, sold for 8 annas.	Dr. Malcolmson.
"	Spendamungolem, ..	Salem,			Has been used for ages in making Damascus steel. Two-fifths of Indore iron are used in the process. The iron is said to be superior to any English iron, and even to the best Swedish. The mines afford a boundless supply, and are easily wrought.	
"	Konasamundrum, ..		Nernul,	Iron clay,	Occurs in the sandstone or Diamond breccia, also at Punnundrow, but not worked.	
"	Deemdoortee, ..			Magnetic,		
"	Bagnapully, ..	Nellore,		Specular & Magnetic,		Dr. Malcolmson.

Ores of the useful Metals found in India — (Continued.)

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Iron.	Doodye,	Cutch,			This is the principal mine in the district. The ore yields 50 per cent. of copper. It occurs in limestone rock and is easily worked.	Capt. Grant.
"	Taggoor,	Koncan,				
Copper.	Dhanpur,	Coomlietor,	Himalaya,	Magnetic,		
"	Dhobri,	Kumaon,	Himalaya,		These mines are next in importance to those of Dhanpur and Dhobri. They occur in beds of indurated talc, which is easily excavated. At Pokri the schist is so soft as to cause great obstruction to the miners. At Khari ore has been observed in small quantity. All these ores are free from arsenic.	Capt. Herbert.
"	Gangoli,	Kumaon,	Himalaya,	Doublesulphuret,		
"	Sira,	Kumaon,	Himalaya,	Doublesulphuret,		
"	Pokri,	Kumaon,	Himalaya,	Doublesulphuret,		
"	Khari,	Kumaon,	Himalaya,			
"	Shor Gurong,	Kumaon,	Himalaya,		Has considerable manufactories of copper, brass, and bell metal.	Dr. Royle.
"	Khalsee,		Himalaya,			
"	Katmandu,	Nepaul,	Himalaya,		These mines have been worked for centuries. They are farmed annually for 14,000 rupees.	Mr. Hodgson.
"						
"	Singhana,	Shekawattee,	Himalaya,		The lode runs north and south. It is said that all the Ajmere valley, from Kishengurh to Rajgurh is traversed by copper lodes.	Capt. Boileau.
"	Khetri,	Shekawattee,	Aravully,	Yellow & grey,		
"	Buboe,	Shekawattee,	Aravully,	sulphurets and	Copper is coined by the chief of Saloombra.	Capt. Dixon.
"	Ajmere,	Shekawattee,	Aravully,	carbonates,		
"	Rajgurh,	Rajasthan,	Aravully,	Red oxides	Mines to the north are said to have formerly yielded revenue.	Col. Todd.
"	Rajauri,	Rajasthan,	Aravully,	and carbonates,		
"	Jeypoor,	Rajasthan,	Aravully,		And in the valley of Oodeypoor.	Mr. J. Hardie.
"	Saloombra,	Mewar,				
"	Mandal,	Mewar,				

Ores of the useful Metals found in India—(Continued.)

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Copper.	Basawur,	Bhurtpore,			This working has been abandoned. The Indian Copper Mining Company has been formed at Madras, to turn the mineral stores of this district to advantage. The ores are free from sulphur and arsenic, and become quite pure on smelting. Observed in limestone rock in excavations made for silver. In Siam and Tonquin. Mines are worked also at Acheen. Said to abound in tin. These mines have been reported upon by Captain Low; at Perar the tin is found 7 feet from the surface. Near to Prince of Wales Island, yields a pure tin called 'Ealin,' 500 tons were at one time exported annually, but now much less.	Capt. Boileau.
"	Nellore,					Dr. Heyne.
"	Onigole,			Carbonate of copper with red oxide of iron.		
"	Wangapadu, ..					
"	Gongpettah, ..					
"	Yerrapully, ..					
"	Agricondolah, ..			Carbonate,	Capt. Low.	Capt. Low.
"	Moulmein,					
Tin.	Mergui,	Tenasserim, ..				
"	Singapore,	Malacca,		Stream Tin. {		
"	Perar,	Malacca,			Capt. Herbert.	Capt. Herbert.
"	Legar,	Malacca,				
"	Junk Ceylon, ..					
"	Sumatra,					
"	Bancah,				Mr. J. Harding.	Mr. J. Harding.
"	Burmah,					
"	Marlaban,					
"	Borela,	Jaunsar,	Himalaya,	Granular Galena,		
Lead.					Sir J. Malcolm.	Sir J. Malcolm.
"	Maiyar,	Jaunsar,	Himalaya,			
"	Bhatnor,	Jaunsar,	Himalaya,			
"		Nepaul,	Himalaya,			
"	Jowar,	Oodeypore, ..	Aravully,	Argentiferous, ..	Mines have been formerly worked with advantage.	Sir J. Malcolm.
"	Ajmere,	Rajasthan,	Aravully,	Galena,		

Ores of the useful Metals found in India—(Continued.)

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Lead.	Jeypoor,	Rajasthan,	Aravully,		Mines to the north are said to have yielded much revenue.	Capt. Dangerfield.
"	Nuseerabad,	Rajasthan,	Aravully,		Has been worked by Capt. Dixon for some years.	Capt. Dixon.
"	Jhodepoor,	Manvar,			30 miles to the SE.	{ Mr. Jones.
"	Lachmeepore, ..	Boglepore,	Vindhya,		40 miles from Boglepore there is a rich vein of galena.	
"	Banguapilly, ..	Nellore,		Argentiferous galena,	A mine here formerly furnished the district with lead.	Dr. Heyne.
"	Paruni,	Nagpur,			Lead has been found in the neighbouring hills.	Capt. Jenkins.
"	Tenasserim,				There are mines also in Ava, Burmah, and Siam.	Capt. Low.
Silver.	Moulmein,				The principal mines.	{ Capt. Foley.
"	Jowar,	Oodeypore, ..	Aravully,	Argentiferous galena.		
"	Assam,				There are rich mines at Songhipago, Songhiabo, and Sohungong.	{ Capt. Herbert.
"	Bhootan,					
"	Siam,					
"	Umeerapoor,	Burmah,				
"	Badcoem,	Burmah,				
"	Woolcolla, ..	Burmah,				
"	Bencoolen,	Sumatra,			In the beds of rivers issuing from the Himalayas.	{ Capt. Herbert.
"	Padang,					
Gold.		Nepaul,			The rivers of Berar, Golcondah, and the Deccan carry down gold dust in considerable quantities.	{ Capt. Herbert.
"						
"	The Gomti river,	Punjaub,				
"	The Mahanuddy River.					

Ores of the useful Metals found in India—(Continued.)

Description of Ore.	Locality.	Province.	Hill range	Mineralogical description.	Remarks.	Authority.
Gold.	Belamonglum,	Mysore,			Contains rich mines of gold. Gold mines worked. Also at Umeerapoorah, Manipur; Noobool-tee is the richest. The mines yield 15,000 Rupees a year. They are in the latitude of Mergui. Occur in granite; Cambodia, Laos, Cochin-China, Pegue, and Tonquin have gold also.	Capt. Warren.
"	Assam,					
"	Badocoem,	Ava,				
"	Woolooltee,	Burmah,				
"	Bantaphannue,	Siam,			West of the frontier. Also in Burnah and Siam. In river beds with the gold washings.	Lieut. Newbold.
"	Batang Morung,	Malacca,				
"	Comtah,	Nagpur,			Has been observed near the South river in considerable quantities. Occurs in efflorescence in rocks containing iron pyrites. Deposits in the galleries of lead mines and in river beds, as the Tomse, Ramgunge, and Jaunsar. In a lake in the territory of the Peddore Rajah.	Capt. Jenkins. Mr. Ravenshaw.
Antimony.	Kah River,	Moradabad,				
"		Malwa,			Major Burney.	
"	Moulmein,			Sulphuret		
"	Tavoy, ..	Malacca,			Mr. J. Stephenson.	
Platina	Kamoe, ..	Ava,				
Quicksilver,	Andaman Islands,				Dr. Royle.	
Manganese,		Ava,				
Plumbago,			Himalaya,		Dr. Heyne.	
Sulphate of Iron, }		Behar,				
Sulphur, ..		Kumaon,	Himalaya,		Dr. Royle.	
"	Amalapor,					
"	Colair Lake,	Ellore,			Dr. Heyne.	
"	Sanesadthara,		Himalaya,			
Diamonds.	Malavully,	Ellore,			This is one of seven villages in the district near which diamond mines exist in the valley of the Kistnah.	
"	Kondapully,	Ellore,				

Ores of the useful Metals found in India—(Concluded.)

Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
Diamonds.	Cuddapah, .. Gooty, ..				In the valley of the Pennar. There are several mines in the valleys between these places and the low grounds to the North. On the Godavery. On the Mahanuddy. The mines here yield 1,20,000 rupees annually to the Rajas of Punnah, Banda, Chercarie and Joitpore. Occurs in efflorescence in alum slate. Found in the Lower, Central, and Upper hills, within a few days' journey of the Ganges. The annual value formerly exported from Bombay was 11,000 lbs the produce of the mines.	Dr. Heyne.
"	Golconda, .. Budrachallam, .. Sumbulpore, .. Kurnool, .. Punnah, ..					
"						
"						
"						
Alum.	Sahibgong,	Boglopore, .. Nepaul, ..	Vindhya,	Sulphate of Alumina.	Mr. Campbell.	Mr. Campbell.
"						
Cornelian.	Rae Peepla, ..	Baroach, ..	Suatpore, ..		In the Pennar district, and in the mountains of the Carnatic. Other valuable gems, as the Spinel ruby, Zircon, Cat's eye, and Topaz, occur in the rivers of the sienitic and basaltic districts of the Peninsula, and in Ceylon.	Dr. Voysey. Dr. Benza.
Corundum.	Salem, .. Kyalphyen, .. Nellore, ..	Carnatic, .. Ava,				
"						
"						
Ruby.	Songayuem, ..	Coimbatore, ..				
"	Kyalphyen, .. Kyalphyen, .. Palunshah, ..	Ava, .. Ava, .. Hyderabad, ..			A mine of garnets. Porcelain earth is found at Ootacamund in the Nilgcherries; and slates in any quantity at Bagulkata in the western Ghauts.	Lieut. Jervis.
Sapphire.						
Garnet.						

Grammatical construction of the Ho language.—By Lieut. TICKELL.

I hope due allowances will be made for the imperfectness of the grammatical details here given, when it is remembered that the Ho language has no written character, nor does there exist a person, native of the Kolehian or otherwise, who could give me the slightest assistance on this point.

It would be trite to observe that grammar is as inherent and essential to all languages, even the most barbarous, as a vocabulary itself. By first learning a number of the words and sentences arbitrarily, the system on which they are founded may be detected in due time by patient comparisons of them, even when the speakers themselves are unable to give the inquirer the least information on the construction of what they are saying. With this difficulty once mastered, it is inconceivable with what ease the most (apparently) complex and difficult languages become familiar.

The sounds of the Ho language are exceedingly pure and liquid, without strong aspirates or gutturals, and may be well rendered by the English alphabet, or still better the French one, as that admits of the slight nasal inflection which prevails in many words in the Ho dialect.

Let the following conventions be made to the sound of the vowels, in the ensuing dialogues, &c.

á —————	as in	“father,”	“rather,”
é —————	„	“prey,”	“été,”
í —————	„	“skip,”	“trip,”
ee —————	„	“sheep,”	“peep,”
ȳ —————	„	“fly,”	“try,”
aĩ or aȳ —	„	longer sound as in “aye, aye?”	
ō —————	„	“bone,”	“stone,”
oo —————	„	“fool,”	“stool,”
* _n (nasal n)	„	“Ton” “Fanfaron,” (French.)	

The long acute vowel sounds, such as *oo* and *ee*, also the letter *r*, are pronounced too liquidly and subtilly to be easily imitated by a stranger, and in some words the inflections of the vowels are inconceivably complex and mellifluous. The general euphony or cadence

* Also *g*, as the French liquid *g*, in Coulogne, Boulogne.

of the language is sprightly and cheerful; if the subject be of a complaining nature it subsides into a strange chaunt, the sentences being linked together by such see-saw sounds, as "ná-do na-do enété ná-do" which have no meaning, but serve to connect together the speaker's ideas.

When two or more words come together, the former ending, and the latter beginning with similar vowels, they are joined by ellipsis, as "Hóla'lé seniéna," instead of "Hóla allé seniéna," *we went yesterday*.

ARTICLE.

There are none, (properly speaking), definite or indefinite.

NOUN.

There is no distinction of genders, marked or influenced by termination, it being determined by the sense or meaning of the word, whether referring to a *male* or *female* being. Besides *man* and *woman*, "erril" and "èra," *boy* and *girl*, "koá" and "koóee," names of relations, and those of a few domestic animals, all other nouns are distinguished in their gender by prefixing "*Sandee male*, or "*Enga female*, as in Persian or English *مادن رينج نرينج*, *he-bear*, *she-bear*.

A noun has three numbers, singular, dual, and plural, as in Greek.

The nouns can scarcely be said to have declension as the terminal does not vary either according to number or case, although a distinguishing adjunct, which may be called a 'Pronoun article,' from its nature and use, is added.

Singular.	Dual.	Plural.
Nom. Sètá, <i>a dog</i> .	Seta king, <i>two dogs</i> .	Sèta ko, <i>dogs</i> .
Gen. Sètá-á, <i>of a dog</i> .	Seta kingya, <i>of two dogs</i> .	Seta koá, <i>of dogs</i> .
Ab. Seta-té, <i>from a dog</i> .	Seta king té, <i>from two dogs</i> .	Seta ko té, <i>from dogs</i> .

The dative, accusative, and vocative cases do not differ from the nominative, being only known from their position in a sentence.

In composition, the noun in an accusative case takes the first place in the sentence, if the nominative be a pronoun; otherwise the noun-nominative precedes, the accusative follows, and the oblique or dative case comes immediately before the verb, sometimes immediately after it. "En ho kajikeeáí áya èra," *that man said to his wife*, "Dendka

oé tootigoikeea," *Dendka shot the bird.* "Eeán hōn do chowlee seta emad̄ya," *my son gave the dog some rice.*

ADJECTIVE.

The adjective does not alter in termination, either in number, case, or gender; and always precedes the noun it qualifies. As "Boogee ho," *a good man*; "Boogee ho-á," *of a good man*; "Boogee ho lo té," *with a good man*, &c. There are no degrees of comparison, but as in Hindustani the qualifying words *very*, or *most of all*, are prefixed to denote grades of quality, as "Etka," *bad*, "Ená té neeá o etka," *this is worse than that*. "Sabee ré nee o etka minna," *this is worst of all*. "Boogee lèka èra," *a pretty woman*. "Boogee lèka èra ko," *pretty women*.

PRONOUN.

The first personal pronoun has four numbers, the singular, dual, plural, and plural comprehensive. The others only the three first, as noticed in the noun-substantives.

The possessive pronouns are the same as the personal, with the genitive inflection *á* added.

PERSONAL PRONOUNS.

Singular.	Dual.	Plural.	Pl. comprehensive.
1st. Eeng or aing, <i>I</i>	Alleeng, <i>we two</i>	Allé, <i>we</i>	Aboo, <i>we all</i>
2d. Um, <i>thou</i>	Abben, <i>you two</i>	Appé, <i>you</i>	"
3d. Ay or áyo, <i>he</i>	Aking, <i>they two</i>	Ako, <i>they</i>	"

In speaking, if the person include the person addressed, himself, and every one present, as nominatives or agents, he uses the plural comprehensive. If he exclude the person addressed, he employs the first person plural, as "Hola aboo seniéna," *yesterday we went* (i. e. you and all of us.) "Hola allé seniéna," *yesterday we went* (i. e. not you, we alone.)

The personal pronouns in the nominative case both precede and terminate the verb, optionally with the speaker, as, *I speak*, "Eeng kajitanna" or "Eeng kajitannaing" or "Kajitannaing."

I go, "Eeng senotana," or "Eeng senotannaing," or "Senotannaing."

And to give energy to the sentence, the pronoun is repeated, with the connect "do" between them, as "Eeng do eeng kajitanna," *T is I who speak*, "Um do um kombookenna," *Thou alone statest it*.

The most difficult part of their construction is in the dative and accusative cases, which are absorbed in the verbs they are governed by, in a manner unknown to other languages, being placed in the centre of the verb, after the root, and before the tense terminal.

As, *I speak to thee*, "Eeng kajimetanna;" *he spoke to me*, "áyo kajikedingia;" *he spoke to them*, "kajiked *koāi*;" *the tiger saw me* "koola do neldedingia;" *he killed him*, "áyo gōikedáya." Here I have underlined the oblique or accusative pronoun, where it comes in, just before the tense terminal of the verb.

POSSESSIVE PRONOUNS.

Singular.	Dual.	Plural.	Pl. comp.
1st. Eenga* or āingia ! <i>my</i>	alleengia	alléa	abooá
2d. Umma, <i>thy</i>	abbena	appéa	„
3d. Aya, <i>his</i>	akingia	akoá	„

These always precede their substantives.

DEMONSTRATIVE PRONOUNS.

Singular.	Dual.	Plural.
Nee or inee, <i>this</i>	neeking, <i>these two</i>	niko, <i>these</i>
Neeá or ineeá, <i>of this</i>	neekingia, <i>of these two</i>	neekoá. <i>of these</i>
Neeté or ineeté, <i>to, with, &c. this</i>	neekingté,	neekoté,

En, <i>that</i>	enking, <i>those two</i>	enko, <i>those</i>
Ená, <i>of that</i>	enkingá, <i>of those two</i>	enkoá, <i>of those</i>
Enté, <i>by, from, with &c. that</i>	enkingté,	enkoté,

"Nee" *this*, is sometimes used idiomatically by a person referring to himself. If a Kole were to be asked what countryman he was? he would answer, "Ho nee gé," *I am*; or literally, *this is a Kole*. Of what clan are you? Answer, "Poortee neegé," *I am a Poortee*.

* Pronounced, as 'mignon,' 'Ligne,' &c. in French.

INTERROGATIVE PRONOUNS.

Okoĩ, <i>who?</i>	chikan, <i>which?</i>	chiá, <i>what?</i>
Okoíá, <i>whose?</i>	chikaná, <i>of which?</i>	

RELATIVE PRONOUNS.

Relative pronouns are very vague, the sentence being generally so rendered as to obviate the necessity of them, thus, instead of saying, *The man who went*; a Kole would say, *The gone man*, "Senien Horo."

But at times "Chikana," *whatever*, and "Ena," *that*, are used relatively, as "Chikana um kajeeá, òna eeng áiooma," *what you say, that I will listen to*.

VERBS.

Verbs are either active or neuter. There is no passive voice.

The Infinitive mood is formed by adding *téá* to the root.

The Present participle by adding *tan* or *té*.

The Past participle by affixing *kedté*.

In the active or transitive voice, the Present tense Indicative mood, adds to the root "*tanna*," in the neuter voice, "*akanna*."

The Imperfect tense there is none, the Present tense being used, and its Imperfect signification understood by the context.

The Perfect tense is formed by adding in the active voice, "*kidda*, *keea*, *kenna*, *lidda*, or *tadda*," to the root. In the neuter voice, "*lena*," or "*ièna*," sometimes "*kenna*."

There is no Pluperfect tense, but greater completion is expressed by conjugating the verb "*chabteá*," *to finish*, added to the root; much the same way as "*chookna*" in Hindustanee.

The Future is formed by adding to the root *eea* or *oá*, or sometimes simply *á*, in which latter case the sound of the root is prolonged. Except "*nooiteá*," *to drink*, which makes "*noonooá*;" and "*roteá*," *to gore* (as a bull) "*roroá*."

The Imperative is formed by adding (in the 2nd person singular) to the root, "*mèn*" and "*omén*" or "*ýmén*," if the root end with a consonant. In the other persons *ká* precedes the pronoun, and the simple root of the verb, which will be more clearly shown in conjugating. In a negative sense, "*alum*" or "*alo*" is prefixed to the 2nd personal pronoun, *á* being added to the root; if in the 3rd person, singular, dual,

or plural "*aloka*" is prefixed to the pronoun, and the root alone of the verb is used.

The Subjunctive mood is vague and imperfect. In the Present, and Future tenses "*rèdo*" is added to the root, sometimes together with the word "*honang*," "*derang*," or "*torá*" (signifying conditionality) affixed.

The Past tense is formed in the same way; indeed there appears to be no Past Subjunctive tense; but sometimes the conditional terminal "*rèdo*" is added to the Past perfect Indicative.

This word "*rèdo*" admits the vowel to be affixed to it, or to come immediately before it and after the root.

Conjugation of the verb "*Kajëteá*," to speak.

INFINITIVE MOOD.

Present tense—*Kajëteá*, to speak,

Present Participle—*Kajitan*, or *Kajienté*, speaking,

Past Participle—*Kajikédte*, having spoken.

INDICATIVE MOOD.

Present tense.

	Sing.		Dual.	Plural.	
1st. Person,	<i>Aïng</i> ,	} <i>Kajitanna</i> ,	<i>Alleeng</i> — <i>Allé</i> ,	} <i>Kajitanna</i> ,	} <i>I &c. am speaking.</i>
2d. ,,	<i>Um</i> ,		<i>Abben</i> — <i>Appé</i> ,		
3d. ,,	<i>Aÿo</i> ,		<i>Aking</i> — <i>Ako</i> ,		

Perfect tense.

1st. <i>Aïng</i> — <i>Alleeng</i> — <i>Allé</i> ,	} <i>Kajikidda</i> , <i>Kajilidda</i> or <i>Kajitadda</i> .
2d. <i>Um</i> — <i>Abben</i> — <i>Appé</i> ,	
3d. <i>Aÿo</i> — <i>Aking</i> — <i>Ako</i> ,	

Future tense.

Aïng, *Um*, &c. &c. &c.—*Kajeea*, *I &c. &c. will speak.*

IMPERATIVE MOOD.

Sing.	Dual.	Plural.
Eeng Kakajee, <i>Let me speak.</i>	Kajeeaboo or Abookakajee, <i>Let us all, &c.</i>	
Um Kajeemén, <i>Speak thou.</i>	Kajee ben or Abbenkakajee, <i>Speak you, &c.</i>	
Ayo Kakajee or Kakajee o kái, } <i>Let him speak,</i>	Kajeealling or Allingkakajee, <i>Let us, &c.</i>	
	Kajeeallé or Alléokakajee, <i>Let us, &c.</i>	
	Kajeeako or Akokakajee, <i>Let them, &c.</i>	
	Kajeeaking or Akingkakajee, <i>Let them, &c.</i>	

NEGATIVE.

Sing.

Dual. Plural.

Alokáing kajeea, *Do not let me speak.*
 Alum kajeea, *Speak not.*
 Alo kaí kajeea, *Do not let him speak.*

Alo k'aboo kajeea.
 Alo k'allé kajeea.
 Alla'bben kajeea.
 Al'appé kajeea.
 Alo ka'ko kajeea.
 Alo ka'king kajeea.

*Do not let us
&c. &c.
speak.*

SUBJUNCTIVE MOOD.

Present tense.

Eeng Kajeerèdo, *If I speak.*
 Um Kajeerèdo, *If thou speakest.*
 Aio Kjeerèdo, *If he speak.*

Aboo,
 Allé,
 Abben,
 Appé,
 Ako,
 Aking,

Kajeerèdo, If we &c. speak.

Perfect or Pluperfect.

Eeng, Um, &c. &c. &c. Kajeekedrèdo, *If I &c. &c. had spoken.*

CONDITIONAL, OR POTENTIAL.

Eeng Kajëäing honang, *I would speak.*
 Um Kajeelum honang, *Thou, &c.*
 Ayo Kajea honang, *He, &c.*

Allé &c. &c. Kajea honang,
We might or would speak.

NOTE. As has been before explained, in all these tenses and persons (except in the Imperative) the pronoun may be either prefixed, or affixed, or both.

The same Verb, Conjugated with its Objective Pronoun.

INDICATIVE.

Present tense.

Eeng or Aŷng	Kajeeing tanna,	<i>I speak to myself.</i>
„	Kajee metanna,	<i>I speak to thee.</i>
„	Kajee áŷtanna,	<i>I speak to him.</i>
„	Kajee' létanna,	<i>I speak to ourselves.</i>
„	Kajee' ling tanna,	<i>I speak to us two.</i>
„	Kajee' ben tanna,	<i>I speak to you two.</i>
„	Kajee' pétanna,	<i>I speak to you.</i>
„	Kajee king tanna,	<i>I speak to them two.</i>
„	Kajee kotanna,	<i>I speak to them.</i>

The same exactly for all the other persons, and tenses, &c.

Perfect tense.

Aing, Um, Ayó, &c. &c. &c.	{	Kajikedingiá.	I, thou, he, &c. &c. &c.	{	spoke to myself.
		Kajiked'miá.			spoke to thee.
		Kajikedáíá.			spoke to him.
		Kajikede'lia.			spoke to ourselves.
		Kajiked'lingia.			spoke to us two.
		Kajiked'bena.			spoke to you two.
		Kajikedpéá.			spoke to you.
		Kajikedkingiá			spoke to them two.
		Kajiked'koá.			spoke to them.

Examples of this construction, especially in the Imperative mood, will be given in the Vocabulary, so need not be further dwelt on here.

It is scarcely possible to reduce the verb "*to be*" to conjugation, unless we suppose the varied forms in which it is used as inflections of separate verbs, wanting in many tenses. For "*to be*" is expressed by different verbs, according to its allusion to time, a person, or a thing; and again as whether it relate to mere existence or nature of existence. In short, there is no auxiliary verb "*to be*" which can be independently conjugated. The unchangeable word "*minna*," or "*minnakana*," is applicable in the present tense alone, to denote a *state* of existence, as "*Eeng, um, ayó, &c. minna, or minnakana*," *I am, thou art, he is, &c.* But in past and future tenses some other verb denoting *presence*, as the verb "*to come*," "*to reside*" &c. must be employed.

But the verb "*to be*," when implying the *nature* of existence, can be rendered in the past and future tenses, as well as the present, by adding to the participle or adjective, *oá* in the future, and *iena* in the past, as "*eeng laga akanna*," *I am tired*; "*eeng lagaoá*," *I shall be tired*; "*eeng lágièna*," *I have become tired*; "*eeng rènga akanna, or renga akannaing*," *I am hungry*; "*eeng rengaóá or rengaing*," *I shall be hungry*; "*eeng rengaìèna*," *I was hungry*. *Oá* and *iena*, it is to be remembered, are inflections of the future and past tenses in all neuter verbs.

Again the verb "*to be*" can be simply represented in the future and past tenses, when speaking of a *thing*, by the word "*hobawa*," *it shall or will be*, and "*hobiena*," *it has been*; also in the present, "*hobow-tanna*," *it is*. This mode of expression commonly refers to the success

or accomplishment of any project. In the English idiom we should say for "hobawa" *it will do, or it will answer*; "hobiëna," *it is all over, or has succeeded*; "hobowtanna," *it is going on*.

That boy will be a thief, could not be rendered "En koá do komboo hobawa," but "En koá do komboo oá."

Your business will be done to-morrow, not "Umma kajee gappa oá," but, "Umma kajee gappa hobawa."

This will never do, "Ka hobawa;" *go away, it is all over* "Mar-senomén hobiëna."

In English and other languages, state, nature, or condition, is rendered by affixing or prefixing the various tenses of the verb "*to be*" to the adjective, as *to be hungry, I am hungry, I was hungry*; "*to be glad, I am glad, &c. &c.*" But in the Ho dialect the adjective itself becomes a neuter verb, and is conjugated by affixing to it the different inflections denoting time and mood—*to be hungry, "rengatéa;" I am hungry, "renga akannaing;" I was hungry, "rengaiënaing;" &c.*

NEUTER VERBS.

After what has been said, it would be unnecessary to give any example of the conjugation of neuter verbs. It only requires to be remembered that their present terminal is "akanna" instead of "tanna;" and their past inflection "iëna," instead of "kidda, tadda, lidda, or eëa," all of which latter are transitive forms.

Some verbs are both neutral and transitive, as "Chabateá" *to finish*. They have therefore both inflections. In the transitive form "Chabateá" is frequently added to the root of some other verb, to denote completion; but it may also be used alone: in the neuter form, it is of course confined to the third person.

EXAMPLES.

Yömchabakiddaí, *He eat it all up.*

Bÿchabakidallé, *We finished (making) it.*

Kajeechabÿmén, *Finish speaking.*

Gappa miang chabawa, *It will be done to-morrow or next day.*

Nádo chabiëna, *It is now finished.*

The word "Hereá" is placed between the root and terminal of a verb to denote positiveness or certainty; as when the speaker means

to state something as an incontrovertible fact, as, "Kajee hereáskiddaï," *most assuredly he spoke*. "Oodoob hereámén," *speak positively*.

The causal form is rendered by putting "chee" between the root and terminal—as "landateá," *to laugh*, makes "landacheeteá" *to cause to laugh*; "aïoomtea," *to hear*, "aïoomcheetea," *to cause to hear*, as in Hindustani á is inserted (with a few exceptions) for the same purpose, as Hunsna, Hunsána; Soonna, Soonána, &c.

Continuity (in the Imperative mood alone) is expressed by adding "akán" to the root, as "doobmén" *sit down*, "doobakánmen," *remain sitting*; "Aïoom mén," *listen*, "Aloomakánmén," *continue listening*.

Finally, the thoroughly performing an act, is often rendered by adding the verb, "jōmeteá," *to eat*, to the root of the expletive verb, as "nel-joomkidallé," *we all saw it (thoroughly)*; "aïoomjōmmén," *listen (attentively)*; "Geetee jōm-meén," *sleep (soundly)*. And should the verb be of a violent nature (referring to some violent act) the particle "táb" between the root and inflection gives force to the meaning, as "Goïtabkiddaï," *he slew him (outright)*; "Toltab kidallé," *we bound him (forthwith)*; "Neertabmén," *Run (quickly) fly!* so "Ooiteá" is *to jump*, and "Ooitabtea," *to bound (as a tiger)*.

Ká before the pronoun gives the verb a negative form, as has been before explained in describing the Imperative mood.

There is no verb "to have," possession being denoted in the same manner as in Hindustani, *I have*, "Eengtra minna"—"Méré pas hÿe."

From the foregoing remarks may be gathered, that in the active or transitive voice

The present terminal is, "Tanna."

The past, "Kidda, tadda, lidda, kenna or keea."

In the Neuter Voice.

The present terminal is, "akénna."

The past, "ièna or lèna ;"

In Either Voice.

The conditional, subjunctive, } "redo" or "kedrado,"
or potential mood terminate in }

all these terminals being of course subject to the inflections of their pronouns, which are, as has been said, as often affixed as prefixed.

A nondescript species of Verb is used in rendering the sentence
 "what shall or can, I, (thou, he, &c.) do?"

Future and Present.

Ch'eeng chikŷa,	} <i>what shall or can</i>	I,	} <i>do ?</i>
Chee'm chikya,		Thou,	
Chee chikŷa,		He,	
Cheeboo chikya,		We all,	
Chee'lé chikya,		We,	
Chee'pé chikŷa,		You,	
Chee'ben chikŷa,		You two,	
Chee'ko chikŷa,		They,	
Chee'king chikŷa,		They two,	
Chee'ling chikŷa,		We two,	

Past tense.

Chee'ng chikakidda, *what could I have done ?* &c. &c. &c.

The verb "*to be able*" is rendered by "Dŷtea" in its moods and tenses, as, "Niádo eeng bŷdŷa," *I can make this*; "Umdokadŷa," *you cannot*; "K'ái dŷoá," *he will not be able*.

Many little exceptions and variations occur to these general rules, which it would be impossible to become familiar with, without constant practice in their arbitrary use; but the foregoing remarks comprise all that would be of practical utility. The constant elision and confluence of words beginning and ending with vowels must be remembered, and that the particle *do*, has no meaning whatever. This will render the examples above given to the different rules simple and illustrative.

NOTE.—The Vocabulary, and Dialogues in the Ho language will be published in No. 107. I have had 50 copies extra of the Grammatical construction, Vocabulary, and Dialogues of the Ho language struck off, and shall be happy to distribute them (*gratis*) to parties desiring to have them.



A Third Memoir with reference to the Theory of the Law of Storms in India ; being, RESEARCHES relating to the Hurricane in the Bay of Bengal, and at Cuttack, from 27th April to 1st May 1840.—By HENRY PIDDINGTON, Esq.

On the 30th April the station of Pooree (or Juggernaut) in Cuttack, was visited by an awful Hurricane, which destroyed almost every house, Native and European. It was subsequently learnt by the arrival of the ship *Nusserath Shaw*, with troops on board, dismasted, that several of the ships of the China expedition, which had sailed a short time previous, had suffered, and that the storm had extended across the Bay from near the Andaman Islands, if not to the eastward of them, in about a NW. direction to Pooree. It seems also to have travelled as far as Kurnaul, inland.

Our documents for the investigation of the track of this storm, amount to about thirty logs and reports of different kinds, the which, preserving always the expressions of the writers in all that is essential, I have abridged into as small a compass as possible; and I have, as before, condensed the whole into a table at noon; giving thus a view of the contrasts which the weather presents in different parts of the Bay, at nearly the same moment of time, the difference of Longitude being too small to require any correction of moment. I regret not having been able to add to this Memoir the logs of several of the ships of the expedition, such as the *Marion*, *Isabella Robertson*, and others; but as they have not been forwarded to me, I have thought the delay not worth incurring, as it is not possible to say when they may return to this port. Our evidence for the track of the storm will, I hope, be found tolerably complete, from its centre having on different days passed over, or close to, five ships, and to one station on shore. We are thus enabled to mark its route with greater exactness, for a longer time, and to a greater distance, than any of the preceding ones hitherto investigated. As in the foregoing Memoirs the logs and tables are followed by a summary view, stating the grounds upon which the track of the storm, the size of the vortex, and its rate of motion are laid down. The general reader, to whom the professional details are tedious, will find her I trust that nothing has been assumed without due amount of proof. The seaman can judge for himself.

Extract from the Log of the Ship "Nusserath Shaw," Capt. Edwards, bound from Calcutta to Singapore and China, with troops on board. Reduced to Civil time.

27th April, 1840. At midnight, light airs and fine, hot, sultry weather; wind SEBS.; at 4 A.M. EbN.; at 8, increasing; and at noon frequent hard squalls. Lat. Obs. 16° 2' N. Long. Chron. 91° 21' E. P.M. strong breezes ENE. to midnight, with dark cloudy weather and increasing sea.

28th April. Wind ENE. to noon. 7 A.M. lost maintopsail. 9 A.M. increasing gale; lost fore and main topgallant mast and head of main topmast. 10, gale increasing; lost mizen mast, boats, &c. At 11, heavy white squall. Noon, blowing a perfect hurricane; three guns lost overboard; no one able to go aloft. From 7 A.M. lying to under bare poles, with wind to the SE. Noon, Lat. account $14^{\circ} 26' 23''$ N. Long. $91^{\circ} 34'$ E. P.M. blowing a hurricane; all the hatches battened down. Wind ENE. At 3 P.M. it shifted suddenly round to SW., laying the vessel gunnel under, with sea awfully high. Midnight, the same, and frequent squalls; vessel a perfect wreck, with all the braces, &c. gone.

29th April. From midnight lying to. 1 A.M. wind SSW. Noon, squally and rain. Lat. Obs. $15^{\circ} 23'$ N., Long. $90^{\circ} 31'$ E. Wind SbW. P.M. fresh gales and heavy weather, with dreadful heavy gusts of wind and squalls; sea breaking over the ship; $3\frac{1}{2}$ feet water in the hold. At 8, weather as before. Midnight, less wind and sea, but ship labouring dreadfully; lying to throughout, with wind to the westward.

30th April. 1 A.M. Ship rolling dreadfully; still lying to. At 4, very squally, and fresh gales, with dark cloudy weather. Noon, Lat. $15^{\circ} 31'$ N. Long. $90^{\circ} 11'$ E. P.M. fresh gales with a heavy cross sea; wind SE.; bore up for Calcutta.

Extract from the Barque "Tenasserim's" Log Book, by Capt. T. Tapley, bound from Calcutta to Rangoon. Reduced to Civil time.

27th April, 1840. First part, light variable winds from the SSE. and suddenly shifting ENE. Midnight calm, sea smooth; last part of part of this day, strong fresh breeze eastward, smooth water.

Long. Chron. Noon,... $91^{\circ} 50'$ E.

Lat. Obs. $17^{\circ} 40'$ N.

Noon. This day cloudy; wind from the eastward; about a seven and eight knot breeze.

1 P.M. Strong breezes eastward, cloudy sky, and unsettled weather. Sunset, strong breezes and cloudy, with a threatening appearance to the eastward. At 8, made the ship snug. Midnight strong breezes from EbS $\frac{1}{2}$ S., with a very threatening appearance; breeze gradually increasing, and coming in strong gusts and squalls.

28th April.—At 4 A.M. weather more threatening and a heavy sea getting up from the eastward. Daylight, wind SE. having every appearance of a gale, and blowing very hard, made all snug for bad weather. At 8, blowing a severe gale; sea at this time tremendous, battened a double tarpaulin fore and aft. Sea making a continual breach over the ship, and blowing very hard. Noon, heavy gale, ship labouring much, was obliged to keep

the close-reefed topsail on her, owing to the heavy weather lurches; sea making a continued roll over the vessel; gale increasing. Sun obscured. During the whole of this twenty-four hours ship was sailing to the southward. P. M. heavy gale from SE. and varying to SSE. with a terrific sea on making a awful breach over the ship; going $2\frac{1}{2}$ knots through the water up to 4 A.M. Course SbW. to SW. From 4 A.M. to noon, ship's head to NE. and ENE.; having wore round. Carried away one of the channel plates. Midnight ship rolling heavy, taking the sea in on both sides.

29th April, 4 A.M. Wind a little more moderate, but sea still continuing the same. Set reefed foresail to steady the ship. Noon rather clear, but gale still blowing hard. Wind SE.

Lat. Obs. Noon, 16° 32' N.

Long. Obs. Noon, 91° 02' E.

At 9, a brig passed, scudding under a foresail only, with topgallant mast on deck. 1 P.M. up foresail; a very threatening appearance to the southward. At 2-30, wore ship to the SW., at the same time, to clear a whirlwind. By this manœuvre allowed the whirlwind to pass about 200 yards on the lee quarter; at this time blowing a perfect hurricane. Wind SSE. and S. Furled every thing to a storm main trysail, and hove the ship to; torrents of rain; sea making a constant breach over the ship. At 5 P.M. more moderate; set the close-reefed topsails, and at 10-30, wore ship to the ESE. Sea still continued high, and a cross head sea, owing to shift of wind in the whirlwind.

30th April. Daylight, more moderate. Wind SSE. Wore round to the SW.; sea still running high and confused. A.M. weather clearing up a little.

Noon Obs., Lat. 16° 21' N.

Ditto Long. 91° 50' E.

Noon, moderate.

The phenomenon which Capt. Tapley describes in the log of the 29th, and which I have printed in italics, I thought so extraordinary that I requested of him a more particular account of it, and the following is his very graphic description of this awful addition to the fury of a tempest, which is, I believe, quite new in our naval records. A whirlwind coming down upon a vessel, lying to, in the midst of a hurricane, must, one would think, carry inevitable destruction with it,* should it fall upon her. The Freak seems to have lost her foremast in one, as will be seen by her log. Capt. Tapley says, "I have much pleasure in giving you answers to your inquiries, as nearly as I can. At 1 P.M. 30th April, by Nautical time, (but by Civil time the 29th,) a very threatening appearance to the Southward; ship's head east, a terrific squall from the SSE. rising very

* Col. Reid refers to an instance of this kind, but I cannot now find the passage again.—H. P.

rapidly, and having a very blowing appearance. When the squall was within 2 miles of the ship, perceived a heaving whirlwind flying to the NNW.; immediately wore ship to the SW., or first to the westward, to give the ship way through the water; by doing so, allowed the whirlwind to pass the ship; when passed, brought the ship to the wind, clued every thing up, and furled all. Soon after, about 10 minutes, the squall took the ship from the SSE. Ship's head about SW., blowing a complete hurricane, could not see half the length of the vessel on the water, owing to the tops of the sea being blown by the force of the wind, and a deluge of rain at the same time. I cannot remember *how** it was turning, *as we were anxious to turn out of it*; it was going round at a furious rate, and disappeared in the rain to the NNW. I do not recollect any lightning at the time.† We could not discern it until it had approached pretty close, and then the most we saw was the foaming of the water travelling up in a rapid progress. The day had been fine and a little clear for a few hours, but blowing hard. At the time this squall appeared, the sky all round assumed a threatening appearance, and squalls gathered and rose rapidly. After this severe squall, the weather kept bad during the remainder of the 24 hours."

Extract from the Log of the Barque "Amelia Thompson" from Penang, towards Madras.

Monday, 27th April, 1840. Civil time. P.M. Strong breezes, with heavy

Wind. squalls of wind and rain.

West. A.M. Hard gales with rain.

8 A.M. More moderate.

Noon. Moderate and fine.

Bar. 29.55—Lat. Obs. 4° 14' N. Long. 88° 18' E.

West. P.M. Strong breezes and squally.

WbS. 8 P.M. Heavy squalls with rain.

WSW. } 8-30. Wind veered to the WNW; wore ship to WSW.

WbN. }

Tuesday, 28th April, 1840. A. M. Ditto, weather at daylight more

West. moderate.

WSW. Noon. Moderate weather.

Lat Obs. 4° 25' N. Long. 87° 48' E.

The Barque "Clarissa" from Penang to Madras experienced no bad weather until the 28th of April, 1840. At noon on that day, she was in 7° 1' N. and 87° 56' E.; it had been blowing hard from West to WSW. in squalls,

* † These are replies to my queries.—H. P.

with rain and a high sea, but did not approach to a gale. On the 29th, the weather became moderate, the swell high and confused.

The Barque "Ganges" from Malacca to Madras. On the 26th of April, 1840, in 6° 37' N and 95° 56' E. a fresh gale commenced at SSW. veering to the SW. On the 27th she hove to under storm staysails; the Barometer fell to 29.50, blowing a hard gale from SSW. to SW. At noon, still lying to in Lat 7° 10' N. 95° 18' E. Bar. 29.60. On the 28th the gale abated, and at noon the weather cleared up. Lat 8° 7' N. 94° 33' E. Bar. 29.80.

Extract from the Log of the Brig "Freak," from Calcutta to Singapore; communicated by Captain Smoult. Reduced to Civil time.

19th April, 1840.—Left the Pilot at the Sand Heads, and carried the wind about SSW., standing to S. Eastward. The wind then became light, and veered from SSE. to SW.; the weather continued light and variable with flashes of lightning, in the north after sunset. On the 20th, Lat. 20° 31' N. Long. 88° 35' E. On the 26th, Lat. 19° 23' N. Long. 88° 40' E. light winds, between SW. and South, with strong northerly currents until 27th, when the wind hauled round to the East. Lat. 18° 56' N. Long. 88° 30' E. P.M. Moderate breeze with fine clear weather. At 8, the wind increased, and weather became cloudy and threatening, which obliged us to take in all steering sails; the wind *moderated at midnight*; set the steering sails.

28th April. At 10 A.M. the breeze freshened again, took in all steering sails and royals, the Barometer standing about 29.30 steady. Lat. 17° 40' N. Long. 88° 32' E. P.M. strong breeze and threatening weather, *the Barometer vibrating very much*,* dark heavy clouds rising in the north, wearing the appearance of ragged edges.

Commenced making preparation for a gale of wind by sending down the lofty yards, and securing spars, hatchways, boats, &c. and double gasketting the sails as we furled them. At 6. P.M. we had got every sail stowed, except the close-reefed fore topsail, the gale increasing so rapidly from NNE. that it obliged us to stow the main topsail, without reefing; the sea rising in proportion. The wind gradually veered round to the north, and blew from that quarter till midnight, (Lat. Acc. 15° 46' N. Long. 88° 18' East) when the wind chopped round to the NW. suddenly, and blew with double force, which threw the ship on her broadside; the helm was immediately placed a-weather, but was rendered useless, owing to the position of the ship. She lay dormant for some time, the

* The italics are mine. This *vibrating* of the Barometer is frequently noticed in the Logs in Col. Reid's work, and seems an infallible sign. In Professor Barlow's account of the water barometer it is particularly noticed as "resembling the breathings of some huge animal."—H. P.

tempest roaring with great fury, and sea flying over us in foam. The lightning mingling gave it the appearance of fire and water; the roaring of the wind prevented us distinguishing whether it thundered or not. We were soon enabled to brace the fore yard forward, which in a trough of a sea wore her before the wind, heading per compass SE. by E. directly in the trough of a tremendous sea, knocked up by the wind from North, which rendered our position most dangerous, as every sea appeared coming on board; in a short time she broached to, with her head north. The wind veering to the westward, and blowing with great fury, the ship was again thrown on her side, but being head to sea, lay much easier (the Barometer sunk to 27.25 in the gale). The foam flying so thick as to extinguish every object except at intervals; a supposed break in the sky afterwards proved to be the top of the sea!

29th April. About one in the morning, a sudden and awful gust of wind carried away the foremast. It was accompanied with a vivid flash of lightning, which enabled us to see the mast and yards carried up in the air, as if in a whirlwind, and then fall on deck with such violence that the fore yard arm stove in the fore hatchway, and went chock over into the weather wing of the ship, leaving the other arm extended to leeward. To this the wreck of the mast and other yards were attached, acting as a lever on the ship, keeping her side down. It remained thus the rest of the night, in spite of all our endeavours to cut and clear it away from the ship. The furled sails blew away by piece-meal; the quarter boat filled with water and broke away; heavy seas breaking on board, and the darkness so intense, that we could not see a yard before us; the water rushing down the hatchways, against all precaution, carried away the larboard bulwark and several stanchions, did the round house much injury, and every thing in its way; we found much difficulty in getting the crew to the pumps. Found a great quantity of water in the hold; considered it prudent to throw over some of the cargo in order to lighten the ship, as the water forced down the fore hatchway in great quantities. The wreck of the masts aft beating about in a most fearful manner, endangering the main mast, the only spar we had to work the ship with in running down to the Sand Heads. At daylight, wind SW.; the crew kept constantly at the pumps. Barometer rising very slowly, being at 27.30. Noon, sun obscure, Lat. account 16° 2' N. Long. 88° 36' E. P.M. wind SW. still blowing furiously, and ship labouring heavily, shipping water over all; showers of rain at intervals, hands kept constantly at the pumps, and clearing away the wreck. The same weather throughout.

30th April. At daylight loosed the peak of the main sail, hoisted it up a few feet, and hoisted the foretopmast staysail to the throat halliards,

in order to keep her to the wind; this soon blew away, together with a spare jib, which was hoisted to the main stay. Constantly employed pumping. Noon a little more moderate. Lat. account $16^{\circ} 41'$ N. Long. $88^{\circ} 0' E.$, cut away the wreck from the jib-boom, which was sprung, bent a spare foresail to the mainyard and set it; got a preventer main topmast stay up, and otherwise repaired damages. Bore up for Calcutta.

1st May. Midnight squally with rain and thick cloudy weather, at daylight people employed setting up rigging, &c. and getting up a main top-sail. Noon moderate breeze with passing clouds. Lat. Obs. $17^{\circ} 26'$ N. Long. $87^{\circ} 47'$ E. Barometer 28.30.

May 4th. At 4 P.M. got a pilot. During this gale, and previous to it, the following phenomenon manifested itself; that of the clouds rising rapidly in the north, appearing ragged and black, with white feathery edges, and stretching to the southward in long tails; the sea becoming tumultuous in, and as soon as the gale reached us the atmosphere becoming very sultry. Barometer stood at noon about 29.30, or about the standard height previous to the gale, and now in Calcutta, about 29.20.*

Extract from the Log of the Brig "Vectis," R. Isomonger, Commander, bound from Calcutta to the Cape. Reduced to Civil time.

28th April.—At noon, fresh breezes east, and cloudy. Lat. $18^{\circ} 37'$ N. Long. $87^{\circ} 55' E.$ Standing south, going 6 knots. P.M. strong breezes; dull hazy weather. At 8 P.M. preparing for bad weather. Midnight, wind ENE. blowing a gale; head SbW.

29th April.—1 A.M. Increasing gale, scudded; and at 6 A.M. hove to under bare poles. At 7 A.M. full hurricane and heavy sea; lost jibboom; shipped a heavy sea, which hove the vessel on her beam ends, and cleared the deck, bulwarks, &c.: Cut away the topmasts. Noon, the same weather, wind marked as *variable*†, Lat. $16^{\circ} 58'$ N. Long. $88^{\circ} 4' E.$ At 2 P.M. began to moderate. Wind marked as veering to the Northward, then to the Westward. At 8 P.M. it stood at SSW. 2 feet water in the well.

30th April.—A.M. to Noon, heavy cross sea. Lat. $17^{\circ} 40'$ N. Long. $88^{\circ} 10' E.$ Wind SbW. Gale continuing, and very high sea.

* It is due to Captain Smoult to say, that this very valuable account of the storm was accompanied with a capital MSS. chart, on which the vessel's track was accurately laid down.—H.P.

† In the confusion of a small vessel on her beam ends it is probable no one could say how the wind was for some hours; or it might have been veering rapidly, and is thus marked variable.

1st May.—4 A.M. more moderate, but heavy squalls with rain. Wind SbW. Noon Lat. $18^{\circ} 43'$ N. Long. $88^{\circ} 18'$ E. Wind SSW. fresh gales and squally, bore up for Calcutta.

2nd May.—Noon Lat. $19^{\circ} 54'$ N. Long. $88^{\circ} 29'$ E.

"George and Mary;" Captain Golightly.

An imperfect account of the weather experienced by the "George and Mary," Captain Golightly, states, that upon the 28th April at Noon, the wind veered from SW. to East with a fine steady breeze, to which all sails were set. At 6 P.M. it became cloudy, with a heavy bank to the NW. The wind shortly after shifted to North in a very heavy squall, lasting for three-quarters of an hour, to which every thing was let go, and the vessel was then prepared for bad weather. The wind continued to veer to the NW. and at daylight of the 29th, had increased in violence. At noon of the 29th, Lat. was about 16° N. Long. $84^{\circ} 30'$ E.* the gale being at its height, and blowing a severe hurricane from the NNW. which lasted for six hours; the wind then veered to the East, then to ESE., to S. and SSW. and at daylight on the 30th began to moderate, leaving a "nasty cross sea."

Extract from the Log of the Barque "Flowers of Ugie" from Calcutta to the Mauritius. Reduced to Civil time.

27th April, 1840.—At noon in Lat. $19^{\circ} 52'$ N. Long. $89^{\circ} 24'$ E. at which time and till midnight, fine clear weather. Wind SE., standing to the southward.

28th April.—At noon smart breeze ESE. and clear. Lat. $19^{\circ} 19'$ N. Long. $88^{\circ} 22'$ E. 3 P.M. Bar. 29.17, breeze increasing fast from ESE. veering to East at 7 P.M. At 6, very bad appearance to the SE., reduced sail. Midnight, strong gales; Bar. 29.11. Ship going 5 knots, and standing to the SW.

29th April.—At 4 A.M. squally with rain. At 7, Bar. 28.19. At 9, gale increasing, furling every thing. At 11, very heavy gales, with heavy rain and dark gloomy weather; hove the ship to on the larboard tack, under bare poles, wind being at NE. at 10; and North at 11. Very heavy sea breaking on board, and sweeping every thing away. Noon very bad weather, vessel straining much, and making much water. Bar 28.15. From

* This is apparently a rough guess from memory, the account being written at the Captain's request by an assistant of the house to which he was consigned, the log book being on board the ship, and the ship on its way down the river.

midnight to 11 A.M., she had run 76 miles SWbS½S. Lat. 17° 15' N. Long. 86° 43' E. by acct. at noon. P.M. Gale still increasing, with a very heavy sea, and vessel lying nearly on her beam ends, so much so, that the pumps would not suck water. Wind NW. at 1 P.M. Bar. 28·36; At 3 P.M. wind West. At 5, SW. At 8 South, at which it continued till midnight. Bar. at 7 P.M. 28·41; at midnight 28·19. At 4 P.M. tremendous gales, with heavy rain and gloomy weather; at midnight gale abating a little.

30th April.—6 A.M. more moderate, but at noon very heavy gales and bad weather, Lat. 17° 48' N. Long. 86° 53' E. Bar. 29·11. P.M. Strong gales and cloudy; saw a vessel standing to the northward with loss of foremast and mizen mast. At 9, Noon, moderate, with lightning to the NW. Wind South till midnight, vessel lying to, head West.

1st May.—Midnight cloudy weather, wind South till noon, when moderate with fine weather, Lat. 18° 23' N. Long. 86° 58' by Acct.

2nd. May.—At noon in Lat. 18° 44' N. Long. 88° 6' East.*

*Extract from the Log Book of the Ship "La Belle Alliance," Capt. Arkcoll;
from Madras to Calcutta. Reduced to Civil time.*

29th April, 1840.—Midnight; moderate breezes and squally, latter part a fresh gale with hard squalls and showers of rain.

28th. At 3 P.M. the Lighthouse on False Point NWbN, at 4, the lighthouse WbN; at 5-30 tacked to the SE; at 6, the Lighthouse WbS½S. and the land at WbN. At midnight tacked to the Northward; at 3-30 A.M. tacked to the E; at 5, the light WNW. At daylight, an increasing breeze from NE. and squally. At Noon an increasing gale with hard squalls, distance on the log 71 miles. Lat. Obs. none. P.M. A strong gale with hard squalls and thick hazy weather; latterly an increasing gale with violent gusts of wind. At Midnight a violent gale, with violent gusts of wind.

30th April.—1 A.M. to 5 A.M. The gale increasing, with violent gusts of wind and heavy rain; furled topsails; ship laying to under storm main staysail. At 6 A.M. ship plunging deep, with a heavy confused sea; carried away the flying jibboom; cut away the wreck. At 8 A.M. trying to strike topgallant masts; ship laying over and plunging deep could not, and obliged to cut away fore and main topgallant masts to save the top-masts; in so doing the head of the foretopmast broke above the rigging;

* Bar. of the ship "Flowers of Ugie" at noon, 18th August in Calcutta at ten A.M. was	29 45
The Barometer at the Surveyor General's Office.	29 56
Difference to add.	0 11
This correction has been made to the Bar. heights given in the log.	

a heavy confused sea. At 9 A.M. a sudden calm, struck main topgallant mast; ship labouring much, from the heavy sea. At 10, a violent gale from SSW. with most awful gusts of wind and heavy rain, the ship laying to under storm main staysail. At noon, gale continuing with equal violence. P.M. A violent gale, with awful gusts of wind, and a heavy sea. Moderating after midnight, with thick hazy weather. At 1 P.M. in a sudden gust of wind and rain, the storm main staysail blew away, the ship lying to under bare poles; heavy and violent gusts of wind and rain, during the day. At 2 P.M. in a heavy gust of wind, the ship labouring much, the starboard boat's davit gave way. Cut away the boat to clear wreck.—Ship lying to under bare poles. Violent gusts of wind from SSW. with heavy rain and thick hazy weather during the night.

1st May. At 5 A.M. the weather moderating, set close-reefed topsails. At noon the weather moderating and the sea going down; thick hazy weather.

30th April, 10 P.M. Bar. 29.40

12 29.20

3 A.M. 29.00

5 28.10

8 28.30

12 28.60

1st May, 4 P.M. 28.90

9 29.10

12 29.30

Lat. Obs. 19.19 N.

The first of the gale was from the NE., and at 11 A.M. on the 30th, it suddenly shifted to the southward, and blew if any thing heavier than before.

I am indebted for this extract, which is so highly interesting, as marking the direct track of the storm towards Pooree (Juggernaut) to Capt. Biden, Master Attendant of Madras, but I could not obtain a sight of the ship's log while at Calcutta; so that her exact position at the time of the shift of wind, is not so certain as it might have been; neither could I obtain a comparison from her Barometer.

Abstract of the Log of the ship "Christopher Rawson," Capt. Smellie. Reduced to Civil time.

On the 27th, exchanged numbers with the Marion, Capt. Pope, in Lat. 17° 15' 30". N. Bar. 29.80; the Bar. down 4 lines, and the weather very oppressive. Light SSE. winds and sultry. Barometer falling fast.

28th April. Midnight, heavy gathering clouds in the SE. and threatening look. At 10 A.M. a very heavy squall from East; I consider this the commencement of the gale; the scud flying in confused masses, and a number of sand birds on the rigging. At noon, heavy appearance of weather. Lat. Obs. $19^{\circ} 29' 15''$ N. Bar. 29.40. P.M. Blowing fresh from E. and ESE., the Barometer 29.35, and every appearance of worse weather; making a bold push for the Pilot. Midnight and until day-dawn, constant heavy squalls and much heavy rain.

29th April. At 4 A.M. sounded in 17 fathoms; at 5 sounded in 10 fathoms, and by two excellent Chronometers made the Outer Floating Light bear from us due west 15 miles distant; finding the sea too high to receive a pilot close-reefed the top sails and courses; under this sail stood out South; wind abeam at East, gale increasing and the sea rising fast. At 10 A.M. a tremendous sea spread from the SSW. and a heavy ground swell on our beam East; preparing for bad weather. At noon gale very heavy, no sun, suppose ourselves SSW. from the Floating Light, distant 30 miles.

Gale increasing at ESE. and East in the heavy squalls; a very high confused sea often breaking over all. At midnight sprung fore yard; sounded in 30 fathoms.

30th April. 2 A.M. Blowing a hurricane, sprung our main mast in the deck partners; the sea washing away our large cutter, davits and all, and making a clear breach over all; both pumps going. The wind SE. and veering round gradually to the southward. At day-dawn observed some broken spars and short pieces of plank passing us; shipped a heavy sea, broke the lashings of the skylight, which unshipped, and nearly filled our cabin with water. Noon., Lat. Obs. $20^{\circ} 28'$ N. A heavy sea struck the ship aft, and injured our rudder head. Bar. 28.80.

Bar. 28.90; gale continues heavy; ship under bare poles, lying in the trough of the sea, very uneasy. Wind SSE., ship's head SWbW. Having blown our storm staysails away got a bolt of new canvas in the mizen rigging.

1st May. At day-dawn ship on her beam ends, and the sea making a fair breach over all; the water much discoloured; sounded in 16 fathoms on the edge of Point Palmiras Reef, the wind suddenly shifting into the SSW. wore ship to the SE. Sun obscured at Noon; no vessels in sight.

Some attempts at a clear-up; ship lying helpless in the trough of the sea; Bar. rose 4 lines. At 2 P.M. set the close-reefed topsails. Sunset clear weather, but destructive sea, midnight heavy squalls from SW.

2nd May. Day-dawn, moderating fast. Out reefs, and stood to the WNW. At 7 sighted a Pilot vessel. At 8 $^{\circ}$ 30' obtained a pilot. From our position on the commencement of the gale, I supposed myself in the centre of the Bay

during the worst part of it, and allowed 36 hours drift under bare poles before I looked for shoal water. My astonishment was great at finding the ship, early on the 1st, in 16 fathoms on the reef; and I can only account for it by supposing the easterly gale had caused a current, or set, to the westward of at least 4 miles per hour; which may perhaps account for so many vessels getting over on the Point, as I had the advantage of 15 miles easting at its commencement.

Balasore.

A letter from Balasore, dated 4th inst., says:—

“We have just escaped a severe hurricane; it blew very hard on the night of the 30th, and the tide rose very high, but luckily the wind did not last long enough to drive the sea over the country. At Pooree they have felt the hurricane most severely. I hear that all the houses and the Government Cutcheries have been blown to the ground, and much damage has been sustained; great part of the native town has been destroyed, and several lives lost. When the circuit house fell, two men were buried, and escaped with broken legs. Pooree is full now, the gents from Cuttack having gone there to enjoy the cool breeze; they and the residents took refuge in the only house which stood the storm: the description of the scene is fearful. Mr. Ewart lost his Arab horse, buried in the ruins of the stable. The natives declare that Juggernaut’s august presence alone prevented the sea from washing away the town. The storm was felt at Cuttack also severely, and I much fear it has been destructive on the whole line of coast. This is a true version I think, and you may perhaps like to give the readers of the *Englishman* the news.”—*Englishman*, 7th May, 1840.

Report from Captain A. Bond, Master Attendant, Balasore.

29th April,	Bar.	29.66	Ther.	85°	NE. Rain and squally,
30th Ditto, ditto,		29.57	ditto,	82	NE. Rain and puffy,
1st May, ditto, 8 A.M.		29.25	ditto,	81	E. Strong gusts of wind,
Ditto, 1 P.M.		29.43	ditto,	82	NE. and East.

On the 1st May, A.M.; at Balasore; strong gusts of wind, with continual rain, inclining to a gale till 8 A.M., when the wind veered from NE. to South, and cleared up at SW. at 9 A.M.

At Budruck, 32 miles WSW. of Balasore, the wind stronger, with flying clouds to the SW.

I was at Budruck on the morning of the gale, and from the log kept here. it was very similar to the one I kept there, in every respect.

The strength of the gale was felt more southerly at Pooree; and inland the rain appears to have been heavier, and the wind less.

The May gales have not affected Balasore since May 1823. No vessels lost on the coast; several put into Chooramoon in distress.

A. BOND.

I am indebted for the following letter to Mr. Ewart, Magistrate of Pooree.

Your letter to Mr. Cumberland has been handed to me. During the storm, and for some weeks, Mr. Cumberland had been very unwell, and had ceased to keep a Meteorological Register. At the time of the storm, I and two other gentlemen were staying at our house. On comparing notes next day, we discovered that we differed in one material point, viz. which way the storm went round.

To the best of my remembrance, the South-west wind, which generally blows so steadily during part of February, March, April, May, and part of June, failed and became variable, hanging between South and East. The sky was very cloudy, and on Wednesday, 29th April, there were showers. On Wednesday afternoon the wind was very strong from NbE.; the rain and wind continued to increase during the night from ENE. On Thursday morning, 30th April, at daylight, it was blowing strong, but people went about their ordinary avocations. By 10 A.M. there was a gale from NE. At noon I went on my elephant to visit the various ladies who had come with their families, but without their husbands. The wind was so violent and gusty, that I found it necessary to hold fast by the pad-ropes, and the drifting rain and sand frequently made the elephant stand, and refuse to proceed. From 8 A.M. on Thursday, 30th, the rain was incessant. The wind continued to blow, with about the same violence, after 10 A.M. till evening from the North-east. It then veered to nearly North, and after hanging between N. and NE., at about 7½ P.M. *entirely lulled*. About 8, what we imagined the ordinary monsoon breeze began to blow from SW.; it however increased, and got round to nearer the West. By 9½ P.M. it blew from WSW. with far greater violence than it had from the other direction. Many houses had lost a portion of the thatch by the NE. wind, but almost all were destroyed by the West wind. It began to abate about 4 A.M. on Friday 1st May; there were occasional gusts during the morning from SW., but our usual breeze blew pretty regularly; my impression was, that just before the lull on Thursday evening the wind was at NW. and went by the East to SW. This struck me particularly, because it was contrary to the received theory.

I fear this is a very vague account, but it is the best I can give.

POOREE,

30th May, 1840.

JAMES K. EWART.

NOTE.—It will readily be seen by those to whom the Theory of Storms is familiar, that the centre of the hurricane, as here described, must have passed over, or a very short distance to the South of the station. The discrepancy of opinions mentioned might easily occur at such a time, amongst gentlemen who were not seamen, and it is more than probable, that, at the centres of storms and near them, counter currents and eddies do occur; and that their changes are almost instantaneous; the main change was from about NNE. to SW. and at the centre this might have happened either way, without affecting the truth of the theory. H. P.

THE GREAT STORM IN ORISSA.

[From a Correspondent at Pooree.]

“On Thursday, the 30th April, one of the most violent storms ever remembered in Orissa visited the station of Pooree, and surrounding district. The wind blew very fresh from the North-east early in the morning, and towards the middle of the day increased so much, as to make every one take precautions to guard against its violence. The surf was unusually high and roaring, and approached the bungalows much nearer than was at all pleasant. Out-offices were levelled, and clouds of sand buried every thing. About 6 o'clock in the evening the wind lulled, when it was hoped that the worst was over, but the disasters of the day were as nothing in comparison with what the night brought. The wind suddenly shifted round to West and South-west, and recommenced in all its fury. Every one sat waiting for the worst, running from one room to another, as the house gave way, and when the general crash came, it was fearful.—The wind and rain so boisterous, that no one could stand erect exposed to them. Ladies then escaped to their palkees, anxiously awaiting the break of day. The darkness of the night totally prevented any communication of one house with another, and it was not until morning that the whole truth could be known. Alas! every bungalow in the station has been destroyed—not one is there that can possibly be inhabited. One solitary puckha-house stood the buffeting of the storm, as it would appear, intended as a refuge for the destitute. It was most providential that some families deserted their own houses during the afternoon and took shelter in any secure place they could find; for had they remained they must have perished. Entire roofs and walls came to the ground, other houses went piecemeal, rafters and thatch coming down, and some have disappeared altogether. Some ladies were obliged to desert their bungalows, and remain in their palkees on the sands the whole night. In fact, no one

has escaped, and many have lost every thing they possess. The drift of the sand was so great, that every thing was buried several feet in it, and a most difficult task it has been to recover property so embedded. The ruins of the houses are almost unfit for repairs, except under a cost equal to the original expense of building, and the whole coast presents one scene of destruction. The city has suffered to a great extent; indeed every house has been blown down, but the immortal remains of Juggurnauth lie undisturbed in his celebrated temple. The surrounding villages have been equal sufferers, and a camp belonging to the revenue surveyor, about 20 miles distant, was totally destroyed. Large trees strew the road, and many lives have been lost in consequence. One family, of eight persons, were crushed under one tree; but the loss of life has been much less than could have been expected. I have not heard of more than forty altogether; but accounts may be brought in hereafter. Altogether the scene has been one I never wish to witness again, for independently of the great pecuniary loss, it has been an awful visitation, which those who have lived and experienced can alone comprehend. POOREE, 3rd May, 1840."—*Englishman*.

Extracts from the Log Book of the Barque "Elephanta," of Greenock; from Clyde to Calcutta. Reduced to Civil time.

April 28th. Bar. 29.60. From midnight to 8 A.M., wind SE. to EbS. fresh breezes, and cloudy; a heavy swell from the SW. From 8 A.M. till noon, light winds and cloudy. At noon Lat. Obs. 15° 20' N. Long. Chron. 84° 29' E. The same till midnight.

29th. NE. fresh breezes and cloudy weather throughout; a heavy swell from the Eastward; the current has set the ship EbN. 20 miles these 24 hours. At noon Lat. 16° 24' N. Long. Chron. 84° 22' E. P.M. light winds and cloudy weather.

31st. A.M. Fresh breezes from SW. and cloudy, with a great swell from the NE.; the ship labouring and pitching very heavy. At Noon, cloudy, the land in sight bearing WbN. to NbW. supposed to be the Dolphin's Nose. At Noon, by very indifferent Obs. Lat. 17° 46' N., Long. Chron. 84° 28' E.; to midnight, moderate and fair.

1st May. A.M. SSW. Fresh breezes and cloudy; a swell from the SW. At Noon Lat. 18° 48' N., Long. Chron. 85° 40' E. P.M. moderate breezes and hazy weather.

Extract from the Log of the Schooner "Amelia," Captain Ross. Reduced to Civil time.

The "Amelia" was off the Sand Heads when the last gale commenced. Unfortunately during the gale the Barometer was injured, which prevents

any correct information on that head, further than that it fell two-tenths the day previous to the gale.

29th April, 1840. At midnight, winds easterly, with light passing squalls. Outer Floating Light bearing EbN. 6 A.M. Wind easterly. Being now to the eastward of the Western Sea Reef, breeze increasing with heavy appearance to windward. Pilot apprehensive of bad weather, recommended standing to sea; stood to the South-eastward. Noon, winds ENE. blowing very hard and sea rising. P.M. winds ENE. increasing to a gale. Midnight, ditto, blowing a hard gale and heavy sea.

30th April. 6 A.M. Ditto as before, blowing with violence, and squalls with rain. Noon, ditto weather; shipping much water on deck; soundings in 62 fathoms. 6 P.M. wind east with heavy appearance to the south-eastward, with occasional heavy rain and hard squalls. Midnight, wind SE. with increased violence, now blowing with great fury. Our sails were blown out of the bolt ropes. *A cross turbulent sea rising in pyramids, and breaking over the vessel, while the force of the wind depressed her lee bulwarks under water.** Soundings in 45 fathoms.

1st May. 6 A.M. Wind veering southerly, still blowing with fury and a great sea. 8 A.M. Wind SW. rather more moderate. Soundings in 20 fathoms. Wore to the Eastward. Noon, wind SW., gale abating. Found by Obs. that our situation is 15 miles to the southward of False Point in 22 fathoms; bore up for the river.

The two days previous to the gale, we had the wind from the South-eastward, light, with hazy weather, hot and sultry.

The gale commenced from the North-eastward, veering to the Eastward and South-eastward, at which point it blew with the greatest violence, and began to break up soon after it reached the South-west point.

During the gale the heaviest appearance of the sky was to the SE. and Southward. The upper clouds appearing to move N. and NW.† even while the wind was NE.

Extract from the Log of the H. C. F. L. V. "Beacon," C. Hudson, Commander.

April 29th, 1840.—A.M. Fresh SE. breeze and cloudy. 4 A.M. Breeze increasing; veering to ESE. cloudy unsettled weather. Daylight, increasing breezes at ESE. and cloudy unsettled weather, heavy sea. 8 A.M. Fresh breezes at Eastward, cloudy unsettled weather. Noon, strong breezes at East, veering to NE. with heavy squalls of wind and rain, threatening appearance. Noon to 4 P.M. blowing in heavy gusts from E. to NE. and ENE. heavy

* This is an instance of the possibility alluded to in p. 46 of my first Memoir, (p 645 Journal As. Soc. for August 1839.) If the shift of wind had been sudden, the vessel would have been laid down against the whole fury of the waves.

† This is somewhat equivocal, for it may mean *to* the N. and NW. or *from* the N. and NW. The observation is nevertheless important.

passing showers, and dark, cloudy, threatening appearance all round. Sunset, blowing hard at ENE. with passing showers, and very threatening appearances to the SE., heavy sea. 8 P.M. Blowing hard at ENE. with passing squalls and light showers, with dark cloudy threatening appearances all round. Midnight, moderating, ENE. breezes and cloudy unsettled appearances to the Eastward.

30th April. A.M. Strong breezes at East, with dark, cloudy, unsettled weather. Daylight, blowing hard at ESE. with very threatening appearances all round, and a heavy cross sea. 8 A.M. Strong breezes at ESE. and dark, cloudy, unsettled appearances to the eastward. 8 A.M. to Noon. wind veering from ESE. to East, with continual heavy squalls, and heavy rain, dark dismal clouds, and very threatening appearances all round, with a confused sea. 4 P.M. Strong breezes at East and EbS. with dark cloudy, unsettled weather. Sunset, strong breezes, veering from East to EbS, with dark dismal clouds, and threatening appearance to the SE. with heavy sea. 8 P.M. Strong breezes veering to SE., with dark dismal clouds and unsettled, with threatening appearances all round. Midnight, fresh breezes veering from SE. to SSE. with heavy passing squalls of wind and rain; unsettled appearances and lightning to the Southward, with distant thunder.

1st May, 1840.—A.M. Blowing very hard in squalls at SSE. dismal threatening appearances and passing showers, with very heavy sea. 4 A.M. Wind increasing to a gale at SSE. with a very heavy sea. Daylight, blowing a gale at SSE. with dismal threatening appearances. 8 A.M. Gale increasing at SSE. with very threatening appearance, and very heavy sea. Noon, blowing a heavy gale at SSE. very threatening appearance, sea still continuing. 4 P.M. Gale still continuing very heavy, weather clearing up a little; sea still continuing heavy. 8 P.M. Moderate breezes veering to SbW. and SSW. with passing squalls of wind and rain, and unsettled weather, with lightning to the SW. Sunset, moderating a little, and wind veering to Southward and SbW. with passing squalls of wind and rain, sea continuing. Midnight, blowing hard at SSW. and SW. with heavy passing squalls of wind and rain, with dark cloudy weather all round, and lightning to the SW.

Mr. Hudson adds the following remarks. "As the variation of the wind and the appearances of the weather, were correctly stated during the gale, the only remarks I have to make thereon, are, that in every gale I have experienced here, it has invariably began at the Northward, veering to the Eastward, sometimes as far as North-east and back again,* generally breaking up at SW.; the heaviest part of the gale generally being between SE. and South, except the last, the heaviest of which was at WSW., the point at which it broke up."

* So in the MSS.

Extract from the Log of the H. C. L. V. "Hope," Eastern Channel.
W. Clark, Commander.

Date.	Winds and Weather.	Bar.	Ther.	Remarks.
<i>Wednesday,</i> <i>April 29th,</i> 1840.	A.M. Fresh Easterly breezes, dark, cloudy threatening weather, and lightning, 3 A.M. Heavy gusts from the Eastward, and passing squalls. Daylight. Strong Easterly breezes and ditto weather. 8 A.M. Fresh breezes and cloudy, with passing squalls and rain. Noon. Strong Easterly breezes and ditto ditto weather; rain at times. Sunset. Ditto winds and weather. 8 P.M. Ditto winds and weather. Midnight, heavy passing squalls from the Eastward, and ditto weather.	29-67	81°	H. C. L. V. Hope Eastern Channel lying at Anchor 140 fathoms cable.
<i>Thursday,</i> <i>April 30th,</i> 1840.	A.M. Heavy squalls from Eastward, and threatening weather; passing squalls and very heavy sea on. Daylight. Strong East to ESE Easterly breezes, cloudy and squally weather. 8 A.M. Ditto cloudy, and threatening appearances all round. Noon. Strong ESE Easterly breezes and ditto weather. Sunset. Blowing hard from East to ES. Easterly, with passing squalls and rain. 8 P.M. Blowing hard at SE. Ditto weather. Midnight. Ditto from SE. to SSE. and ditto weather.	29-60	81°	
		29-60	82°	
		29-55	81°	
<i>Friday,</i> <i>May 1st,</i> 1840.	A.M. Blowing a moderate gale at ESE. with heavy gusts at intervals, and rain; weather still threatening; shipping much water. Daylight. Gale increasing at SE. battened down the hatches and made all snug; veered to 200 fathoms cable. 8 A.M. gale still continuing at SE. with frequent squalls and rain. Noon. Moderating a little, veering to the southward, frequent squalls of wind and rain, and heavy sea on. 4 P.M. Decreasing at SSW. very unsettled appearances all round; very heavy sea on. Sunset. Strong SS Westerly breezes, with cloudy and threatening appearances all round. 8 P.M. Ditto ditto weather. 10 P.M. Wind shifted suddenly round SSW. to NW. with threatening appearances and much lightning. Midnight. Light variable breezes from NW. to SW. cloudy and threatening appearances to the Westward, and rain.	29-50	81°	200 fathoms cable.
		29-53	83°	

Tabular View of the Gale of 29th April, to 2d May, 1840, at the Pilot Station off the Sand Heads.

Date, Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
April 29th, 1840.	Magna, H. C. P. V.	At anchor 18 fathoms Western Sea Reef.	On the 28th Light breezes from SE. to ESE. First part, wind ENE.; middle and latter East, blowing hard. At daylight equally, and stormy appearance to the Eastward, wind from ENE. Strong Easterly breezes with rain in the evening, and a heavy sea. Bar. fallen to 29.54 at 7.30 P.M. Veered to 30 fathoms.
	Cauvery, P. V. ..	At anchor 17 fathoms off tail of the Western Sea Reef; South Channel Buoy, NE½E.	On 28th. Fine; wind from SE. to ESE. First part of this day fresh breezes ESE. to ENE. Latter E. to SE. with hard squalls and heavy rain, riding 160 fathoms.
	Seahorse, P. V. ..	At anchor off Northern part of Point Palmiras. 20 fathoms, dark sand.	Strong breezes ENE. to East, and very squally. Vessel labouring much, riding with 120 ft. cable.
	Coleroon, P. V. ..	At anchor Eastern Channel; Floating Light Ebs½S. 1½ miles. ..	First part moderate Easterly winds. From 8 A.M. to midnight hard squalls from NE. to ESE. with rain and heavy sea.

N. B. The week preceding moderate, and fine weather. Winds from SW. to SE. On 28th winds variable from ENE. to ESE. and weather fine.

Date, Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
30th April 1840.	Megua, P. V. ...	At anchor Western Sea Reef.	Strong gale from the Eastward, heavy squalls. At daylight, heavy squalls and rain from ENE. and very stormy appearance; vessel labouring much. At Noon. Wind rose to a gale from the Eastward. Blowing in heavy gusts with rain. 10 P.M. Increasing, veered to 125 fathoms, then blowing a hard gale and very heavy sea running; vessel shipping much water. Midnight. The wind hauled round to East, still blowing hard.
	Cauvery, P. V.	At anchor as before, 17 fathoms.	First part moderate from ESE., latter fresh gales from SE. to SSE.
	Seahorse, P. V.	At anchor off Northern part of Point Palmiras, as yesterday.	Fresh gales ENE. to Ebs. with heavy rain; 160 fathoms cable. 4 P.M. gale increasing.
	Coleroon, P. V.	At anchor Eastern Channel Floating Light Ebs. 14 miles.	First part hard squalls from ESE. Noon; more moderate, latter 8 P.M. hard squalls SE. to SSW. with lightning and rain. At 10 P.M. blowing a gale at SEbE. and to midnight the same.

Date, Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
1st May, 1840.			
	Megna, P. V. ..	At anchor Western Sea Reef. ..	Wind, first part, from ESE.; middle, SE.; latter, South. At daylight still blowing a hard gale from ESE. but with a clearer appearance. Noon, began to lull; wind SE. At 4 P.M. wind abating. At Sunset, hauled to South.
	Cauvery, P. V. ..	At anchor as before; drifted into 114 fathoms on the Western Sea Reef.	A.M. Fresh gales from SSE. to SW. P.M. Moderating from SW. with a squall from WNW. and rain. At 8 A.M. driving on Western Sea Reef with 160 fathoms. Let go a second anchor. Noon, blowing a fresh gale from SWbS. shipped a heavy sea and carried away the tiller. 8-30 P.M. Moderate from SW. Midnight, wind moderate from SW. and cloudy.
	Seabone, P. V. ..	At anchor off Northern part of Point Palmiras, as before.	Fresh gales ESE. to SSE. with heavy rain at intervals. At 1 A.M. driving. At daylight driving again; 200 fathoms cable. Noon, gale moderating; wind SSE. to SSW. Midnight, moderate.
	Coleroon, P. V. ..	At anchor as before.	Early part a gale from SEbE. Towards morning increasing gale from South, with a very heavy sea. At 10 A.M. gale veered round to SW. shipping heavy seas; riding with 150 fathoms. P.M. gale moderating. Midnight, moderate; SSW. to WSW.

Schooner "Margaret," Capt. Thaddeus; proceeding up the River.

28th April, 1840. *Civil time.*—Noon. Lat. 20° 45' N. Long. 88° 32' E. 55 fathoms, soft mud. P.M. Fresh breeze ENE. At 9, NE. cloudy, and lighting from SE. and East at midnight.

29th April.—Noon. Strong breeze and cloudy; working up. P.M. Small rain. P.M. ENE. and at 5, NE. Midnight; strong breeze NE. and threatening gloomy weather, with drizzling rain.

30th April. Wind ENE. At daylight threatening. Noon, passed Diamond Harbour, midnight hard squalls. At anchor off Wollooburra.

1st May. A.M. ENE. Wind fresh breeze and rainy, cloudy and threatening at daylight. At 8-30, wind SSE. strong breeze. Noon, heavy gales. 4-30. P.M. Wind South. Midnight, heavy gale with small rain. At anchor half way between Wollooburra and Calcutta.

2nd May. A.M. Wind South. Strong gale with small rain; arrived at Calcutta. P.M. SSW. Wind, with rain.

At Calcutta,

the following are my own observations. The Barometer is corrected to the standard at the Surveyor-General's Office.

29th April, 1840. *Civil time.*—At 8 A.M. Bar. 29.74. Squalls from the NE. During the day close sultry weather, calms and light squalls at times from NE. with drizzling rain. At 7 P.M. Close and sultry, drizzling rain and light airs from the NE. with cloudy, gloomy, weather all round. Bar. 29.67. During the night, gloomy weather, with light breezes, from the E. and NE.

30th April.—The same weather continuing. At noon squalls and drizzling rain from East and ENE. Bar. 29.64. Calms and heavy rain to 4½ P.M. Bar. 29.57. Evening and to midnight, light airs from the East, dark gloomy weather, and drizzling rain at times.

1st May.—From midnight to 6 A.M. dark gloomy weather, with light breezes and squalls at times from East and ESE. At 6 A.M. Bar. 29.52. A squall from the SE. with heavy rain: scud flying fast from the SE. 10½ A.M. Bar. 29.52. Strong breeze SE. with squalls. Noon. Bar. 29.47. A gale with heavy squalls SE. to ESE. with heavy rain, 3 P.M. Bar. 29.39. Gale in heavy squalls, from SSE. 4½ P.M. Wind S. (gale) with frequent squalls, Bar. 29.39.

5½ P.M. The same. Bar. 29.40. 6½ P.M. SbW. Heavy dark scud and squalls. Bar. 29.42. 7½ Sudden squalls and lulls between them, from SSW. and SW. Bar. 29.45. 9 P.M. The same; squalls hauling to SW. Bar. 29.52.

2nd May.—5 A.M. Bar. 29.58. Fine weather.

I have inserted the following report on the principle, that no knowledge should be, in the present state of the inquiry, set aside; but I do not think it has much relation to our present subject.

Report from the Collector of Coringa to the Government of India.

"As it may enable the gentleman who has undertaken to investigate the course of storms, to fix with some accuracy the extent to which the late gale of the 30th April and 1st May reached, I have the honor to forward an extract from the Log just received from the Coringa Lighthouse from 6 P.M. of the 1st ultimo, till midnight; when the wind died away. This squall appears to have been the tail of the storm, and did not, I should think, extend much farther along this coast. The weather for two or three days before had been very threatening, and I understand the Barometer fell to a considerable extent, but as the instrument for the Lighthouse has not yet been received from Madras, I regret that I am unable to furnish you with a more accurate report."

"G. SMITH."

Extract from the Log kept at the Lighthouse at Coringa.

Hours.	Winds.	Remarks on Friday, 1st May, 1840.
6 P.M.	SW.	Wind moderating, and a squall brewing in the NW.
7.	"	The squall, with thunder and lightning, commenced blowing from this quarter with a smart shower of rain.
8.	Westerly,	
9.	SW.	Blowing very fresh.
10.	"	
11.	"	Wind moderating, weather clearing up.
12.	"	

The Brig "Union," from Coringa to Pondicherry. Forwarded by Capt. Biden, Master Attendant, Madras.

On the 30th April, when she was at Noon in Lat. 14° 19' N. Long. 82° 15' E. had smart breezes from SW. amounting to strong gale, and high sea. At midnight, wind South, strong gales with dark gloomy weather, and a turbulent sea, laid to under bare poles.

1st May. At 3 A.M. wind SSW. Daylight, moderating; made sail, wind SWbS. and SSW. till noon, when fresh breeze and hazy weather. Lat. 14° 49' N. Long. 81° 18' E. P.M. moderating, but towards, and at, midnight increasing again to fresh gales SbW. to SSW. and high confused sea.

2nd May. Wind SW. to SE. at noon, when it moderated to light airs from that quarter. Lat. 14° 26' N. Long. 80° 15' E.

Extract from the Log of the Barque "Sarah," from Visagapatam towards Madras. Reduced to Civil time. Forwarded by Captain Biden, Master Attendant, Madras.

30th April, 1840.—P.M. Fresh breezes SW. to 7 P.M., veering to SbE. at 7 and South at 8, with cloudy weather till midnight.

1st May.—At 2 A.M. hard gales SW. veering to NW. at 4, and again to SSW. At 7 heavy lightning, split several sails. At noon moderating, Lat. 13° 25' N. Long. 82° 47' E. Bar. 29.56. P.M. Wind SbE. fresh breezes and cloudy, till midnight.

Extracts from the Meteorological Journal kept at the Madras Observatory.

Date,	Barometer.			Thermometer.		
	8 A.M.	4 P.M.	10 P.M.	8 A.M.	4 P.M.	10 P.M.
1840. April 26th.	29.776		29.766	86.0		87.3
27th.	29.780	29.614	29.706	86.3	91.0	89.7
28th.	29.700	29.628	29.720	86.4	90.0	88.4
29th.	29.680	29.605	29.684	87.2	91.3	89.2
30th.	29.680	29.568	29.680	87.9	99.0	89.8
May 1st.	29.720	29.643	29.798	88.3	93.0	86.5
2nd	29.820	29.750	29.858	86.0	89.0	87.8

The following table is extracted from a Meteorological Register kept at Chuprah, by Mr. Ravenshaw of the Civil Service.

April 24	29.64	87½	29.57	88½	<p>East variable { 4 P.M. NbW. Variable. { Do. Do. Gale from E. at 6½ P.M. Strong Gale from E. all night, to present hour 10 A.M. accompanied with clouds, but no rain. At 4½ still blowing from E., but more moderate. At 10½ P.M. still blowing; fresh Gale all night. Ditto. 4½ P.M. E. fresh more moderate. Gale continues. Strong wind but variable ENE. cloudy, at 4½ E. moderate. East moderate Do. fresh.</p> <p>N. B. (SE. Gale at Calcutta,)</p>
25	29.54	88	29.36	88½	
26	29.48	86	29.46	87½	
27	29.52	86	29.48	87½	
28	29.56	87½	29.56	88	
29	29.62	87½	29.56	88	
30	29.56	88	29.52	88½	
May 1	29.53	86	29.53	86	
2	29.53	83	29.50	84	
					<p>N.E. blowing fresh cloudy. 4½ P.M. squall at NbE. rain Variable, rain all night. Do. Cloudy, sky overcast.</p>

Memoranda from Dadoopoor, Kurnaul, and Hansie, of a storm which occurred at those places on the evening of the 4th May, 1840; forwarded by Lieut. Baker. Dadoopoor. Report of Mr. W. Dawe, Delhi Canal Department.

On the 4th (the day of the storm), the wind had been blowing strong from the Eastward all day, but about 7 p.m. heavy clouds appeared in the SW. to West quarters, with thunder and lightning. The storm came on at 7 hours, 45 minutes, from the southward of West. But by 8 p.m. it had settled at North-west, and continued to blow steadily till about 9 p.m. with a few drops of rain. From this period till 10 p.m. the thunder was heavy and continued, and the lightning vivid. But the wind came in sudden and heavy gusts, which has done much damage to the trees, &c. As the crops had been cut, by the appearances after the storm had subsided it might have been concluded that it was only one of usual occurrence; but as good sized trees have been broken short off, this proves that it was otherwise.

By reports from the Deyrah Dhoon, and Saharunpoor district, it appears the storm has been as severe at those places also.

WILLIAM DAWE, Conductor.

DADOOPOR, 14th May, 1840.

Copy of the Meteorological Register kept at Dadoopoor, for the first week of the month of May, 1840.

Date.	Observations day-break.				Ditto at 10 A.M.				Ditto at 4 P.M.				Ditto at 10 P.M.				Remarks.															
	Thermometer.			Rain Gauge.	Thermometer.			Rain Gauge.	Thermometer.			Rain Gauge.	Thermometer.																			
	Barometer.	Attached.	Detached.		Wet bulb.	Barometer.	Attached.		Detached.	Wet bulb.	Barometer.		Attached.	Detached.	Wet bulb.																	
1 28-536	68	"	67	"	65	"	"	"	28-725	96	"	94	"	81	"	28-630	103	"	102	"	86	50	"	"	28-602	79	"	78	"	74	"	Clear, light, variable wind.
2 28-540	70	"	69	"	66	50	"	"	28-636	96	"	95	"	80	"	28-590	103	"	100	50	83	50	"	"	28-632	80	"	78	"	72	"	Clear, light, variable wind.
3 28-660	80	"	79	"	73	"	"	"	28-766	92	"	91	"	80	"	28-766	100	"	99	"	80	"	"	"	28-652	83	"	82	"	79	"	Clear strong easterly wind.
4 28-640	77	"	76	"	74	"	"	"	28-702	92	"	91	"	83	"	28-544	100	50	100	"	87	"	"	"	28-634	74	"	72	"	70	"	A.M. Clear strong easterly wind. P.M. a storm from W. to N.W. with rain.
5 28-576	73	"	72	"	67	"	"	50	28-694	88	"	87	"	78	"	28-614	91	"	90	"	80	"	0	03	28-662	75	"	74	"	68	"	A.M. Clear, light, easterly wind. P.M. Squall, easterly shower.
6 28-712	69	"	68	"	66	"	"	"	28-828	83	"	83	"	74	"	28-786	92	50	92	"	78	"	"	"	28-790	78	"	77	"	70	"	Clear, light, easterly wind.
7 28-742	68	"	67	"	66	"	"	"	28-828	86	"	85	"	75	"	28-736	95	"	94	"	75	"	"	"	28-742	79	"	78	"	78	"	Clear, strong, easterly wind.

May, 1840.

Kurnaul. Lieut. Baker's Report.

We had westerly winds at Kurnaul on the 1st and 2nd instant; and on 3rd and 4th, a strong breeze from the Eastward, and 3 or 4 p.m. on the 4th, a heavy bank of clouds appeared to the westward. About sunset we had frightful gusts of wind from the West, North and North-east, the air during the intervals being sultry and oppressive.

About 8½ p.m. the sky became entirely overcast, and a violent squall of wind began to blow from the Westward, accompanied by clouds of dust, and latterly a few drops of rain. The wind continued to blow from the West with more or less violence for about two hours, when it gradually went round to the East, from which quarter it continued to blow till 2 p.m. on the 5th, when it was interrupted by a second (less violent) squall, from the Westward, accompanied by a slight shower of rain.

The strength of the wind during the first squall must have been considerable, as it unroofed many out-offices at the station, and blew down many hundred trees on the Canal banks.

Hansie. Report of Mr. T. Johnson, Delhi Canal Department.

I have the honor to report, agreeable to the Government Notification dated 11th September, 1839, that this station was visited by a storm of wind and dust on the evening of the 4th May, 1840.

The storm commenced at ¼ past 8 o'clock p.m. from the NW. the wind blowing in strong gusts, bringing with it dense masses of dust; its duration was for ¼ of an hour, when the wind veered round to the NE. and continued to blow a stiff breeze from that point nearly all night, unaccompanied by dust. There were masses of clouds with much lightning passing along the northern horizon, but none of the clouds came over this neighbourhood, nor did I hear any thunder. I am inclined to think that the storm did not extend much further than this to the South or South-east, for what came here was lateral, and apparently from some heavy storm at a great distance from this.

The thermometer during the day had been up to 106° and at the commencement 90°, At the subsiding of the storm it was down to 76°.

The following logs have also reached me; and that no knowledge of the weather prevailing about the Bay at the time of the storm, should be lost, I have printed them. I shall remark upon them after summing up the evidence we have for the track of the storm.

*Extract from the log of the Packet Columbia; from Calcutta towards Singapore.
Civil time.*

On the 24th April.—At noon in Lat. $5^{\circ} 10'$ N. Long. $99^{\circ} 53'$ East; light breezes and fine weather. At 10 P.M. very threatening to the Southward. At midnight a tremendous heavy squall, with much rain, thunder and lightning, and the wind veered suddenly to the SWestward.

25th April.—At 5 A.M. hard squalls, winds variable from SW. to SE. Daylight, strong breezes with a heavy head sea. Noon, strong breezes with a very heavy sea. Lat. $4^{\circ} 49'$ N. Long. $99^{\circ} 42'$ E. P.M. Moderating about midnight; wind SE. throughout.

26th April.—At 10 A.M. increasing again from SSE. to SE. Noon, Lat. $4^{\circ} 53'$ N. Long. $100^{\circ} 1'$ E. off Pulo Penang. Wind SSE., breeze increasing from SE. till midnight.

27th April.—A.M. A gale at SE. with a tremendous sea, frequently heaving the vessel on her beam ends. At Noon. Lat. $4^{\circ} 46'$ N. Long. $99^{\circ} 50'$ E. Towards midnight moderating from SSE. but increasing so much the next day, as to oblige the vessel to go into Penang harbour.

*Extract from the Log of the Brig Pyeen Boun, from Moulmein to Madras;
from Capt. Biden, Master Attendant, Madras; supposed by Nautical time.*

April 29th, 1840.—Lat. $15^{\circ} 52'$ N. Long. $97^{\circ} 5'$ E. Hard squalls with occasional showers of rain, and a high sea running this day; wind at SSW.

April 30th.—Increasing heavy squalls from SSW. with lulls at intervals; a heavy sea running throughout the 24 hours; sent down topgallant masts and yards.

May 1st.—Hard gales from SW. with thunder, lightning, and rain, and a heavy confused sea running, breaking occasionally over the vessel. Under closed-reefed topsails.

May 2nd.—Increasing gales from SW., with heavy dark appearance, thunder and lightning, and a very high sea running. Split both topsails, unbent them; bent, and close-reefed two others.

May 3d.—Lat. $14^{\circ} 32'$ N. Long. $96^{\circ} 30'$ E.

H. C. S. Amherst. Gale of 27th April to 1st May, 1840.

The H. C. S. "Amherst" was lying at Kyook Phoo, and experienced, as by her log, nothing but squally and rainy weather at times from the 28th April to 1st May. The winds were moderate, and variable from ESE. to SE. South and SSW.

From the "Colombo Observer."

On Saturday night, 25th April 1840, a strong breeze of wind commenced, amounting almost to a gale—apparently the beginning of the Monsoon—accompanied, as usual, with a heavy sea and a high surf over the Bar, which has since continued. In this state of the weather a wharf jolly-boat, returning from the Persia, when crossing the Bar, was swamped, and, melancholy to relate, three persons were drowned.

The ship Recovery, Captain Johnstone, was at noon of the 28th April in Lat. $5^{\circ} 43' N.$, steering to the NNE. to round Ceylon. At noon of the 29th, she was in $7^{\circ} 20' N.$ with Westminster Abbey bearing SWbW. At noon on the 30th having stood north 126 miles she was in Lat. $9^{\circ} 40' N.$ and at noon on the 1st May in $11^{\circ} 57' N.$ having stood north 149 miles, and had fine weather throughout these days.

Barque "Cornwallis," from Bombay towards Calcutta. Civil time.

At noon on 28th April in Lat. $11^{\circ} 50' N.$, Long. Chron. $74^{\circ} 48' E.$ Fine weather till midnight.

29th April.—Midnight, strong 6 knot breeze NW. Hazy strong SSE. Daylight and to Noon heavy westerly swell. Noon Lat. $9^{\circ} 14' N.$ Long $75^{\circ} 50' E.$ increasing to sunset and midnight. Wind NW. throughout. A.M. 30th April, strong breezes SW. to Noon, heavy westerly swell. Noon Lat. $7^{\circ} 3' N.$ $78^{\circ} 15' E.$; P.M. and to midnight, very heavy swell from West; wind westerly; thick hazy weather.

1st May,—Light 5 knot breezes at daylight, and fine weather; vessel labouring so much with the heavy westerly swell, that it is feared she may roll away her masts. Hove to to set up the rigging at Noon. Wind westerly throughout Lat. $5^{\circ} 47' N.$ Long. $80^{\circ} 20' E.$ High swell continuing till midnight, when it abated and is not mentioned on the 2nd.

I have next, as in the former Memoir, arranged the winds and weather experienced at Noon, Civil time, by each of the different vessels, and at the stations within the Bay of Bengal, in a tabular form; so as to afford a ready reference from the chart and diagrams, and to shew more strikingly than by detailed accounts, the remarkable contrasts which different points of the space comprised in the charts, exhibit.

Tabular View of the Hurricane in the Bay of Bengal, and at Cuttack, of 27th April to 2nd May, 1840.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 27th April, 1840.	Nusserath Shaw,	ENE. strong breezes; dark cloudy,	16 2	91 21	...	...	...	Increasing sea.
	Tenasserim,	Easterly fresh breeze, ...	17 40	90 50	...	...	...	...
	Freak,	Wind light; hauling to the East,	18 56	88 30	...	...	...	...
	Flowers of Ugie,	SE. fine clear weather, ...	19 52	89 24	...	...	...	Steering to the S. Westward.
	Christopher Raw- son,	SSE. light and sultry, ...	17 15	...	29.80	...	...	Heavy swell from the SW.
	Elephanta,	SW. to SSW. moderate and fair,	13 52	83 50	29.60	...	...	{ A.M. Blowing in hard gales from Westward with rain.
	At Madras,		...	...	29.67	...	88	
	Amelia Thompson,	West, moderate and fine, ...	4 14	88 18	...	...	...	...
	Ganges,	SSW. to SW. hard gale, ...	7 10	95 18	29.60	...	...	{ On 26th, in Lat 6° 37' N. Long. 95° 56' E. fresh gale at SSW. veering to the SW. On 27th, hove to under storm stay- sails. Bar. 29.50

Date, Civil time.	Names of Vessels and Places	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 28th April, 1840.	Nusserath Shaw, Vectis, ...	ENE. a hurricane. ...	14 26	91 34	...	...	...	{ At 10 A.M. Lost mizen mast, blowing a hurricane. 3 P.M. wind shifted to South-west- ward.
	George and Mary,	East fresh breezes and clou- dy, ...	18 37	87 55	...	...	...	At 6 P.M. Heavy bank to the SW. { Sea making a continued breach over the vessel, gale increas- ing.
	Tenasserim, ...	South-eastward, heavy gale,	...	...	...	...	...	{ At 6 P.M. Gale increasing ra- pidly from NNE.
	Freak, ...	Hauling to NNE. strong breeze and threatening,	17 40	88 32	...	...	...	{ Increasing breeze veering to East at 7 P.M. with very bad appearance to the SE.; standing to the SW.
	Flowers of Ugie,	ESE. smart breeze and clear,	19 19	88 22	29.17	...	...	Running in for a pilot.
	Christopher Raw- son, ...	East to ESE. heavy appear- ance, ...	17 29	...	29.40	...	...	Heavy swell from SW.
	Elephanta, ...	EbS. light winds and clou- dy, ...	15 20	84 20	...	...	...	...
	At Madras, ...	Fine weather, westerly breeze, ...	...	...	29.66	...	89	...
	Cornwallis, ...	WSW, moderate, ...	11 50	74 48	...	...	...	{ Blowing hard and high sea, but not a gale.
	Amelia Thompson,	West to WSW. squalls and rain, ...	4 25	87 48	...	...	...	Wind not specified.
	Clarissa, ...	...	7 11	87 56	...	...	...	...
	Ganges, ...	Clearing up, ...	8 7	94 33	29.80	...	...	...

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 29th April, 1840.	Nusserath Shaw.	SbW. squally and rain, ...	15 23	90 31	...	...	...	{ Fresh gales and heavy weather, with dreadful gusts of wind and squalls, sea breaking over the ship, 3 ft. water in the hold. Full hurricane with a heavy sea, vessel on her beam ends with decks cleared, loss of top masts &c. Hurricane, lasting for about six hours from NNW. then veer- ing East and ESE. { Rather clear, but still blowing hard. Showers of rain. High sea running. Hurricane since midnight.
	Vectis, ...	Variable! full hurricane,	16 58	88 4	...	...	...	{ Hove to under bare poles; hea- vy sea and very bad weather. Thick hazy weather, p.m. gale in- creasing fast, off Point Palmiras. SSW. 30 from floating light. Gale increasing fast, confused sea. At the inner station; 140 fa- thoms of cable out. Threatening appearance; mode- rating at midnight.
	George and Mary,	NNW. a mere hurricane,...	16 0	84 30	...	...	...	
	Tenasserim, ...	SE. gale, blowing hard, ...	16 32	91 2	...	...	...	
	Pyeen Boun, ...	SSW. hard squalls, ...	15 52	97 5	...	...	...	
	Freak, ...	SW. blowing furiously, ...	16 2	88.36	...	...	...	
	Flowers of Ugie,...	NE. at 10, and north at 11, and NW. at 1 p.m. heavy gales, ...	17 15	86 43	28.36*	...	...	
	La Belle Alliance,	NE? increasing gale and hard squalls, ...	...	...	...	...	...	
	Chirstopher Raw- son, ...	East to ESE. in squalls, heavy gale, ...	...	...	...	...	...	
	Hope, L. Vessel,	Easterly strong breezes and cloudy, ...	21 26	88 07	29 65	...	81	
	Beacon, L. Vessel,	East, veering to NE. heavy squalls, ...	21 04	88 27	...	...	...	

* Probably by mistake see remarks—H. P.

Date, Civil Time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 29th April, 1840. <i>Continued.</i>	Megna, P. V. ...	East and ENE. blowing hard,	° ' ...	° ' ...			...	{ At anchor Western Sea Reef; 18 fathoms, 90 fathoms cable out.
	Cauvery, P. V. ...	East to ENE. and ESE. hard squalls,					...	{ At anchor, tail of Western Sea Reef; 160 fathoms cable out.
	Coleroon, P. V. ...	NE. to ESE. hard squalls,					...	At anchor near Floating Light.
	Amelia,	ENE. blowing very hard,					...	{ Sea rising, increasing to a gale. Standing to sea with a pilot on board.
	Elephanta,	NE. fresh breeze and cloudy weather,	16 20	84 22			...	{ Heavy swell from the Eastward, and current to the Westward of 20 24.
	At CALCUTTA, ...	NE. calms and light airs,...	22 34	88 22			...	{ Close sultry weather and driz- zling rain.
	Margaret,	ENE. strong breeze and rain,					...	{ Between Kedgerree and Diamond Harbour.
	At Balasore, ...	NE. rain and squally, ...	21 28	87 10	29.66		85	
	At Pooree or Jug- urnath,	NbE. strong wind,	19 48	85 45			...	Increasing breeze to midnight.
	At Madras,				29.64		89	
	Cornwallis,	NW. increasing breeze, ...	9 14	75 50				
	Clarissa,	Moderate on this day, ...						

Date, Civil time.	Names of Vessels and Places.	Winds and weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 30th April, 1840.	Nuserath Shaw, Vectis, ... Tenasserim, ... Union, ... Pyeen Boun, ... Freak, ... Flowers of Ugie, La Belle Alliance. Christopher Raw- son, ... Hope, L. Vessel. Beacon, L. Vessel. Megna, P. V. ... Cauvery, P. V. ...	SE. fresh gales, ... SW. gale continuing, ... SSE? moderate, ... SW. strong gales and high sea, ... SSW. Increasing, heavy squalls, ... SW. a little moderating, ... South; very heavy gales and bad weather, ... SSW. a violent gale with awful gusts, ... SSE. heavy gale, ... Strong ESE. breezes and threatening, ... ESE. to East, heavy squalls and threatening weather, N. to ENE. blowing a gale, Fresh gales ESE.	° ' ... 17 40 16 21 14 19 ... 16 41 17 48 ... 20 28 21 26 21 14	° ' ... 88 10 91 50 82 15 ... 88 0 86 53 88 07 88 27	 29.11* 28.60 28.90 29.60	 82	{ Bore up for Calcutta; heavy cross sea. Very high sea. Becoming fine. { Veering to South by midnight, and SSW. by 3 AM. 1st May. Laid to under bare poles. { Heavy squalls with lulls at intervals, and heavy sea; pre- paring for bad weather. { At 11 AM. shift of wind from NEastward to SSW. Hea- vy sea. { Under bare poles in the trough of the sea. 140 fathoms of cable out. { At anchor Western Sea Reef 125 fathoms cable. Heavy sea. Ditto Ditto.	

Corrected.

• Corrected.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 30th April, 1840. <i>Continued.</i>	Coleroon, P. V. ...	ESEasterly, veering to SEbE. moderating, ...	° / ...	° / ...	...	...	...	{ At anchor near Floating Light P.M. Gale at SEbE.
	Amelia, ...	At EbN. blowing a hard gale, ...	...	...	...	...	...	{ Heavy sea, wind veering to East at 6 P.M. and SE. at midnight.
	Elephanta,	SW. fresh breeze and cloudy,	17 46	84 28	...	...	...	{ A great swell from the NE. Ship labouring much.
	At CALCUTTA,	{ Light East to ESE. squalls and drizzling rain. ...	22 34	88 22	29.64	...	...	{ To midnight, light airs and gloomy, drizzling weather.
	Margaret, ...	ENE. threatening, ...	...	...	...	...	...	Passing Diamond Harbour.
	At Balasore, ...	NE. rain and puffy, ...	21 28	87 10	29.57	...	82	
	At Pooree or Jug- gurnath, ...	NE. heavy gale, ...	19 48	85 45	...	...	...	{ Incessant rain. Shift of wind at 8 P.M.
	At Madras,	{ NW. Strong breeze; thick hazy weather, ...	...	...	29.66	...	89	{ P.M. Very heavy swell from the Westward.
	Cornwallis,		7 3	78 15	...	...	...	
	Moir, ...	SW. smart breeze increasing	14 19	82 15	...	...	...	{ P.M. Increasing to strong gales at South, by midnight.
	Sarah, ...	SW. fresh breezes, ...			...	...	...	

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat.N.	Lon.E.	Bar.	Simp.	Ther.	Remarks.
Noon. 1st May, 1840.	Vectis,	{ SSW. fresh gales and squally... ..	18 43	88 18	...	...	...	Bore up for Calcutta.
	Union,	{ SSW. and SWbS. fresh breezes hazy,	14 19	81 18	...	...	...	{ Increasing again to fresh gales SbW. and SSW. at midnight.
	Pyeen Boun, ...	{ SW. hard gales, thunder, lightning, and rain, ...	...	...	...	...	...	{ Confused sea; under close- reefed topsails.
	Freak,	Moderate breeze,	17 26	87 47	...	...	...	...
	Flowers of Ugie,	South, moderate and fine, ...	18 23	86 58	...	...	...	...
	La Belle Alliance,	{ Moderating from the Southward,	...	...	29-30	...	...	Moderating from 5 A.M.
	Christopher Raw- son,	SSW. clearing a little, ...	...	...	...	...	...	{ In 16 fathoms; off Point Pal- miras; ship lying helpless. P.M. Moderating.
	Hope, L. Vessel,	{ Moderating and veering to the Southward, ...	21 26	88 07	29-53	...	83	{ 200 fathoms cable out. Heavy sea on.
	Beacon, L. Vessel,	SSE. heavy gale and sea, ...	21 04	88 27	...	...	...	{ P.M. Clearing up a little, veer- ing to SSW. at midnight.
	Magna, P.V. ...	SE. beginning to lull, ...	...	...	...	...	...	{ At anchor; Western Sea Reef.
	Cauvery,	SWbS. fresh gale,	...	...	...	...	...	{ Sunset; wind south. Driving on the Western Sea Reef with 160 fs. of cable out; at 8-30, moderate.
	Coleroon,	SW. gale,	...	...	...	...	...	{ At anchor as before. At 10 A.M. gale veered to SW.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
Noon. 1st May, 1840. <i>Continued.</i>	Amelia, ...	SW. gale abating,	...	...	...	...	...	{ 15 miles to the south of Point Palmiras in 22 fs. Bore up.
	Elephanta, ...	SSW. moderate and hazy,	18 48	85 40	...	...	...	{ Gale began at 6 A.M. and end- ed at about 9 P.M. to mid- night.
	At CALCUTTA, ...	SE. to ESE. Gale with squalls.	22 34	88 22	29.47	...	...	{ At anchor Wollooburra 12 miles below Calcutta.
	Margaret, ...	SSE. heavy gale,	...	...	...	...	...	{ Wind veering from NE. to South at 8 A. M.
	At Balasore, ...	South strong gusts,	21 28	87 10	29.43	...	81	{ Gale abating from 4 A. M.
	At Pooree or Jug- gurnath, ...	SW. gusts at times,	19 48	85 45	...	...	...	{ A heavy squall from SW. for three or four hours at 7 P. M.
	At Coringa, L. H. At Madras, ...	...	...	...	29.70	...	90	{ Fine weather, but tremendous swell, continuing till mid- night.
	Cornwallis, ...	Westerly breeze and fine, ...	5 47	80 20	...	...	...	{ A Gale veering from SW. to NW. and SSW. the preced- ing 12 hours.
	Union, ...	SSW. fresh breeze and hazy,	14 49	81 18	...	...	...	
	Sarah, ...	SbE. moderating,	13 25	82 47	29.56	...	...	

We have now to show what is the evidence we possess for—

I. The formation of the vortex, and evidence for its form.

II. Its size

III. Its rate of progression.

I. *The formation of the vortex and evidence for its form.* Our evidence for the actual circle laid down on the 27th is, as will be subsequently seen in speaking of the centres, very imperfect; as is also that of the 28th, where all we know is, that it *was* a veering hurricane with the *Nusserath Shaw*, and could not be said to reach the *Freak* till the evening. Hence I have taken it to be a vortex of about 300 miles in diameter, and that the *Tenasserim's* SE. gale was a little without the circle, though really arising from the same disturbance. The diagrams, and the subsequent remarks upon the evidence by which I have placed the different centres, will render unnecessary any further detail upon this head.

In estimating the centres for the different days, I have been guided as follows,—

On the 27th, we have the logs of the *Nusserath Shaw* and *Tenasserim* available, and of these, the *Nusserath Shaw*—near to which vessel the centre passed on the following day at 3 P.M. when she had the shift of wind,—must of course have been the nearest to it. She had the wind steady from ENE. during the whole of the 24 hours (from noon 27th to noon 28th) an evidence that she was on the direct line of the track of the storm. She also made good, from noon to noon, a course of 100 miles S. 7° E.; while the track of the storm (by projection from the shift which she experienced, from ENE. to SW.) must have been about N. 34° W. and S. 34° E. so that we may say, without much exaggeration, that the ship travelled 100 miles, and the hurricane 180 miles almost directly towards each other! A very remarkable instance of the truth and value of the Theory of Storms, if rightly understood; for it is clear that this, which happened to a single ship, might have happened to a whole fleet! Heaving to for six hours, would have saved the owners and underwriters the heavy loss which the dismasting and return of this vessel to Calcutta entailed; and a good Barometer and Simpiesometer on board, would infallibly have indicated the coming danger in time.

The *Tenasserim* seems but just to have felt the first puffs of the storm on this day.

It will be remarked in the table for this day, that the *Ganges* in Lat. $7^{\circ} 10'$ N. Long. $95^{\circ} 18'$ E. was hove to from the day preceding, in a heavy gale blowing "from SSW. to SW." The chart does not admit my including her position, but if projected, it will be found that if the circle of the storm was completed, she was about on the opposite side of it from the *Nusserath Shaw*; and I have thus, with reference to the rate of travelling of the centre of the storm, between the 28th and 29th, assumed that it may have been about half way between them, or 290 miles from each. This would give it a circle of 580 miles on the first day, and we have no better authorities. The brief extract from the log of the *Clarissa* which vessel it will be seen, could not be far from the same latitude* on the 27th; being on the 28th in $7^{\circ} 1'$ N. but seven degrees further west; (her Long. being $87^{\circ} 56'$ E.) gives us "blowing hard from West to WSW.," so that there was probably, as in the gale of June, 1839, a Westerly and South-westerly gale blowing across the mouth of the Bay, while the vortex was forming and travelling over from the Andamans to Cuttack. "The fine weather and SE. breezes" of the *Flowers of Ugie* and *Christopher Rawson* are exactly what should occur on the northern arm of a parabola formed by the deflection of a heavy SWesterly monsoon, setting in from the Bay against the high land of the Malay Peninsula.

For the 28th April. If we take the storm to have now travelled at the rate of 7 miles an hour, its centre at noon may have been about 15 to 25 miles SSE. from the *Nusserath Shaw*; since this ship had, at 3 P.M. the shift of wind from ENE. to SW. as shown by her log; so that the centre must have passed near her, to the Southward, or even over her. The *Tenasserim* at 180 miles distance, had the wind at SE. "a heavy gale" though if this was the hurricane, she should by her position, which is nearly due north of the *Nusserath Shaw's*, have had the wind at East. As there can be no doubt about the *Nusserath Shaw* having had the centre close to her at noon, and that her position was not far wrong, I have taken the

* Being bound from Penang to Madras, she had to make a westerly course across the Bay.

point marked, 20 miles to the SE. of her, for its place at noon. The *Tenasserim* had probably her part of the storm somewhat deflected by the opening between the Andamans and Cape Negrais? or was not properly within the vortex, but in the northern arm of the parabola of the monsoon. The *Freak* and *Vectis* can scarcely be said to have felt the storm at noon on this day; the *Freak* at least not till 6 P.M., when it was a rapidly increasing gale at NNE., so that its circle may have been about 300 miles in diameter at this time.

On the 29th April, we find that the *Freak*—which vessel had had the gale rapidly increasing from NNE. at 6 P.M. on the 28th,—had it veering to NW. at midnight between the 28th and 29th, and to SW. by 6 A.M. or daylight; making on the whole 14 points of veering in 12 hours. At noon she had it also SW. Projecting this, it shows that the centre may have passed some 30 or 40 miles to the North-eastward of her position at midnight, which is very carefully laid down by Capt. Smolt; and that it was travelling in a N. Westerly direction. The *Flowers of Ugie* also, with a very careful log and corrected Barometer, had, we find, the storm increasing, from “squally with rain” at 4 A.M. to heaving to under bare poles at 11; the wind from East at midnight, to NE. at 10; North at 11; NW. at 1 P.M.; West at 3; SW. at 5; and South at 8 P.M. With her Barometer at 28.36, and the wind veering 16 points in the seven hours! between 10 A.M., and 5 P.M. or $2\frac{1}{4}$ points per hour; she cannot have been more than 15, or 20 miles at the utmost, from the centre. I should estimate it to have passed also to the NE. of her position. By projection I find 12 miles may have been her distance from the centre.

The log of the *Vectis*, though the centre cannot have passed far from her, is by no means so carefully kept as those of the *Freak* and *Flowers of Ugie*; so that, though I have placed her as I found it written, I am inclined to think that she may have been nearer to the *Flowers of Ugie* than she is placed on the chart.

That of the *George and Mary* presents also some anomalies, and the very remarkable one, that the wind seems to have veered as if the storm had passed close to the Southward of her. This could not have been, at all events, the same vortex. Did any division take place of the main vortex into two? which might account for this? and for the anomalies in the log of the *Vectis*? I should be unwilling, however, to suppose this,

upon the very imperfect statement which has reached me, and this written by the clerk of a commercial house, who was probably not a seaman.

I have then taken the *Freak's* and *Flowers of Ugie's* positions, to determine the place of the centre this day, particularly the last vessel's, as there can be, but little doubt of her position, as she was going free till the time she hove to; and the logs of both vessels are excellent. The *Tenasserim* and *Nusserath Shaw* are apparently out of the actual circle of the storm on this day. They were perhaps beginning to feel the monsoon, which as I shall subsequently show was making its way rapidly up the Bay.

For the centre of the 30th April. We find that according to Mr. Ewart's very graphic letter, the shift of wind took place at Pooree (Jug-gurnath) between $7\frac{1}{2}$ P.M. and $9\frac{1}{2}$ P.M., so that we may take the centre to have passed that station at $8\frac{1}{2}$ P.M. of the 30th. From noon of the 29th to $8\frac{1}{2}$ P.M. of the 30th is $32\frac{1}{2}$ hours, and the distance from the centre of the hurricane on the 29th to Pooree, is about 165 miles. Throwing away fractions, this is about 5.1. per hour, and assuming the storm to have travelled in a straight line, we find upon measuring back for these $8\frac{1}{2}$ hours, that the centre at Noon falls about 40 to 45 miles to the SW. of Pooree. This also agrees with the log of *La Belle Alliance*, which vessel had the shift of wind—and she probably passed through, or close to the centre,—at 11 A.M. This position of the centre would give the wind at the station of Pooree NEbE. Mr. Ewart's letter says NE., but a discrepancy of a point might occur even to a seaman; where compasses, weather-cocks, and vanes were not, we suppose, abundant; and where the tempest was also a sand-storm. To the North, we find the *Christopher Rawson* with the wind marked at SE. at daylight, and SSE. in the afternoon, but we have no statement of the wind exactly at noon, and in the state she is described, her observation of latitude must have been but a very indifferent one. Her place in the circle would give the wind to have been about SEbS., so that there is with her, also, a difference of a point, or a point and a half, only. The logs of the *Flowers of Ugie* with a gale at South, and *Vectis*, a gale at SbW. differ widely from what they should have been had the circles of the vortex extended so far as their positions. I have marked them on the diagrams, and now proceed to consider the probable cause of this discrepancy, and of that which we observe in the logs of the Pilot and Light

Vessels. I have adverted, in both my preceding Memoirs, to the probable effects produced by the interruption which a vortex may experience when approaching the land.

In this instance, as before, we must consider the storm as a fluid vortex, moving onwards and striking the extremity of the Coromandel range, with two openings, that of the valley of the Mahanuddee, and of the low country above the Balasore hills, through which to force its way, (see the second Chart to my first Memoir). It is difficult to suppose, and with the imperfect maps we possess, impossible to calculate, what the effect of this double interruption would be; but we may, I think, fairly attribute to it the diminished rate at which the storm appears to have travelled; its remarkable change of course during this last 24 hours; the "awful gusts" of wind described in the log of *La Belle Alliance*, and the discrepancies of some of the logs as to the direction of the wind.* We find, what is very remarkable, the *Elephanta* coming up along shore with the usual monsoon wind of the season, and "fresh breeze and cloudy weather," though, as will be seen by the diagram, she is not far from the circles of the *Christopher Rawson*, *Vectis*, *Beacon*, and *Freak*, all of them still in very bad weather. There can be no doubt about the *Elephanta's* position, since she had the land in sight. The "great swell from the NE." which I have marked in italics, is, clearly that of the tempest, which at this time was just approaching the unfortunate station of Pooree. The *Elephanta's* distance from the centre of this day is considerable, being 163 miles, which would require the vortex to have been 326 miles in diameter, to have reached her.

Taking the nearest range of elevated land to be 30 miles inland from Pooree, we may suppose that circle of the storm upon which the *Flowers of Ugie* is placed in the diagram, to have been just impinging against it at noon, and hence perhaps the sort of *flattening* of it into an irregular oval, which gives the wind on the NE. and SE. portion,—*Flowers of Ugie*, *Vectis*, and *Christopher Rawson*,—a more southerly direction; and farther to the NE. creates the irregularity of the Pilot

* Captain Smoult of the "Freak" in a letter subsequently sent, says "at day-light on the 30th, the wind had hauled round (in the space of four hours) from NNW. to ESE. then back to Southward and SW. from which quarter it blew generally, till I arrived at Point Palmiras."

and Light Vessel's having the wind so far to the Eastward as EbS. to ESE. ; while at Balasore it is NE. and puffy. We may on all these grounds I think, assume that the vortex had become wholly irregular, except near the centre. We should remark, however, that throughout there is no *contradiction* as to the general rule for the direction in which the wind moves ; for all the evidence goes to show that in the open ocean it would have been a circular storm, blowing from right to left.

For the centre of the *1st May*, we have to consider that the monsoon wind was making its way up along the coast ; but we find that at Pooree, though abating from 4 A.M., there were still gusts at times from the SW. *La Belle Alliance* was on the verge of the southern part of the storm ; but the *Christopher Rawson*, close off Point Palmiras, though the weather is clearing a little, is described as lying helpless. From this vessel's position, the report from Balasore, the wind at Calcutta, and with the Pilot and Light-vessels' logs* I have judged the centre to be about where I have marked it, but we must not forget, that to extend the circle to Calcutta, will make it one of 300 miles in diameter ; and that from this point, nearly half way to Calcutta, that part of the vortex nearest the earth had, since before noon of the *30th*, met with all sorts of obstructions ; since it was travelling onwards amongst the numerous ranges of hills which bound the vallies of the Mahanuddee, the Braminy, the Byturnee, and the Subunreeka rivers, to the north of Cuttack as far as Midnapore. From this cause, we cannot on this day expect any great regularity in the direction of the winds, if we project them on circles, and we must be content to take this day's evidence as before, as proof only that the general law of direction has been always followed as far as we have any evidence.

II. *The size of the vortex.*

From what has been before said, and from the chart, it will be seen that the storm appears to have been more extensive about the *27th*, and again to have expanded on the *1st May*, but our evidence for both these days is incomplete. That of the *27th*, because we have but two ships by which to be guided, and that of the *1st May*, because the only

* I suspect some inaccuracy in the log of the "Beacon" for this day, but have not been able to verify my supposition.

evidence we have is all on one side, and within a small arc of the circle. Hence we must say, that *it appears* to have been, while crossing the Bay a vortex of about 260 miles in diameter; and that *it may have been* larger at its commencement and termination. The Coringa hurricane of *November* 1839, is, I think, clearly enough evidence of a storm contracting in size, and this may be one of a storm first contracting and again expanding? for as, in truth, we know so little of the laws which govern these phenomena, all we can do,—all at least that I can venture to do,—is to set down the evidence carefully, with such conclusions as may strike us. Our evidence, and our conclusions will all, I trust, be weighed out and scrutinized by abler hands and heads.

III. The rate of progression of the storm.

From the centres laid down, this will be as follows:—

27th April to the 28th	...	...	175 miles
28th to 29th	...	...	350
29th to 30th	...	...	113
30th to 1st May	...	...	175

Of these we must perhaps exclude the centre of the 27th, for which we have but too little evidence. It is nevertheless possible, that as the track of the storm, if it was then completely formed, crosses the lofty hills of the Andamans (2500 feet high, says Hamilton) it experienced some sort of check from them on its progress? It is a curious coincidence, that after laying down, as well as I could, the centre of the 1st May, I found that I had given the storm 175 miles of distance from the centre of 30th April, which is exactly what it appears to have made on this day when crossing the Andamans! It was forcing its road over the Cuttack hills between the 30th and 1st May, as over those of the Andamans, between the 27th and 28th April. The centre of the 28th must be nearly correct, being so close to the *Nusserath Shaw*; as well as that of the 29th, for which we have the able log and chart of Captain Smoult of the *Freak*; and that of the 30th, which depends upon the position and shift of wind, an hour before noon, of *La Belle Alliance*, and at Pooree $7\frac{1}{2}$ hours after noon, which do not admit of any great error.

The four distances above stated, }	Miles per day,	Miles per hour
give an average of ... }	203 or	$8\frac{1}{2}$
The last three distances give ... }	213 or	9

But in both cases, the great distance travelled is that between the 28th and 29th. We cannot be far wrong in assuming this as correctly laid down, I think, when we look at the carefulness of the logs, and the remarkable rapidity with which the storm reached and passed some of the vessels? We may therefore take it as an instance of a storm in the Bay which, for this part of its track,—28th to 29th,—travelled 350 miles in 24 hours; or something more than $14\frac{1}{2}$ miles per hour! *Why did it travel so slowly again, from the 29th to the 30th?*

We must take the vortex of the 28th and 29th to have been at the surface of the ocean, and, for any height with which we have to do, call it an aerial column of, say, 250 miles in diameter. Such a volume of displaced air, moving with such a velocity, must necessarily be felt at some distance preceding the line of its track. It meets as it approaches the coast with one direct obstacle, nearly at right angles to its course—the Coromandel range, and with the deflecting force of the SW. monsoon, which the *Elephanta*, we see, is bringing up along the coast. Whether these are the causes, or whether they are sufficient ones, I cannot presume to decide; they appear to me to be probable ones at least, and to account fairly enough for the decreased rate of progress and change of direction. The tracks perhaps should be laid down in curves, and not in straight lines? The facility of tracing these last, and of bringing them to fixed points at noon, have made me prefer the form of straight-lined tracks, in this and my former Memoirs, to curved ones.

On the 29th, the centre of the storm was 150 miles from the coast, and we may say that it was 180 miles from the first considerable range of hills; so that taking it, as is seen in the diagram, to be 260 miles in diameter, or 130 in radius, the aerial wave, which preceded it, was just about impinging on the hills at noon. How soon the re-action of this on the vortex was felt, we have no means of judging. The NE. wind experienced by the *Elephanta* on this day, when she is just on the outer verge of the storm, and which it will be noted is *against* the coast wind which she was bringing up, seems to be an effect of this atmospheric disturbance; as the “*heavy North-easterly swell*” of the 30th evidently is of that of the storm; the aerial wave having thus preceded the aquatic one by about 24 hours.

In tracing this storm farther inland, we have first the report from Chuprah, in Lat. $25^{\circ} 46' N.$ Long. $84^{\circ} 46' E.$ bearing about N. $8^{\circ} W.$ 228 miles from the spot where I have placed the centre on the 1st

May,* which spot is in Lat. 22° N., $85^{\circ} 25'$ E. I have printed it, but am doubtful if it has any relation to our storm. From Mr. Ravenshaw's table, it appears, that he had a storm on the 26th *April*, another on 1st *May*, and a third on the 5th *May*, but as our centre for the 1st *May* at noon cannot be very far wrong, we can scarcely suppose that the impediments the hurricane met with can have reduced its rate of travelling so as to allow it only a motion of less than 228 miles in four days and ten hours, which is the difference between noon on the 1st, and 10 P.M. on the 5th; when, from the gale being at East, the centre must still have borne South from that station, reducing the rate of its progressive motion to perhaps 40 miles a day!

The reports from Delhi and Kurnaul, however, seem to show that the storm experienced there on the 4th, may have been owing to the last efforts of this one which we have been tracing. Kurnaul is in Lat. $29^{\circ} 40'$ N., and Long. $77^{\circ} 57'$ E. bearing, therefore, N. 41° W. 624 miles from our centre on the 1st *May*. From noon on the 1st to, say midnight, on the 4th are $3\frac{1}{2}$ days, and this would give the distance travelled to be 178 miles per day. In the fluctuating nature of the storm, there is much of what we might, I think, expect from impulses of the kind in the neighbourhood of high mountains, and when their forces were nearly expended. If we admit these squalls in the neighbourhood of Delhi to have been part of the Cuttack storm, we shall then have traced it from the Andaman Islands to that place!

There is one more circumstance to advert to, before closing this Memoir, which I should not omit; and this is the great amount of property which, even with what we now know, has been clearly lost by ships running headlong into the storm; and this might, in all human probability, have been saved, by heaving to for twelve hours. If the tracks of the *Nusserath Shaw* from the 27th to the 28th *April*, of the *Freak* from the 28th to the 29th, of the *Vectis* from the 28th to the 29th; and of the *Flowers of Ugie* from the 28th to the 29th, be examined on the chart, it will be distinctly seen, that each of these vessels ran down from 100 to 150 miles to meet, or cross, the track of the hurricane! while, at the rate it was travelling, and with the infallible warning which their Barometers and the direction of the wind might have afforded them of its approach and direction, heav-

* I have learnt that about this date a very severe storm was experienced in the southern and eastern parts of the Midnapore district, but no reports have reached me.

ing to for twelve hours would have saved them all the heavy loss which they must have incurred;—to say nothing of the awful risk of foundering, which three out of the four certainly ran. If we take the amount of losses by these ships, and that by the *Marion* and others, we shall have a very large sum; the greater part of which might probably have been saved by the simple use of our knowledge of the Law of Storms. We see that they had successively the gale increasing to a storm from North to ENE. and ESE. The centre of the vortex must then have been to the Southward and SEastward of them, and their safe plan was, to heave to, for a few hours, on the starboard tack; when, being always on the right hand side of its path, they would have had the wind draw from ENE. to SE. and SSE. as we see it did with the *Nusserath Shaw* on the 30th and successively with all the others. The wind would then have been about at the violence of a gale, as it was with the *Tenasserim*; at the very time it was dismasting the *Nusserath Shaw*; and with the *George and Mary* when it was tearing the *Freak* and *Vectis* to pieces.

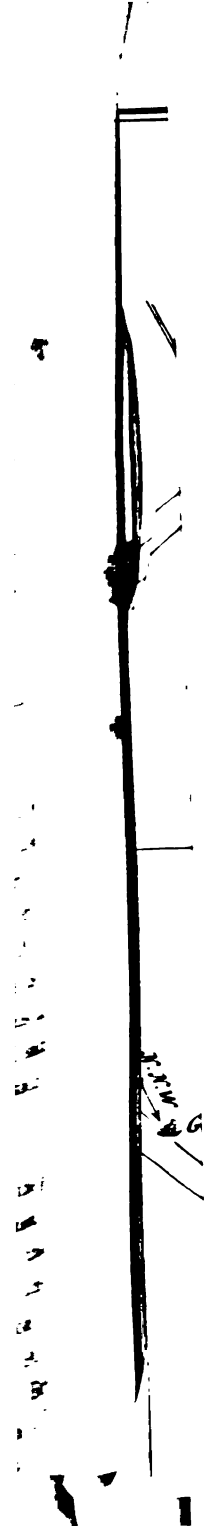
The Diagrams.

As for the 27th we have only two vessels on opposite sides of a circle, and no shift of wind, or other corroborative evidence, I have not thought it worth while to give a diagram for this day; nor for the 28th, where the centre depends partly upon the rate at which the vortex may have been travelling, and partly on the correctness of the *Nusserath Shaw's* position at noon. I have already stated why I take the circle of the hurricane not to have much exceeded 300 miles on this day.

On the 29th and following days, however, we have several ships, and these complications require a diagram to illustrate them, which I have accordingly, as before, given for each day.

Since the foregoing pages, were placed in the hands of the printer I have been favoured by Captain Pope, of the ship *Marion*, with a copy of his protest in consequence of the dismasting of that ship. The following is a summary extract from it, altered to Civil time.

"The gale may be said to have fully commenced by noon on the 28th April 1840, at which time she was in Lat. 15° 10' N. Long. 90° 15' E., and it was then blowing a hard gale at NE. By 3 P.M. Barometer falling fast, made every preparation for bad weather. At 5h. 30' P.M. a complete hurricane; the ship hove to on the larboard tack. A little



emoir

TORMS

1

ms of Vessels

Hurricane

al

y

ON

after 6 P.M. lost all three topmasts and both cutters. At 7 P.M. wind veered to the Northward and Westward at 7h. 30', blowing a severe hurricane; Barometer 28.00 inches, ship a complete wreck; wind veered round to Southward; a heavy sea struck the stern and stove in the upper dead lights. At 8 P.M. Barometer rising, but still blowing *beyond description*; the gig blown away during the night; 2 feet water in the well. Midnight gale moderating. Barometer 29.00; ship lurching heavily.

"29th April. Daylight moderating. Bar. 29.50."

The Chart having been lithographed before this log reached me, I could not place the *Marion* upon it; but as she must have drifted to about Lat. 15° 00' N., Long. 90° 00' E. at 7-30 P.M. and these lines intersect each other; her position will be easily seen; as being about 115 miles from the centre of the storm on the 28th; which as we see by the veering of the wind, passed to the Northward of her at about 7h. 15' P.M. giving a velocity of 16½ miles an hour for this short space of time; while as we have seen, the average velocity for the twenty-four hours was 14½ miles. This is good evidence of the truth of our work.

Proceedings of the Asiatic Society.

(Wednesday Evening, 3rd February, 1841.)

The Honorable Sir E. RYAN, in the Chair.

The following gentlemen proposed at the Meeting of the 13th January last, were ballotted for, and duly elected; viz.

Capt. W. R. FITZGERALD.

C. B. TREVOR, Esq.

RAJA KHAN BEHADOOR, Khan of Gyah.

The necessary communication of their election, and rules of the Society for guidance, were ordered to be forwarded to the parties.

Capt. W. SMYTH, Bengal Engineers, was proposed a Member by G. A. BUSHBY, Esq. seconded by the Officiating Secretary.

Library and Museum.

Carey's Principles of Political Economy, 8vo.	3
—— Essay on the Rate of Wages, 8vo.	1
—— Credit System in France, Great Britain, and the United States,	1
—— Answers to the Question—"What constitutes currency?" &c. &c....	
<i>Presented by the Author,</i>	1
Pickering's Eulogy on Dr. Bowditch,	1
Tyson's Discourse on the Surviving Remnant of Indian Race,	1
—— Memoir of T. C. James,	1
Du Ponceau and Fisher's Memoir on the History of the Celebrated Treaty made by W. Penn,	1
Oriental Christian Spectator. New series, vol. 1st, No. 12,	1
11th Report of the Inspectors of the Eastern State Penitentiary of Pennsylvania,	1

Journal of the Academy of Natural Science of Philadelphia, vol. 8th pt. 1st 8vo.	1
Calcutta Monthly Journal, &c. 3rd series, No. 73,	 1
Madras Quarterly Medical Journal, vol. 3d. No. 19,	 1
Murray on the Topography of Meerut, Calcutta, 1839,	 1
Communication, Faite à la Société Philosophique Américaine. Philadelphia, 1840,	 1
Dewan Waheed MSS. (in Persian) 8vo. Presented by Rajah Soorag Narain Roye,	 8

The following report was submitted by the Officiating Curator for the month of January last :—

H. W. TORRENS, Esq.,

Secretary, Asiatic Society.

Sir,

I have the honor to submit my report for the month of January.

"*Paleontological, Geological, and Mineralogical Departments.*—I have proceeded at every spare moment, in arranging the collections most in need of it, but I have been so often interrupted in this, by the necessity of searching out names, localities, &c. that I have commenced a tabular index to the Society's Journal, of matters relating to these departments, which will not only save much time to the Curator of the Museum, but be of great use to visitors and students; as if printed at the end of our Catalogues, it will form both a summary and a table of references. This is particularly needed by strangers, who do not know what we have been doing of late years, and what we possess; or who do not know where to look for papers referring to the subjects or localities, on which they may desire information. Four volumes of the eight published ones of the Journal, are thus indexed, and page 1 of the index is sent herewith, for inspection.

The duplicates of Captain HUTTON's Himalaya specimens, are packed for transmission to the Honorable the Court of Directors. I have carefully compared and assorted the two series, so as to insure their perfect correspondence.

"*Osteological and Mammalogical Departments.*—Nothing new to report.

"*Ornithological Departments.*—The duplicates in this department are all packed for transmission to the Court of Directors; being 270 specimens.

"*Fishes, Reptilia, &c.*—Our duplicate snakes also (66 specimens) are packed for transmission to the Court of Directors.

"The additions to the Museum this month have been as follows :—

Dr. T. R. ROTH, { 3 specimens, *Procellaria capensis*, Stormy Petrel, or Mother Carey's Chicken.—Stuffed and mounted.
 { 1 specimen, *Diomedea Chlororhynchos*, or Yellow-billed Albatross.—Stuffed and mounted.

"CURATOR.—1 Specimen, *Falco ater*, Common Kite.—Stuffed and mounted.

"PURCHASED.—1 *Viverra Genetta*, the Genet.—Stuffed and mounted.

As. Soc. MUSEUM, {
 31st Jan. 1841. }

I have, &c. &c.

H. FIDDINGTON,

Actg. Curator, As. Soc. Museum.

The duplicate specimens alluded to, as also the duplicates of Captain HUTTON's Spiti Valley Geological Collections, have been forwarded through the General Department of the Government of Bengal, for transmission to the Honorable the Court of

Directors, with reference to a resolution passed at the Meeting of the 13th January last.

Read a letter from Mr. JAMES DODD, Assay Master at Agra, offering to the Society a valuable collection of minerals chiefly Cornish; most of them good and instructive, and some few rare.

Resolved—That a communication be made to Mr. DODD, to the effect, that if he should feel inclined to take into consideration an offer for his collection of rupees 600, the Society would be recommended to purchase it, as an addition to their Museum.

The Officiating Secretary noticed the existence of a number of models of crystals in the Assay Office of the Calcutta Mint, where they were of no use, and might with advantage be placed in the rooms of the Society.

Application to the Officiating Assay Master to this effect having been made, and that Officer not appearing to come into the views of the Society as to the expediency of the removal of the models.

Resolved—That the request of the Society be submitted to the Government, so that the Officiating Assay Master may be authorized to transfer the models in question to the Museum of the Asiatic Society.

Read a letter from Mr. Secretary Bushby of the 20th January last, conveying the authority of the Supreme Government to the application of the Society of the 13th November last, to purchase certain instruments and cabinets from the collection of the late JAS. PRINSEP, Esq. for a sum not exceeding rupees 1,350.

Read letter from the Officiating Curator of the 25th January last, reporting purchase of the instruments and cabinets for rupees 735.

Resolved—That the thanks of the Society be conveyed to the Government for this grant, and that an order be issued for the payment of the amount, from the General Treasury in favour of the Secretary.

Read a letter from Professor O'SHAUGHNESSY of 21st January last, applying for the use of the Society's rooms, for a course of Lectures.

Resolved—That the Officiating Secretary inform Professor O'SHAUGHNESSY, that the President and Committee of Papers of the Asiatic Society are happy to have it in their power to facilitate the delivery of the course of Lectures he contemplates giving, on the Laws and Effects of Galvanic Arrangements, by placing at his disposal the rooms of the Society, the costs and charges of lighting being borne by him.

Read a note submitted by Mr. W. H. BOLST, Accountant to the Society, on the pecuniary grant made to the Society by the Honorable the Court of Directors, the object being to point out the real intentions of the Court, as connected with that grant.

Resolved—That as doubts are entertained by the Society, a reference be made to the Government, and through them ultimately to the Honorable the Court of Direc-

tors, to ascertain whether the Court in authorizing the Government of India to pay the amount of rupees 300 per mensem, intended it as a separate grant for a distinct purpose, in *addition*, and not in *supercession* of that made by the Government of India in July 1837, pending a reference to the Honorable the Court of Directors; and whether the larger subsequent grant is to be considered as merging in the previous smaller one, because it was made as the result of the reference from the Government.

Read a letter from Mr. Secretary BUSHBY of 13th January, covering correspondence with Capt. TREMENHEERE, respecting the Geological collections brought out by that Officer from England.

The Secretary stated, that the chamber lately occupied by the model of the Moorsabad palace, would be available for the collections of Capt. TREMENHEERE.

Read a letter from Capt. TREMENHEERE with enclosure, on the subject of Economic Geology in India.

In submitting the paper in question, the Officiating Secretary suggested, that as the best means of availing themselves of Capt. TREMENHEERE's ingenious production, the Editor of the periodical, called the Journal of the Asiatic Society, be supplied with a copy, and requested to give it as early publication as he can conveniently, in his Journal.

As Editor, the Secretary begged to state, that not only would the paper be inserted if entrusted to him in the Journal, but any number of extra copies supplied to the Society for distribution to whomsoever they please, with no other charge than the cost of the paper they are printed on.

The suggestion of the Secretary was agreed to, and the paper furnished for publication, as proposed.

Read a letter from Mr. C. VISSCHER, Secretary to the Batavian Society of Arts and Sciences, forwarding results of tide observations in the Archipelago of Batavia, during the year 1839.

Resolved—That the civility be reciprocated, by transmitting to Mr. VISSCHER for presentation to the Batavian Society of Arts and Sciences, copies of Registers of the rise and fall of the tide at Pulo Island and Singapore, received through the General Department of the Government of Bengal, during November and December last.

Read a letter from Mr. Deputy Secretary Young, of 29th December last, requesting to be favoured with full information regarding the Zoological Collection by the late Dr. HELPER, alleged to have been made over to the Asiatic Society's Rooms.

The Officiating Curator having been requested to furnish a report on the subject; submitted the following:—

TO H. W. TORRENS, Esq.

Secretary Asiatic Society, &c. &c.

SIR,

With reference to letter No. 17, from the Deputy Secretary of the Government of Bengal, conveying a request from the Right Honorable the Governor of Bengal, to "be furnished with full information regarding the [Zoological collection alleged to have been made over to the Museum of the Society" by the late Dr. HELPER; I have the honor to report that—

1. It appears by the Society's proceedings of 10th December, 1838, that the *Ornithological* part only, of Dr. HELPER's collection was originally deposited at the Asiatic Society's rooms; the Honorable the President in Council having referred to the Society, as per Mr. Secretary PRINSEP's letter, of 12th September, 1838, soliciting its advice and assistance, generally in the matter; and also as to the separation of the specimens, that could be spared.

2. That the division of the collection into three parts, as recommended by the Museum Committee, was made at the Museum; and that of these, one, being packed by the Curator and Assistants, was forwarded to Government for shipment to Europe, for the Honorable the Court of Directors. Dr. HELPER's part was taken away by him, at that time.

3. That of the part left for the Society, some birds were mounted, and the remainder, being 173 (duplicates) are now in the Museum.

4. These duplicates form a part of those (322 specimens in all, and mostly birds) which at our last December Meeting, I recommended being sent home to the Honorable the Court of Directors without delay; as they would be of value at home, if only for exchanging, while they had almost none here, and were necessarily fast deteriorating.

5. No collections of the classes Mammalia, Reptilia, or Pisces, from Dr. HELPER, have reached the Society, that I can learn. With the birds are three skins only of Mammalia (two monkeys and one of a squirrel), and these, no arsenic having fortunately been used in their preparation, are in a very indifferent state.

6. This remark applies equally to the birds; but it is possible that European taxidermists may succeed in mounting and repairing a very considerable number of them; and in Europe they would thus last a long time.

As. Soc. Rooms,
13th January. 1841.

I have, &c. &c.

H. PIDDINGTON,
Acting Curator, As. Socy's. Museum.

A copy of the foregoing paper, together with No. 81 of the Journal Asiatic Society, was forwarded for the information of the Government.

Read a letter from Dr. F. TAMNAU, Jun, of Berlin, of 8th November last, containing proposals of exchanging minerals of the East, with those from Germany, Sweden, Norway, &c.

Resolved—That the following reply be made to Dr. TAMNAU, Jun.

6 T

TO DR. F. TAMNAU, Jun.

Berlin, Prussia.

Care of Messrs. TAMNAU & Co. Hamburg.

SIR,

As. Soc. Rooms, 3rd February, 1841.

I am directed by the Asiatic Society of Bengal, to acknowledge the receipt of your letter under date 8th November 1840, and to express to you on the part of that Body, the lively feeling of satisfaction with which it finds itself in communication with you, particularly under circumstances which promise so much advantage to the Society, and prove in a most gratifying manner, the flattering consideration with which you regard it.

The exchange you propose is one which the Society would for itself gladly close with, but there are reasons which induce it to pause before concluding an arrangement, the terms of which are unexceptionable.

The Museum of the Society in the department of Mineralogy and Geology, has been from causes which it would be impossible now to enter upon, deprived of the advantages of systematic arrangement, so necessary, or rather so indispensable to its utility. Rich in specimens, it has been most unfortunately deficient in the means of arranging them, while difficulties of other kinds have interfered with the facility of classification to such a degree, as to leave the Society in doubt even as to the real extent and value of several of the collections it possesses.

Under these circumstances, I am desired to inform you, that the Society would rather propose to commence the interchange of specimens, than suffer you to do so; less it should so happen, that the value of what it would be in a position to offer, should be incommensurate with that of the collection which you might forward.

I shall take occasion to address you again on this subject, as the gradual arrangement of the Museum proceeds, begging in the mean time to inform you, that the list you have furnished will be carefully borne in mind, and specimens, if available put aside for transmission to you through Messrs. ALLEN and Co., Booksellers, Leadenhall Street, London; to whom all communications to the Asiatic Society of Bengal may be at all times addressed.

Be assured, Sir, of the sentiments of respect, and esteem with which

I have, &c.

H. TORRENS.

Read a letter from Capt. T. S. BURT, forwarding Copy of an inscription from the neighbourhood of Mount Aboo, and detailing the result of his researches there, and elsewhere in Rajpootana.

Read communications from Capt. HURTON, regarding his late visit to Killa Bheest near Khelat, in search of inscriptions.

Read a paper from Lieut. BAIRD SMITH, on the practical properties of the Galvanic Battery.

Read a paper from Dr. JAMRISON, regarding some interesting Geological discoveries

The Secretary informed the Meeting that the communications from Capts. BURT and HURTON, Lieut. BAIRD SMITH and Dr. JAMRISON, would be published in early numbers of the Journal.

Read a letter from Major RAWLINSON of Candahar, offering for publication in the Journal of the Asiatic Society, his Memoranda on the Persepolitan inscriptions, and his copies of them. It was observed by the Secretary, that anxious to give the Society the credit of first publishing the results of that distinguished antiquary's important discoveries, he would place the material, on its arrival from Candahar, at the disposal of the Society for publication in the Transactions of the Society, a course, observed the Secretary, he thought best calculated to give the record of Major RAWLINSON's priority of discovery a permanent existence, while, in order to meet that Officer's wish, that this right should be asserted as soon as possible, he would anticipate matters, by giving the letter press in the Journal, as from the Transactions, while engravings of the cunciform inscriptions were being prepared.

Referred to the Committee of Papers.

On the proposal of the Honorable the President, Sir E. RYAN, seconded by the Honorable H. T. PAINSEP, the Officiating Secretary (H. TORRENS Esq.) was appointed Secretary to the Asiatic Society of Bengal.

For the presentations and contributions, the thanks of the Society were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

Vocabulary of the Ho language.—By Lieut. TICKELL.

GOD, SING BONGA, OR MARANG BONGA.

Persons, Distinctions, &c.

a man, ho <i>or</i> horo,	girl, kōoe,
woman, èra,	lord <i>or</i> master, gōmké,
father, appoo,	servant, chittratannee,
mother, enga,	fostered servant } dassee,
son, koáhōn,	without wages, }
daughter, koōihōn,	hired labourer, nallatannee,
nephew, hōntédèt,	beggar, koitannee,
brother (elder,) baó,	thief, komboo,
brother (younger,) oonditté,	diviner, oja <i>or</i> soka, (<i>Ooria</i>),
brothers, oondi boko,	priest, déoree, (<i>Ooria</i>),
sister, missee, (?)	witch <i>or</i> wizard, najumtannee,
husband, herel <i>or</i> hám,	a Lurka Kole, Ho,
wife, èra,	a Nagpoor Kole, Orang,
old man, hám	a Bhoomij, Mootkan,
old woman, booree,	a bramin, bamee,
adult woman, ballé hapanoom,	foreigners in general, dickoo,
adult youth, ballé sepèd,	blacksmith, kamar,
middle aged man, gandee bar,	potter, koonkal,
boy, koá,	gwalle (drover,) gow, (<i>Ooria</i>),

weaver, piaï *or* mâlee,
 work, pýtee,
 name, notoom *or* noomoo,

name-sake *or* friend, sákee,
 business (affair,) kajee,

Edibles, &c.

boiled rice, mandee,
 dinner (eatables) doondoo,
 meat, jeeloo,
 egg, petto *or* billee,
 salt, booloong,
 ghee, gõtôm,

oil, soonoom,
 water, dah,
 spirits, arkee,
 rice-beer, eelee,
 milk, toá,

Features of Country, Elements, &c.

fire, sengel,
 water, dah,
 earth, oté *or* hassa,
 air, hoio,
 rain, gamma dah,
 thunder, reemeed saree,
 lightning, hicheer,
 hail, harril,
 frost, rattan dah,
 dew, saparoom,
 clouds, reemeed,
 wind, hoio,
 the sun, singee,
 moon, chandoo,
 a star, eepil,
 a forest, beer,
 a grove, tota,
 a sacred grove, saér,
 a mountain, booroo,
 a small hill, gootoo,
 lofty *or* huge rock, hootoop,
 a flat rock *or* slab, sereng,
 a stone, dirree,
 a valley, kocha,

a ravine, hooang,
 a scrub jungle, patta,
 a grass jungle, doomboo,
 a cave, oondoo,
 a plain, pee,
 a river, garra,
 a rivulet, lore,
 a spring, seteng sood,
 a well, chooa *or* sood,
 a water-fall, dooltan dah,
 sand, geetil,
 clay, hassa,
 soil, oté,
 mud, lossod,
 a deep pool, ikir,
 a road, horá,
 a village, hattoo,
 a temporary dwelling } *bassa*,
 in the woods,
 a house, oá,
 a sleeping house, mandee oá,
 a farm house in }
 the fields, } *oosám oá*,
 a hut to watch crops, gooyoo,

a granary, *kōlōm*,
cattle pound, *gōt*, (*Ooria*,)

byre or cow house, *gow oá*
a ricefield, *koondée*,

Time.

a year, *sirma*,
last year, *má*,
this year, *missad*,
next year, *kalom*,
year after next, *tèr kalom*,
some years ago, *má mán*,
a month, *chandoo*,
a day, *má*,
daylight, *singee*,
day by day, *dimsee*,
sunshine, *jété*,
yesterday, *holá*,
day before yesterday, *holatèr*,
to-morrow, *gappa*,
day after to-morrow, *miang*,
two days after to-morrow, *indree*,
three days after to-morrow, *tèrtree*, the other day, *hola mán*

to-day, *tising*,
last night, *enang needa*
night, *needa*
dark, *nooba or hendé*
light, *marsal*
morning, *settá*
very early, *eedang bo*
cock crow, *seemko rar*
evening, *aiioob*
midday, *tikin*
afternoon, *tara singee*
midnight, *talaneeda*
one day, *moosing*
two days, *barsing*
three days &c., *appé má &c.*,
now-a-days, *nimír*

Numeration.

one, *miad*,
two, *barria*,
three, *appia*
four, *oopoonia*,
five, *moya*,
six, *toorooia*,
seven, *áya*,
eight, *eerilia*,
nine, *arrea*,
ten, *gèl*,
eleven, *gelmiad*,
twelve, *gelbarria &c.*,

twenty, *hissee*,
twenty-one, *hissee miad &c.*
thirty, *dosee*,
thirty-one, *dosee miad &c.*
forty, *barhissee*,
fifty, *barhisseeegèl*
sixty, *appéhissee*,
seventy, *appéhisseeegèl*,
eighty, *oopoonhissee*,
ninety, *oopoonhisseeegèl*,
one hundred, *mee sow*,
two hundred, *bar sow &c.*

half, *talla*,
whole, *jaké*,

half a maund, *bissea*,
a seer (measure), *pattee*,

rupee, taka,
eight anna piece, adelee,
four anna piece, sikkee,

pice, dibia,
a coss, gowdee,
a cubit, mooka,

Miscellanea, Tools, &c.

cloth, lijia,
string, bÿre,
a fowra (shovel), koollam,
hatchet, haké,
small ditto, kōndé haké,
adze, hassee,
chisel, rooka,
crowbar, sobol,
pickaxe, saba,
hammer, kotassee,
pinchers, sandasoom,
scraping knife, kattoo,
nails, mēdkinniloom,
lock of a door, bákenesèt,
bellows, sinnipoot,
file, rèta,
iron, mèd,
plough (yoke,) ár,
shaft of plough, issee danda,
ploughshare, nÿl,
iron point of ditto, pál,
pin of yoke, samballee danda,
thong to tie yoke & shaft, nanglee,
sugger (jungle hackery), saggee,
shafts of ditto, tagree jangee,
thong to lash on yoke, chamta,
axletree, ligga,
cross bar, join- } sambalee danda,
ing the shafts, } or panjaree,
mud board, karra,
its handle, kaba,
earthen pot, chatoo,

lota, mōota,
basket, dalán,
small basket, tōnkee,
battle-axe, kappee,
bow, ásar,
arrow, sar,
barbed arrow, kán sar,
plain arrow, kootoo sar,
blunt headed ditto, tootee,
trident ditto, roompa,
fishing arrow, pōrla,
transverse ditto, sōmpa sar,
bolt (for a kind } tonga sar,
of cross bow), }
spear, chooree,
jingling staff (to fright- } teneké
en scorpions, &c.) } danda,
a stick or staff, danda,
a club, sōnta,
a flute, rootoo,
drum, doomang,
fiddle, banam,
pan-pipes, eepoo rootoo,
kettle-drum, damma,
booang (a cocoanut } bang boong
with horse hair }
stretched across), }
cow horn, sakwa,
a necklace, hissir,
brass bracelets, sakom,
ditto on upper arm, taró,
ear-rings, moorkee,

ear chain, joroé and booin,	float, pooi,
nose ring, koodmoo,	bat fowling net, lowta,
peeper putta, peerpeeria,	clap net, oé janalum,
armlets, andoo,	bird lime, atta,
toe rings, katta pola,	brick trap, jampa,
finger rings, tee pola,	quail trap, room room,
a saree, sýe lijia,	hare net, kooltrej janaloön,
thread (for bind- } ing hair), } chindee,	tiger trap (made like } koola rana- a huge rat trap.) } tang,
dip net, janalum,	a mat, jattee,
large ditto, kabra,	a bedstead, parkum,
casting net, mahajal, (<i>Ooria</i>),	a stool, gandoo,
small dip net, ganaree,	rafters, senéör,
basket weir, koombat,	uprights, koonto,
dip basket, sonobo and sonolong,	watling branches, jatta,
trap basket, jimmeree,	thatch, sýoo,
fishing hook, bunassee,	door, dooár,
fishing rod, bunassee danda,	wall, genil.
line, bunassee sootan,	

Parts and affections of the Body.

the body, homo,	the nostrils, mooá oondoo,
— head, bo,	— breast, kooam,
— hair, oop,	— shoulders, tarran,
— eyes, mèt,	— fore arm, soopoo,
— nose, mooa or mootaa,	— arm, tee,
— bridge of nose, mooa dandee,	— hand, tee,
— ears, lootoor,	— palm of hand, talka,
— mouth, á,	— fingers, angolee, (<i>Ooria</i>),
— teeth, danta,	— nails, rama,
— jaw teeth, gandoo danta,	— claws (of animals,) sarsar,
— gums, danta jeeloo,	— thumb, engadaro,
— tongue, aláng,	— armpit, hatla oondoo,
— cheeks, joá,	— nipple, toá,
— eyebrows, mèt kandom,	— backbone, sindree jang,
— throat, hoto,	— belly, lýe,
— nape of neck, sèrom,	— navel, bootee,

the penis, loé,	veins, patta,
— testes, billee,	sinews, sting patta,
— pudendum, roojee,	fever, homo hassoo,
— nates, doobooi,	dysentery, lye dool,
— anus, ee oondoo,	epilepsy, ambarree,
— thighs, booloo,	small pox, maree, (<i>Ooria</i> ,)
— knee, mookooi,	cholera, oola,
— leg, koorchoo katta,	lame, lökey,
— calf, dooroonga,	maimed-handed, loonkee,
— foot, katta,	blind, sooree,
— toes, daro,	deaf, kalee, (<i>Ooria</i> ,)
— urine, dookee,	palsied (he is,) tirtir tannaï,
— semen, { poondee dookee or	dumb, konda,
{ hōn dookee,	squinting, apir mèt,
— fæces, ee,	stuttering, alangé jereana or jèr,
— saliva, bé dah,	rheum, manda,
— pus, sondo,	cough, koo manda,
— blood, myoom,	flatus, gassee,
— brains, hatang,	leprous, toondoo bandia,
— bowels, joroye lye,	pain, hassoo,
— stomach, pora lye,	shivering, rookoo,
— heart, soorr,	heat, lolo,
— liver, eem,	itch, kassara,
— spleen, pillä,	mustaches, á goochoo,
— gall, issia,	wise teeth, joá jang,
— shoulder-blade, dowree,	poma adami, oot totoá,
a bone, jang,	tail, chalom,

Quadrupeds.

monkey (<i>macacus rhesus</i> ,) gýe,	hyena, { hadgar koolá, or mendee
lungoor (<i>circocebus entellus</i> ,) sarra,	{ koolá,
tiger, koolá,	large red jackal, tow koolá,
a very large old tiger, garra koom,	common jackal, kurmhá,
leopard, teón koola,	fox, tooyoo,
tiger-cat, bow,	dog, seta,
common cat, poosee or billýe,	wild dog, tannee,
small tiger cat, beer billýe,	bear, banna also baloo,

ratel or Indian badger, } oosa ban-	four horned deer (chickera), oré,
(<i>mustela ratalla</i> ,) } na,	muntjac deer, seeleep,
civet cat, sōgōt,	antelope, badoo,
great red squirrel, hondeng,	memina, yar,
flying squirrel, ooral,	gower, sŷnl,
common palm squirrel, too,	arna, beer biár,
hare, koolhye,	common buffalo, karra,
porcupine, jeekee,	ditto female, bitkil,
rat, kattia,	cattle in general, ooree,
bandikote rat, gooroo,	calf, miew,
musk rat, choondee,	two or four toothed bull, damkom,
mouse, chootoo,	young bullock, boysur,
ichneumon, saramboombooi,	barren cow, gowee,
pteropus (flying fox) badooree,	young cow (two or four teeth), pèta,
small bat, chootoo bardooi,	goat, boda mèrom,
manis or pangolin, armoo,	gelt goat, byda mèrom,
saumer deer, saram,	sheep, mènree,
neel gŷe, mooroom,	pig, sookree,
female neel gŷe, soosam,	wild boar, beer sookree,
spotted deer (<i>axis</i>), poosta,	horse, sádōm,

Birds.

spotted eagle, doomoor kwid,	oriole, bocho,
jungle eagle, booroo kwid,	hoopoo, pootamdoombee,
kite, kwid,	cassican crow, hoyán,
great meadow hawk, péré kwid,	bulbul, chéporr,
chicquera hawk, reechee,	Malabar hornbill, deoree,
peregrine falcon, beesree,	common or gingi ditto, mát tongé,
ruby-eyed hawk, halloo,	blue-throated barbet, gootoor,
pied buzzard, tookoo sambé,	Philippine barbet, koodn,
jara honey buzzard, kora kwid,	great parakeet, meeroo,
kestrel, sookla reechee,	lesser ditto, kéad,
great horned owl, doondoo,	common kingfisher, chooing kikīr,
little owl, pàcho or kokōr,	great ditto, liangtong kikīr,
butcher bird, charree,	pied ditto, marang kikīr,
Indian roller, tolán,	chesnut headed ditto, garra kikīr,
king crow, dānchoo,	gold-backed woodpecker, hām éró

middle spotted ditto, gegèd,
 cœrulian flycatcher, hattar,
 scarlet and black } pykee oé,
 flycatcher,
 honey sucker, sooi oé,
 duree finch, gondree,
 reed grosbeak, peereed,
 pit lark, soorooi oé,
 water wagtail, ooree manda,
 koél, toaó,
 mýna, saloo,
 hill mýna, booroo saloo,
 crow, ká,
 Indian magpie, hoorlee,
 crow pheasant, sengel topa,
 goat-sucker, hapoo,
 swallow, hèn,
 common dove, potám,
 green pigeon, hooá,
 domestic pigeon, doodmool,
 peacock, mara,
 ditto with full train, atoommara,
 cock, seem,
 jungle cock, beer seem,
 black partridge, hendé chitree,
 grey partridge, cheetree,
 quail, bassa batta,

bush quail, gerreá,
 button quail, della door,
 rain quail, batta,
 double spur partridge, askal,
 adjutant stork, gooroor, (*Ooria*,
 sarhuns (sýrus,) hoorr,
 damoiselle crane, ago maree,
 white stork, ganda keea,
 grèat white egret, solong kantoo,
 common paddy bird, ko,
 black stork, kankee,
 black ibis *or* curlew, raón,
 Norfolk plover, kooi toopee,
 bastard florikan, kenkoto mara,
 snipe (jack or whole,) kèt batta,
 painted snipe, kōn batta,
 sandpiper, doolbee,
 cormorant, dah ká,
 dabchick, dah seem,
 nobbed goose, toopee hey dégé.
 whistling teal, hé dégé,
 girra teal, merōm dérèbet,
 brown cuckoo, bota kakoo,
 a bird, oé,
 nest, tooka,
 egg, petto *or* billee,

crocodile, pýnl,
 iguana, torr,
 chamelion, kaka rambad,
 crested lizard, kaka,
 small lizard, rété kaka,
 rock lizard, sereng kaka,
 monitor lizard, kettra,
 tortoise, horro,

Reptiles.

land tōrtoise, pee horro,
 a frog, choké,
 a toad, rotopoto choké,
 a snake, beeng,
 cobra capella, pando nagoo,
 cophia, russellu, pogo jarra,
 dhomon, jamboo beeng,
 kerate, barra cheetee,

tree snake, hartoo,	amphisbæna, soonoom beeng,
great ringed snake, sakōm beeng,	scorpion, marmar,
black and white } booroo gon-	scolopendra, sengel marmār,
kerate, } dýte,	mygale, <i>or</i> bird- } koola baraban-
earth adder, noor beeng,	catching spider, } dam <i>or</i> koola
coluber constrictor, patáyan beeng,	bindeeram,
python, toonil,	jungle spider, bindeeram,
grass snake, loyong beeng,	crab, katkom,
water snake, dah doondoo,	

Insects.

bug, majee,	ichneumon fly, koonkal ho,
cassida beetle, roopa cheedoo,	muskeeto, peechoo <i>or</i> siking,
male (winged) ant, boordool,	beetle, sadom cheedoo,
queen white ant, boonoom enga,	tumble dung ditto, ee ooroo,
red tree ant, how,	capricorn ditto, hopo,
procession ant, hab moi,	fly, roko,
little red ant, moi,	tusser moth, loomam cheedoo,
black ant, tonto,	butterfly, pampal,
boatman, gowcheedoo,	louse, tilloo,
water clock, dahooroo,	flea, sikoo,
pipula, dah cheedoo,	tick, tickee, (?)
white ant, needeer,	grasshopper, sōmsorr,
water scorpion, chacha hatacheedoo,	mantis, banna jye jye,
jungle hive bee, toomblee,	cricket, tété,
wasp, soorpang,	caterpillar, jependér,
carpenter bee, pérom,	cocoon, koá,
great black bee, bah ooroo,	

earth worm, linda,	muscle, gendr,
leech, happad,	fish, hakoo,

Trees, &c.

a tree, daroo,	thorn, janōm,
branch, koto,	flower, bah,
leaf, sukám,	fruit, jo,

tamarind tree, jojo daroo,
 peepul, hessa daroo,
 burgut, b̄ye daroo,
 jack tree, ponso daroo,
 plantain, kadal,
 mangoe, oolee daroo,
 castor oil tree, bindee,
 kuchenar, sing á,
 Indian laburnum, hurree daroo,
 assun tree, hatna daroo,
 saul, sarjeem,
 jamoon, kooda,
 neem, neem,
 kurm, koomba,
 taree tree, r̄eldaroo,
 tillye, tillye,
 kurhar, doorlee,
 dhaó, heseldaroo,
 gloriosa superba, bing kichoom,
 b̄yre bush, bakra,
 water lily (pudm.) t̄y bah,
 a salook lily, salkát,
 mowhooa tree, mad kum,
 mowhooa berry, dolá,

keond tree (ebony,) tirril daroo,
 seesoo, kirree daroo,
 damun, goin ȳer,
 gumhar, kasmár,
 maize, toorpoo gangye,
 dhan, baba,
 wheat, gōm,
 chunna, chola,
 oorid, ramba,
 ruhur, sané,
 buddee, poondée ramba,
 vetch or pea, á,
 cotton, katsom,
 sugarcane, goor danda,
 tobacco, sookool,
 soorsoo, mannee,
 surgoojia, ramtia,
 tie, tilmee,
 jowar, till̄ye gangye,
 moong, moogee,
 thatching grass, syoo,
 other grasses, doomboo,
 wild grape, ee etoár,
 cocoanut, boorka,

Adjectives.

acid, jojo,
 adult (man,) ballé sepèd,
 adult (woman,) ballé papanoom,
 bad, etka,
 bitter, moroia,
 black, hendé,
 blunt, toogooma,
 broad, ossar,
 clean, 'boogin,
 cold, rabang,
 cool, réa,

dark, nooba,
 deep, ik̄ir,
 dirty, homoo,
 drink, booloo,
 fair, essel,
 fat, rota,
 fierce, koorkoor,
 foolish, kōnka,
 gentle, labit,
 good, boogee
 great, marang,

green, gádé,
 gross, (fat,) dildil,
 happy, jeesookoo,
 heavy, hambal,
 hot, lolo,
 hot (taste,) hád,
 large, marang,
 left (sinister,) koigné,
 light (luminous,) maskal tété,
 light (weight,) lar labbar,
 long, jilling,
 loud, essoo sarian,
 little, hooding,
 many, essoo,
 merry, billing,
 naked, tota,
 narrow, hooding ossará,
 new, nama,
 noisy, sarian,
 old (thing), paparee,
 old (man), ham,
 old (woman), booree,
 passionate, oán,
 pointed, richoop,
 pretty, boogee nellotea,
 proud, marang mordo,
 plentiful, poora,
 passive, happá,
 rabid, bala booloo,
 ragged, sèr,
 right (dexter,) etom,
 rough, kété *or* illing,

round, gota,
 red, arra,
 sad, mundookoo,
 salt, hèm,
 sharp, lessèr,
 short, doongooi,
 short (man,) toom broo *or* imiting,
 shallow, tembé,
 sick, hassoo,
 slow (lazy,) gáir,
 small, hooding,
 smooth, lebbé,
 spotted, kabra,
 square, chepèd,
 stinking, etka soana,
 striped, onol,
 strong, iting,
 sweet (luscious,) ibilla *or* nōgōd,
 slender, sooroo,
 tall, sangalee,
 thick, rota,
 thick (fluid,) eebil,
 thin (man,) battree,
 thin (fluid,) etang,
 ugly, kaboogee nellotéa,
 weak, hooding péá,
 well (in health,) boogee,
 white, poondee,
 wicked, etka,
 wise, séana,
 yellow, sassang,
 young, hōn,

Verbs.

to admit, hoojoo cheeteá,
 — admit (confess,) èákedtea,
 — advance, dárántea,

to arise, ootanteá,
 — arrive, setreteá,
 — argue, epésértea,

to ascend, rakabteá,	to breathe, roonteá,
— ask, kooliteá,	— bring, agweeteá, awiteá,
— ask (demand or beg,) asseeteá,	— bring forth (young,) honiteá,
— avoid, ochorenteá,	— burn, rooiteá,
— awake, enéteá,	— bury, topateá,
— bake, ladéteá,	— buy, kiringteá,
— bathe, reánteá, kopanteá,	— call, jewteá,
— be, minna, (defective verb,)	— call (name), metyteá,
— beat, rootea,	— care, heátingteá,
— bear (load,) go eedeteá,	— carry, sábeedeeteá,
— be angry, oantea,	— catch, sabteá, sasabteá,
to be ashamed, giewtea,	— cavil, tirree mirreeteá,
— cool, réateá,	— cherish, assoolteá,
— born, oondooboteá,	— cheat, chakadteá,
— happy, sookoooteá,	— climb, dehteá, rakabteá,
— hungry, rengateá,	— conjoin (2 streams,) léréteá,
— hot, loloteá,	— cost, gonomteá,
— in flames, joolatáteá,	— covet, malteá,
— noisy, kakaláteá,	— conceal, ookoooteá,
— sad, heatingteá,	— copulate, doopooirteá,
— silent, happánteá,	— correct, býrooyteá,
— sleepy, doomtea,	— count, lekateá,
— tired, tagowtea,	— cry (weep,) raéteá,
— thirsty, tetangteá	— cut, hadeteá,
— open, meeteá,	— cut cloth, changateá,
— vexed, mündookoooteá,	— cut down (a man,) málteá,
to begin, etétea, ookooroooteá,	— cover, haroopteá,
— beg (charity,) koiteá	— collect, gemérteá,
— bewitch, tengenteá,	— come, hoojoooteá,
— bind, tolteá,	— cross over, tarrumteá,
— bite, hooateá, habteá,	— crouch, oogoorookoooteá,
— bite off, hooatopangteá,	— dance, soosoonteá,
— blame, tomunteá,	— delay, gareeteá,
— boil (verb neuter,) pooroteá,	— destroy (any thing,) rapoodteá,
— boil, (verb active,) issiniteá,	— deny, kokodteá,
— break, perechoateá,	— descend, agoonteá,
— break in pieces, rapoodteá,	— die, gojoteá, goíteá,

- | | |
|--------------------------------------|-------------------------------------|
| to dig, laóteá, maóteá, | to freeze, ratanteá, |
| — dirt, homootéá, | — frighten, { boroléréteá or boro- |
| — dive, oonoomteá, | cheeteá, |
| — dread, boroteá, | — forsake, bageeteá, |
| — dream, koomooiteá, | — gargle, poóteá, |
| — drink, mooiteá, | — gather (together,) { gemerteá, |
| — make to drink, anooiteá, | hoonditeá, |
| — drip, lingeteá, | — get (obtain,) namteá, |
| — dry, (v. n.), hanjetéá, | — get behind (hide,) danangteá |
| to drive, harteá, | — give, eméteá, |
| — drown, charoo, } goiteá, | — go, senoteá, |
| — soor, daboora, } | — go before, áirteá, |
| | — go behind, doiateá, |
| — eat, jómeteá, | — go in, boloteá, |
| — embrace, hamboodteá, | — go out, oltea, oléteá, |
| — emit, ôlcheeteá, | — go out (quench as fire,) èteá |
| — emit (urine,) dookeeteá, | — go up, rakabteá, |
| — emit (feces,) eeteá, | — gore, roteá, roroteá, |
| — emit (flatus,) gasseeteá, | — grasp, sabakanteá, |
| — exercise, bonga ondongeteá, | — grieve, heatingteá, mundookteá, |
| — fall, endagoiteá, | — grow, marangteá, |
| — fall (from a height,) jewteá, | — hang (suspend,) dangteá, |
| — fear, boroteá, | — hang (kill a man,) { oorooi gooĩ- |
| — feed, (or graze,) atèrteá, | keeteá, |
| — fell (a tree,) gingteá, | — hail, (v. neuter,) harriliteá, |
| — fight, (shooting,) toopooingteá, | — hail, (call out) jewyteá, |
| — fight (with swords, &c.,) mapateá, | — harm, dookootéá, |
| — find, namanteá, | — hate, oanteá |
| — finish, sekateá chabateá, | — heap, gemerteá, |
| — fish, hakoogoikenteá, | — hear, aioomteá, |
| — fling, hoodmateá, | — hit (shooting,) toíteá, |
| — fly, apírteá, | — hide, ookootéá, |
| — fly, (pop,) etèteá, | — hold, tellýteá, sabteá, |
| — flow, harriteá, doolteá, | — howl, rateá, |
| — follow, doiateá, | — hunt, sangarteá, |
| — forget (temporarily,) reengteá, | — hurt, hasoocheeteá, |
| — forget (totally,) adateá, | — hush, hapácheeteá, |

to irritate, koorkoorcheeteá,	to measure, mokýteá,
— issue, andongteá,	— mend, amingteá,
— jest, sandabyteá,	— mind, oodkedteá,
— join, léréteá,	— miscarry, enda ádteá,
— jump, ooíteá,	— miss, katoíteá,
— keep, doíteá,	— mix, missowteá,
— keep, (in the mouth), latoométeá,	— mourn, [see To muse,]
— kill, rogoíteágoikeeteá or goíteá,	— muse, heatingteá,
— kill, (with a club), tam goíteá,	— name (a person), noomootéá,
— kiss, chérébeteá,	— name (a thing), metýteá, metáteá,
— know, adanteá, adaoroomteá,	— nigh or near, náíteá,
— know, (an acquain- } nelroo-	— obtain, namteá,
} tance,) } metéá,	— obstruct, baribakedteá, kesedteá,
— lag, doiateá,	— open, raéteá,
— lash, rootéá,	— oppose, [see To obstruct,]
— last, týntea hobowteá	— offer (on an altar,) domateá,
— lament, gámteá,	— pain, hassookeeteá,
— laugh, landýteá,	— pass (by or over,) paromteá,
— lave, kossanteá	— peep, sangeel nelleteá,
— lead, eede atweetéá aírteá,	— pierce, ropootooíteá,
— learn, etontéá,	— place, doéteá,
— leave, bagéteá,	— plait, grásteá,
— lie, labakajíteá,	— plant, beetteá,
— lie down, geetee sengèrrteá,	— play (fun,) oonoongteá, billingteá,
to light (illumine,) maskalteá,	— play (instrument,) orangteá,
— light (as a bird,) agoontéá,	— plough, seeteá,
— like, [see To love,]	— point at, choondoolteá,
— lime, (bird,) attáteá,	— poison, rédanookedté goíkeeteá,
— line, jeedteá,	— praise, essoo boogintéá,
— load (burthen,) goteá,	— pray (invoke,) dangeteá,
— loose, ratýteá, atýteá, áéteá,	— price, gonomteá,
— lose, adýteá, aderýteá,	— pull, orowiteá, towiowiteá,
— lose, (victory,) kádýteá,	— pursue, harteá, harsabeeteá,
— love, jeesookooteá,	— push, oodoorteá,
— lurk, oogoorookoonteá,	— put, [see To place,]
— make, býteá,	— quench, éteá,
— make round, lagotýteá,	— rain, gamateá,
— marry, andeeteá,	— ramble, honôrbýteá,

to rape, hoinkeeteá,	to shine, joolteá,
— reach, seterteá, tegateá,	— shoot (at,) tooingteá,
— read, olsukam porowteá,	— shoot (kill,) poíteá,
— reap, iréteá,	— shove, oodoorteá,
— recognize, nelroometeá,	— show, nellecheeteá,
— relate, oodoobteá,	— shut, handiteá,
— remember, adaoroomteá,	— seize, sabteá, sasabteá,
— repeat, kajirooŷteá,	— sign (mark,) ankaíteá,
— reside, tŷnteá,	— silence, happacheeteá,
— retire, oossanteá,	— sin, enkateá,
— return, rooáteá, dooírteá,	— sing, doorangteá,
— return (going round,) bioorteá,	— sit, doob teá,
— ridicule, landabŷteá,	— slander, cheeryteá, oomibŷteá,
— rip, changateá,	— sleep, geeteeteá,
— rise, ootanteá,	— smell, jeeteá,
— rise (the sun,) olenteá,	— smell, (v. n.), soanteá,
— roar, ráteá,	— smile, landateá,
— roast, rappŷteá,	— snatch, rapateá,
— rub, gassaréteá,	— snore, hooírteá,
— run, (or run away,) neerteá,	— soil, homootéá,
— say, menteá,	— sound, sárioteá,
— sacrifice, bongateá, domateá,	— sound (depth), tegatam roopteá,
— salute, joharatweeteá,	— sow, hereteá,
— save, bunchibowteá (<i>Ooria.</i>)	— skin, potateá,
— scare, borocheeteá,	— speak, kajeeteá,
— scold, erangteá, gondeteá,	— spit, béhteá,
— scratch, gotaēnteá,	— spoil, enkateá,
— scream, yewtanteá,	— square, lachepedeteá,
— see, nelloteá, nelteá,	— stand, tingoonteá,
— sell, akaringteá,	— steal, kombooteá,
— send (away,) kooltyteá,	— stink, etkasoanteá,
— send (for,) keáowiteá,	— stop, (v. n.) tŷnteá, tingoonteá,
— set (down,) doíteá,	— stop, (v. a.) kesedteá, dárumteá,
— set on flame, atarteá,	— strike, rooteá,
— sew, sooeteá,	— string (a bow,) dahteá,
— shake (shirer,) v.n. tŷr tŷrleá,	— suck, lététeá, chopodteá,
— shame, giewteá,	— summon, [see Send for,]

to suspect,	} amgengamden to-	to vex, atteá,
	munteá,	— vomit, ooloteá,
— swear (oath,) sarraenteá,		— wake, eneteá,
— swim, oiartea,		— walk, senoteá,
— take, (in the hand,) tellýtea,		— wander, hōnōrbýtea,
— teach, etokeeteá, etocheeteá		— want (ask,) asseeteá,
— tear, oë chachateá,		— wash (cloth, &c.), eetkíttea,
— think (deem,) adkarteá,		— wash (the body,) noánteá,
— thirst, tetangtea,		— wash (the teeth,) karkadtea,
— throttle, lingoikeeteá,		— waste away (the body), oosoteá,
— throw, hoodmarateá,		— wet, loomtea,
— throw away, endateá,		— wear (clothes,) botoötea,
— throw down, endaétea,		— weave, lijia tingétea,
— tickle, gérégeteteá,		— weep, raétea, yámtea,
— tie, toltea,		— win (victory), málýtea, mádýa
— transplant, roaétea,		— wither, roteá,
— tumble, endagoiteá,		— work, pýteeteá,
— turn, (v. n.) bioorteá,		— wound, gowkeeteá,
— understand, aicomooroomtea,		— yawn, chábeteá,

Conjunctions, Prepositions, and Adverbs, &c. &c.

yes, èya <i>or</i> éá,	where ? okoiré ? okoitár ?
no, banno, bannoá,	how many ? cheminang ?
not <i>or</i> not so, ká,	so many, eminang,
none, bankwá,	then, { emindré, enté, entédo,
certainly, båtchiad,	{ <i>or</i> enété nádo,
perhaps, honang, derang <i>or</i> torá,	forwards, airté,
“ Oh, that's it ? ” <i>or</i> {	backwards, oosá,
“ Say you so ? ” } ké ?	before, airté, airdo,
and, ando <i>or</i> öndo,	firstly, seeda ré,
“ Of course,” ando ?	now, ná,
“ I say ! ” helá ! ettia !	long ago, moonooré,
“ Is'nt it ! ” kachia !	afterwards, týoomdo, entétýoomdo,
“ Hullo, there ! ” ocho hé !	any one, amba,
when ? chooila ? okobetár ?	with, lo, loté,

alone,	} soomang, eskarchim	on one side, kootée ré,
	(<i>A Sontae word,</i>)	far, singing,
great many or very, essoo,		near, náíté or jappar,
much, poora,		above, sirma ré,
then (at that time,) enbétar,		below, sooba ré,
hither, neepárté,		behind, danang ré,
thither, enpárté,		quickly, buddeeté,
hence, niaité,		separate, essam,
here, nendré,		in, ré,
there, endré,		out, by, with, from, <i>te,</i> }
		both are affixes,
the other side,	} tèrrparte or tèrr-	the whole, jaké,
	parparrum,	the half, talla,
this side, niparparrum,		each, mootid,
in the midst, talla ré,		

Adverbs are formed by adding té to their adjectives.

like, leká,	why ? chikan menté,
a little, anga or angalekà,	" never fear " " there now ! " }
or else, bandrédo,	" depend upon it " &c. } joo !

To this Vocabulary might be added a long list of terms of relationship, more elaborate in the Ho language probably than in Hindustanee ; also a catalogue of *Keelees*, or Clans, into which the Hos are undivided ; but these I omitted ascertaining during my stay in the Colehan, and the opportunity of so doing is now lost. Many of their proper names are names of birds, beasts, &c, and from their birth they frequently retain nick-names, descriptive of some peculiarity in early childhood.

A few names of Places.

h̄ybassa, the dwelling of Ch̄ye,	Lossod ìkir, the muddy pool,
ootoo dirree, the window stone,	Roko sookoá, " pleasant to flies,"
onto hattoo, village of ants,	S̄yul dowree, the gower's shoulder,
eead chalom, parakeet's tail,	Kattia mara, rats and peacocks,
oio hattoo, village of winds,	Sarjum hattoo, village of Saul trees,
ætil pee, the plain of sand,	Kadulsookwa, { " pleasant in
re hattoo, village of Bur trees,	plantains,"

Names of Rivers, Hills, &c.

Hackoo yám dah, {	the water of	Charree booroo, hill of butcher birds,
	weeping fish,	Mara billee, pea-hen's egg hill,
Roro garra, roaring river,		Ooree manda, bullock's track hill,
Oéko atta dah, bird-lime water,		Hâm booroo, the old hill,
Toongi garra, the clear river,		Toopooing pee, the plain of battle,
Sompa serra, hill of arrows,		Saél poét booroo, } hill of the shot
Sereng serra, hill of rocks,		gower,
Abooroo, hill of the wild pea.		

Names of Persons.

Potam, a wood pigeon,	Dildil, corpulent,
Loké Damoo, lame Damoo,	Madkum, mowhooa tree.
Jeetoo Mangta, little baby Mangta,	Ooroo, a beetle,
Sooree Lenga, blind Lenga,	

Dialogues.

What is your name?	Umma chikan noomoo?
Mine? Markundo.	Eenga chee? Markundo.
Of what clan are you?	Chikan keelee oum?
I am a Poortee.	Poortee neegé.
Where do you live?	Okoré minna mia?
In Goomwa.	Goomwa ré.
Where do you come from?	Okomanna té um hooilena?
From Ramila, which is in Keon- jur.	Ramila té eeng hooilena; Keon- ré Ramila.
Where are you going to?	Okoté um seno tanna?
I am going to Seryekela.	Saïr té eeng sèna.
What business have you come on?	Chikan kajee réum hoojooèna.
Some dispute about land.	Otéá épèsèr minna.
Where is your house?	Umma oádo okorea?
In Ramila, I tell you.	Ramila ré, metamtannyng.
Is your house far from hence?	Umma oá niaité sangng ahee?
Very far! It is across the Byturnee,	Essoo sangng honang! Byturnee garra parrum.

What is your trade, or calling?	Chikan p̄tēe té umi assoolotanna.
[sow (am a ryut,) Sir.	Hertann̄yīng, gōmké!
What is your father's name?	Appoo'm do chikan noomoo?
He is dead.	Goien āi!
Yes, but did you not call him by some name when alive?	Eyá, mendo áio jeedakauré kaché'pé noomootadaï?
We called him Harree, but I tell you he is dead, Sir!	Harree'lé metá: goiénāi, gomké! metam!
Are you married?	Andeekiddum?
No; I will marry by and bye.	Bannoá; owré engandee.
Is your house finished?	Umma oá do sekiena chee?
Have you brought any grass?	S̄yoo um ōwliidda chee?
Yes, I have brought some.	Eyá, owlidd̄yīng.
Have you cut any trees for me?	Aīng nangenté daroo gingkiddum?
I'll fell some to-morrow.	Gappa eeng geengia.
I do not understand you.	Umma kajee do ka'ing etoitanna.
I do not know.	Ka'ing adana.
Call an interpreter.	Mar, soocansee kew̄ymén.
Put it on the ground.	Oté ré doimén.
Work quickly; do not be lazy.	Buddee p̄yteepe, hé! Aluppé ga- reena.
Do not go away now.	Nádo alum seneá.
Wait a little.	Angaleka gareemén.
Throw it away.	Enado hoodmaendamén (or simply) endamén!
Let it go.	A ty mén.
Do not let it go.	Alum áyá.
Hold it.	Sabakanmén.
This is not good.	Niá do ka boogee.
Make it again.	B̄y roōymén.
Take care!	Boogeeté, hé!
Get out of the way.	Hora ankira mén.
Stand aside.	Ochor en mén.
Open it, I will see.	Ráï mén, nel jōm̄yīng.
Shut it, or it will escape out.	Handit āi mén, bandredo neeraï.
Cover it.	Haroop táï mén.
Go on before.	Aïrte seno mén.

Come along, come along !	Do, do, do, do !
Come, get on.	Do ! aïrémén.
No I won't, I am tired.	Ká'inga ; lagiènaing !
What ? do you feel ill ?	Chia ? um hassooièna ?
I feel very ill, Sir.	Essooing hassooièna, Gomké.
Where do you feel pain ?	Okotarré hassoo metanna ?
I have got a headache.	Bo ré eeng hassooièna.
A thorn has run into my foot.	Kattaré janum bolièna.
When did your father die ?	Appoo'm do chooila goyéna ?
Ten years ago.	Gel sirma ièna.
How long have you lived there ?	Amdo chiminsirma endré tÿkenum.
Where did you live before that ?	Aïrdo okoiré umtÿkenna.
Why did you leave that place ?	Entado chikanminna bagéátoodum.
Why did you run away ?	Umdo chikan menté'm nirièna ?
I thought they would kill me.	Goïkee'ngiako, menté eengririèna.
Whose bullocks did you steal ?	Okoia ooreeko umkombookenna.
I didn't steal them.	Ka'ing kombookedkoá.
How many cattle were there ?	Chemin ooreeko tÿkená.
There were a great many.	Essooko tÿkena.
Did you kill any man ?	Midho amba um goïkeeachée ?
Did you wound any one ?	Okoiamba um gowkedda chee ?
I wounded one man with an arrow.	Midho eeng poitkeea.
I shot twice. (" two shoots,")	Bar mÿl eeng tooingkeea.
How many were you all ?	Chemin horo'pé tykena ?
There were only two of us.	Alleeng do bar ho soomang.
There were only three of us.	Allé do appé ho tykena.
I was there alone.	Aïng soomang.
Was it dark at that time ?	Enbétar do nooba tanachee ?
No, it was light.	Bannotora ! maskal akanna.
Who seized you ?	Okoï sabked mia ?
Jurryekussat's son, Mahtee, seized me.	Jurrÿekussatá hon, Mahtee, da sabkedingia.
Did he bind you ?	Tolkedmiái ?
Yes, he bound me with a rope.	Eyá, býre té tolkedingiaï.
If I let you go, will you ever shoot at any one again ?	Eeng âmiëndredo, tÿoomdo okoï amba tarté um tooingiachee ?
No, I will not, there !	Banno, ká'ingtooingia, joo !

Lying is not proper.	Labbakajee do kái boogeea.
Killing any one is not proper.	Okoido goitatabdo ka boogeea.
If you kill another man, you will be hung.	Etáho goikendredo, um fansee na-moa.
If you threaten or annoy him, you will be put in prison.	Aído eranglérédo, chee boroeeree lérédo, endredo koid o'um.
Bring him to me to-morrow morning.	Ineedo gappa setá eengtáté aw-imén.
Do not beat him, but do not let him go.	Ineedo alum rooia, mendo alum sénécheea.
If he will not come, bind him and bring him along.	Ineedo káihoojooredó, tolkété ag-weemén.
Do not give him anything.	Ineedo chikanna alum emáyá.
Show me.	Nelécheeing mén.
Have you found it?	Námleea chee'm?
Oh, go and seek it properly.	Joo, boogeté nam b̄y mén.
Do it again.	Enka rooy mén.
I fancy you are a lazy man.	Umdo gareeho honang.
You do not speak truth.	Umdo saree ka jee do ka oodoobtan-na. Deeta té kaum oodoobtanna.
Take care, you will tumble down.	Boogeté ! enda gojoun.
Call him, call loud.	Yewymén. Pooraté yewy mén.
Tell him to show the way.	Hora airomén, metymén.
I want it as long as this.	Neminang jilling báé.
Longer than this.	Niaité ōndo jilling.
Take it away.	Eedeēy mén.
What is the price of this goat?	Neemeromá cheminang gōnōm.
Two rupees.	Bar taka.
You ask a very dear price.	Essoo um gōnōmtanna.
No ; it's a very large goat.	Bannoa ; esso marang mērōmáĩ.
I will only give you one rupee.	Meetaka soomang eeng èmama.
No, I won't take it.	Banno ; k'ínga, k'áinga !
How many fowls will you sell for a rupee?	Meetaka ré chemin seemko um akaringa?
Twenty fowls for a rupee.	Meetaka ré hissee seemko.
Well ; but give me good fat ones.	Mar ! men do boogee rota seemko emaingmén.

Hullo Sir ; will you buy this young monkey ?	Hé gōmké ; nee g̃yē hōm umkee-reengia ?
Why ; what do I want with a young monkey ?	Chia ? g̃yē hōuté ch'eeng chik̃yā.
Oh, there was a Sahib here, used to buy them, once.	Ké ! moonooá gōmkédo kiringked-koá honang.
That's why I asked you.	Enaré eeng koolikedmia.
I want none of your wild beasts, but bring me fowls, goats, cows, eggs, rice, straw, wood.	Enleka beer jatee do k̃yngá, men do seemko, meromko, pétako, seembilleeko, chowlee, boosoo, san eengtar té agweemén.
What have you got for sale ?	Chikan um akaringia ?
A very large rattlesnake, Sir.	Essoo marang pogo jarra beeng-gomké.
Take it away ; take it away !	Mar, eedeẽy men, k'ainga !
Never let that boy come here again.	Enkoádo ondo missa aluppé.
Dence take him ! (let tiger bite him.)	Hoojoocheea. Koola kái háb !
I want to sleep.	Eeng do eeng geeteea.
I can't sleep, you make such a noise.	K'aing geeteed̃yā ; essoo'pé kaka-la.
Do not talk loud.	Pooráté aluppé kajeeá.
What do you want ?	Chikanum asseea ?
I am a poor beggar, Sir.	Koítannaing, gomké !
Do not drink more, you will be tipsy.	Ondo do alum noonooá ; booloo ōum torá.

Out of doors.—Shooting &c. &c.

Come along, come along, let 's go a hunting.	Dé, dé, dé, dé, sangaraboo !
Let 's all come along !	Do laboo hé !
Let 's go to Dugra hill.	Dugra booroo té' boo sēná.
There are plenty of bears there, and peafowl, and chicquera deer.	Nendredo essoo bannako minna ondo marako, ondo oréko minna
Do you all scour the hill.	Appédo booroo parrumté sangé aweepé.

We will stop the gháts.	Allédo gáttee kesedkoá.
There 's a bear coming, Sir.	Báloo dára, gomké.
Dubro has shot him in the back with an arrow.	Dubro mee mýl doia parré poit keeaï.
This way, this way, he is cross- ing over.	Niparté, niparté ! parrumoai.
He 's hit ! he has tumbled into the ravine.	Töyenái ! Hooang ré enda goiënaï.
It 's a she bear ; there are two cubs.	Enga baloo dérang. Bar hönking minna.
Hullo Sir, I 've shot a peacock.	Hý gomke ! mara eeng poit goikeea.
Are there any deer in this jungle ?	Nee beer rébeerjeelooko minnachee ?
There are, Sir.	Minna koá, gomké.
None now ; we made such a noise, they must be all off.	Bankoá nádo ; essoo'lé sarriëna nñriënako honang !
Well ; let 's try a little.	Mar ! nel namaboo.
Don't kill the bear's cubs ; I will rear them.	En baloo hönko aluppé goikeea assoolkoaing.
There was a tiger on Toongboo- roo, last night. I heard him roaring.	Enang needa Toongbooroo ré koola týkennái, eeng ái ráтанаï aloo- madaing.
I think we shall get nothing here.	Eeng adatannaing, nendré chikani o ka namoá.
What do you think ? What is your advice ?	Um chikanum héatingtanna, um- ma sianré chikana'm kajeea ?
Which is the way to Cherye ?	Oko hora Cheryeté sentéa do ?
Why, this is a very high hill.	Essoo marang booroonee géderang !
The trees are all in flower, and the water, is deep and clear.	Sabee darooko bahtanna, ondo nádo dah o ikeera, ondo toongé toongea.
What ? is this the Kurkye ?	Chia ? niado Kurkye garra chee ?
Of course ; What else ?	Eyá andó ?
The water is running very fast.	Dah do essoo harritanna.
Are there alligators here ?	Nendré do tñnl ko minna chee ?
None now ; there are in the rains, certainly, but you can't see them.	Bankoá nimír do ; gammadin ré minna do minna, mendo kako neloá.
Are there any fish ?	Hakoo ko namoá chee ?

Plenty of them.	Essoo ko á.
We net them once a year.	Sirma mootid allé jallum kotanna.
The large fish swim deep, and lie under the big stones.	Marang marang hakoo koikir dá ré ko t̃yena, ondo marang dirre latarré oogoorookoonako.
Where are you two off to?	Okoté' bená?
We (two) are very tired, and are going home.	Essoo'ling lagièna. Oáté'ling roa
I am very thirsty; where shall we find water?	Essoo'ing tetangièna, okoréboo dah namoá.
This spring is dry.	Nee seting sood do hanjetièna.
Eat some mangoes.	Oolee ko jōmmén.
This is very sweet.	Nia do essoo Sibillá.
Let's all return home; it is get- ting late.	Oa té rooá' boo; aioobièna.
It has been very hot to-day.	Tising do essoo jétéièna.
I want to bathe.	Eeng oran̄ying.
We all bathe here, under the tree.	Sabee hokoallé nee daroo sooban̄ gé réanna.
Don't go in here, somebody has been washing clothes.	Nendré do alum boloa, okoi do ljjia eet kidkeea.
Sikhoor swims very well, but Harree dives better than he.	Sikhoor essoo oiar etoána, men do Harree áĩ táĩte essoo booge oonoom etoána.
How far is it from hence to Ch̄ye- bassa.	Niaité Ch̄yebassa sentea do chemin sanging a'chee?
About three coss.	Appé gowdee leká.

Weather, &c.

It is very cold to day.	Tising do essoo rabangá.
It is blowing hard.	Hoio do essoo dárá.
There is dew on the ground.	Oté ré saporoom dah minna.
It has'nt rained one day, for two months.	Bar chandoo ièna moosing do la gammakidda.
It is raining over Charree hill.	Charree booroo chattan ré gammá tanna.

Ooreemanda is hid in clouds.	Ooreemanda booroo do reemeed ré danang ièna.
It is getting cloudy, and blows hard.	Reemeel hobowtanna, hoio essoo.
I hear the thunder : it will certainly rain to-day.	Dará : reemeel saree aïng áïoomtanna, tee sing bâtchiad gamyā.
There is no moon, but the stars are shining.	Chandoo do bannoá, mendo eepilko jooltanna.
It is very hot (from closeness, in distinction to sunshine or fire.)	Essoo balbala minna.
It froze last night ; there was frost on the ground this morning.	Enang needa jaké ratankiddaï, teesing seta ogé doomboo ré ratang dah minna kannā.
I am wet through.	Essoo eeng loomièna.

With a Prisoner, &c.

Did you steal Sangee's money ?	Sangee a taka um kombookenna chee ?
No, I never stole it.	Banno ; k'aïng kombookidda.
Did you enter his house last night.	Enang needa áïa oáté um boloiena chee ?
Yes, I went to ask for tobacco.	Eyá boloienáïng, sookool eeng asseea, menté.
Did you kill your son Kapore ?	Umdo amma hon Kapore goikeea chee ?
Yes, I killed him.	Eyá, goikiddáïng.
For what fault did you kill him ?	Chikan cheera ré um goikeeáïa ?
He never committed any fault.	Missa do k'aï cheerakidda.
We were both starving.	Rengé' leeng gojotanna.
I had nothing to give him to eat.	Jometea do ján jeta do k'aïng emai dya.
He cried, and looked in my face.	Rákiddaï, eean medre nelkidaï.
He was weak, and laid down on the ground.	Pé do ka tŷkidda, entenado otéré geetee enáï.

He lay down in the jungle and could not rise again.	En beer ré geetee enaĩ, ondo k'ā tingoo rooŷ dya.
Night was coming on, and I heard the tiger roaring.	Needa hendiente, koola o rátanna aioomadaĩng.
And I thought he would seize you, my poor boy, if I left you.	Enkoola do jeedakanre habmiai torá, eeng bagee endredo, menté adakiddaĩng, koá !
And so I killed you !	Entenádo. Goikedmiaĩng !
I then buried him in a ravine, Lest the wild beasts devour him.	Enté do hooang ré eeng topotadya. Beer jeeloo do kako jomaĩ, menté.
I went away slowly, for I was weak and ill.	Maíté eeng seniena, jan pé o ban- noá, essoo eeng hassooièna.
And when I had got further into the forest, I thought I heard him call.	Ondo nádo en beer ré bolokedé, iewaĩng tannaĩ, adakidaĩng.
And then I fainted away.	Enté nado eeng goyenaĩng.
But he calls me now every day.	Mendo nádo dimsee aĩ kewaiĩng tana.
In the morning, and noon, and night I hear him call, Father, oh father !	Setta ré, singee ré, needa ré kewav- ing tannaĩ, Appooing, appooing, hey appooing !
So I cannot eat, I cannot work, I cannot laugh, I can live no more !	Enté k'aĩng jōmdya, k'aĩng p̄te dya, k'aĩng landa dya, jeed do k'aĩng jeed dya, ná do !
So hang me, Sir ; kill me quick, and this wretchedness is over !*	Mar, fansee emáing mén, mar. buddee té goikeeing mén, gomk- enté chabiena nee gé !*
It was a very dark night, and Serám tumbled into the well.	Essoo marang hendé needa t̄ykidda. Seerám chooáré iew kanjooienai
We called him, but he gave no answer.	Allé essoo'lé iewkeea, k'aĩ gōnga.
When they brought a light, we found he was dead.	Enté sengel owliddako, maskal ti- dallé, enté'lé nelkeea, goia kan- nai.

* The above is taken almost verbatim from the confession of a Ho prisoner, who delivered himself up after the murder of his son in the woods of Ooisooia in Kotegur peer, 1837-38.

I shall begin to-morrow. Bindrye Gapá eeng èteá. Bindrye hola é
commenced yesterday. onkooroo kidda.

Examples of the Imperative Mood, Future tense, &c.

You sing a song, and he will play the flute, all the girls will dance.	Umdoorangémén, áido rootoo oran- giaï, ondo sabin erakosoosoon ako.
Never steal, never take what is not your's.	Já emindreo alum kombooia, okóá ammabeetee bannoa, enádo alum eedeeca.
Never covet another man's goods.	Já emindréo etá hoá beetee ré alum malloá
Do to others as you would that others should do to you. This is the great secret of well- doing.	Umchileka sabeehoko taíté boogee umnamtanna, enlèka sabee hoko umboogeeekomén. Sabee boogee- oteá nerégé minna.
Never take God's name in vain.	Sing Bonga á noomoon landa ba- karé alum doia.
Do not let them go to the river.	Garra par té alo kako sèn or alum seneecheekoá.
Go quietly, and peep over the wall, see what he is doing.	Maíté senketé, genil ré sangil nel- leemén chikanaï chikatanna.
Hear me well.	Boogeeeté aoomingpé.
Ask me what you wish to know.	Chikana'pé kooleea, enao koolee- ing'pé.
I speak for your good.	Appea boogee nangenté kajee pé tannáing.
I will not deceive you.	K'aïng chakad pé á.
Others have deceived you.	Adong do chakad'pé kidda.
Do not believe in false gods ; there is but one God.	Sama Bongako aluppé mannating koá; bonga do miad soomang minna.
My God is your God.	Eenga Bonga, enao appea Bonga.
What you say, he hears.	Chikana'pé kajeea, enao aoom oáï.
Whatever you do, he sees.	Chikana'pé chikāya, enao nellāï.

From his eyes you cannot hide.	Aïamèdté appé do ka ookoodya.
In trouble, he will deliver you.	Appé mundookien dredo, bunchi- ba'piái.
In fear, he will preserve you.	Appé boroiendredo, do'péai
Without him, you will perish.	Aï k'ai tynredo, gojoápé.
With him, fear nothing.	Aï tynredo, ján aluppé borja.
Believe in him, and he will give you all things.	Sareeyépé, sabin ái ema'peá.
He made you and can destroy you.	Býked'peai, goikeepédya.
Keep him in your hearts.	Jeeré do aipé.
Never forsake him.	Aluppé bagai'pé.
I leave you ; but remember my words.	Bagé' pétannaing ; mendo eeng kajee heating pé.
Fare you well.	Boogee té tyn'pé.

Translations of Ho songs, &c. I have omitted. The Vocabulary having grown more voluminous than I had anticipated.

S. R. T.

*A short account of Khyrpoor and the Fortress of Bukur, in North Sind. By
Captain G. E. WESTMACOTT, 37th Regt. Bengal N. I.*

The recent achievements of the British Army in Sind and Kabul have advanced our frontier to the Indus, and placed in our hands the fortress of Bukur and the town of Sukhur in Khyrpoor, places of the first importance, as they command the navigation of one of the finest rivers in the world: the route by which an army can threaten our territories from the north, and the productions of Persia and Central Asia are transported to Western India and the ocean.

During a residence at Sukhur, in the summer of 1839, I obtained some information about the country adjacent, which I have the pleasure to lay before the Asiatic Society, in the hope, as little has yet been published about Upper Sind, that it will be acceptable. The Government were jealous of their subjects mixing with the British, and narrowed the circle of my inquiries. I did not visit the interior of the country, and the information is defective on points I had wished to elucidate, but it will be found, I believe, tolerably correct.

It is difficult to define the extent of territory belonging to the prince of Khyrpoor, because intermixed with that of Hydrabad, but I shall describe first his possessions east of the Indus, and afterwards those on the west bank of the river.

The territory east of the river is included within the parallel of Lat. $26^{\circ} 50'$ and $28^{\circ} 50' N.$, and Lon. 68° and $70^{\circ} E.$ It is bounded on the north by the independent chiefship of Daodpootra; on the south by the possessions of the Ameers of Hydrabad; on the west by the Indus; and on the east by the Rajpoot principality of Jeysulmeer. Its extreme length, measured from the Daodpootra frontier southward, is 100 kos,* or about 120 English miles; and its breadth from east to west nearly the same.

Two-thirds of the district attached to the petty fort of Subzulkot in north Khyrpoor belong to Noor Moohummud, the senior Ameer of Hydrabad, and the remaining third to Meer Roostum of Khyrpoor. They nominate their own governors and divide the revenues. Subzulkot is on the route travelled by caravans from Kabul, the Punjab, and Northern India, which pass through Buhawulpoor to Sind; and duties are levied at the custom-house on transit merchandise.

The purgunnah of Shikarpoor is often called Moghulee, from having been peopled in the time of the Dooranee kings by Puthans and Moghuls from Afghanistan. It lies near the northern limit of Sind, on the west bank of the Indus, and the revenues and expences are divided into five shares, three of which belong to Noor Moohummud and Nuseer Khan, the senior Ameers of Hydrabad, and the remainder to Meer Roostum and his brothers. It extends north-west to Rojhan in the province of Kuchee, about twenty-five miles beyond the city of Shikarpoor, on the road to Kandahar. Southward it reaches within about sixteen miles of Larkhanu in the purgunnah of Chandkoh in Lower Sind, and has the Indus on the east. This district was invaded several times by the Talpoorees prior to 1810, when Meer Sohrab Khan, the father of the reigning Ameer of Khyrpoor, seized upon Sukhur, and twelve years later wrested the whole of Shikarpoor from the royal family of Kabul, and annexed it permanently to Sind.

North of Shikarpoor and west of the Indus, Meer Roostum holds the districts of Boordgah and Keen, inhabited by tribes of Boordees and Kuchees, who are poor, idle, addicted to plunder, and under imperfect abjection. Boordgah is celebrated for its pastures, which nourish the

* The Khyrpoor kos is $1\frac{1}{2}$ or $1\frac{1}{4}$ English mile. The people call it fifty kos from Bukur to the fort of Shahgurb in the desert, on the confines of Jeysulmeer, and the same from Shahgurb to the city of Jeysulmeer, and accomplish the whole distance in ten days. Subzulkot is forty kos from Bukur, or three days' journey for a horseman, and four for a pedestrian.

finest cattle, goats and sheep, of any district under this government. It produces a good description of wool and wheat, joowaree, cotton, and plenty of sakur, a red dye obtained from the flowers of tamarisk, which grow on the banks of the Indus.

The country on the east bank of the Indus south of Daodpoora including Khyrpoor and the space below it, as far as the 26th parallel of latitude, is called Surae, which means north in the language of Beloochistan; and that on the opposite bank from Boordgah southward to the purgunnah of Chandkoh, is called Moghulee. North Khyrpoor, comprising Oobara on the Indus, and the space eastward to the Jeyzulmeer boundary, was called formerly Umeer Wuhun, and seems to have belonged in the end of the 7th century of the Hijru, to Nusrut Khan, Sooltan of Mooltan, who bestowed it as a dowry on his daughter on her union with Budr Dea, grandson of Moohummed Mukae, the venerated founder of Bukur.

Khyrpoor is lotted into shares among the brothers of the Talpoor family, who subdivide them into portions for their sons, nephews, and relations; these are mixed with much confusion, and the same individual holds lands in five or six different places. Meer Roostum, who occupies the *musnud*, has a great deal the largest portion, but allows his brothers to govern their districts and dispose of the revenues as they choose. Their lands usually descend from father to son, but all acknowledge Meer Roostum as the lord paramount, and assist him with troops in time of war. On the birth of a male child in the prince's family, he allots a portion of the royal lands for his maintenance.

Some of the districts into which Khyrpoor is divided are extremely small, and named after their chief towns. In general the inhabited spots distant from the Indus, are scattered wide, and people call every place a town which has forty or fifty houses.

The districts are as follow—

Boong, } Under Meer Roostum.
Bara, }

Subzulkot—Meers Noor Moohummed and Roostum.

Raotee—Ulee Ukbur.

Meerpoor, } Nuseer Khan.
Ghotkee, }

Roree, including the ancient city of Alore—Meer Roostum, Ulee Ukbur, and Ulee Morad.

Khyrpoor, or Gagree—Meers Roostum and Ulee Morad.

Dijeeekot—Meer Ulee Morad.

Raneepoor.

Halanee.

Ludha, }
 Gagun, } Meer Roostum, Nuseer Khan, and Ulee Morad.
 Mathelo—Meer Roostum.
 Futtihabad.

The principal divisions of Moghulee are—

Shikarpoor, }
 Jutvee, } Nuseer Khan.
 Sukhur, }
 Noushuhra—Moohummud Husun.
 Roopa—Meer Roostum.
 Durbelo—Ulee Morad.
 Goonjaba, }
 Futtihpoor, } Meers Roostum, Nuseer Khan, and Ulee Morad.

The reigning family is a branch of the Talpoor tribe, which came originally from Shahzadpoor on the mountains of Kuchee, the most easterly province of Beloochistan. Other writers have given an account of them, and I shall merely state that their ancestor Byram Khan was minister of state under Mirjan Surfuraz Khan Kalhora, by whom he was cruelly slain with his son Sobdar about the year 1775. His death produced violent disturbances in Sind, for he possessed extensive influence with his tribe, and the people of the country. In 1781 Bejur, another son of Byram Khan, shared his fate by order of Mirjan Abdool Nubbee, uncle of Surfuraz Khan, which exasperating the Talpoorees, they rose in a body, and having dethroned the tyrant, raised Futtih Ulee, the grandson of Byram and chief of their tribe, to the government, which has continued ever since in the possession of his family. This revolution occurred about fifty years ago, in the reign of Timour Shah of Kabul, to whom Sind was then tributary. He had endeavoured in the commencement of the struggle to restore the Kalhoras, but was not latterly in a situation to assist them, and formally invested the Talpoorees with the government.

Meer Chakur Khan, the grandfather of the reigning prince, was the first of his race who obtained authority in Khyrpoor. He went blind from age, and was succeeded on his death by his son Sohrab Khan, who died also at an advanced age in 1830, and left five sons :

Meer Roostum Khan, who succeeded him.

Meer Ghoolam Hydur, (deceased.)

Meer Moobaruk Khan, (deceased.)

Meer Chakur Khan.

By another marriage :

Meer Ulee Morad.

Meer Roostum has issue seven sons :

Moohummud Husun.
 Ulee Ukbur.
 Mooreed Hydur, (dumb.)
 Ulee Murdan.
 Sher Moohummud.
 Ullah Buksh.
 Ghoolam Moohummud.

Meer Ghoolam Hydur left issue :

Moohummud Khan.
 Uhmud Khan.
 Moostufa Khan.

Meer Moobaruk died in 1839, and left issue five sons :

Meer-Naseer Khan, who succeeded to his father's possessions.
 Moohummud Ulee.
 Fuzl Moohummud.

By another marriage :

Ulee Moohummud.
 Wulee Moohummud.

Meer Chakur Khan has one or two sons, whose names I did not learn

Meer Ulee Morad has issue three sons :

Kuka.
 Sohrab.
 Ghoolam Hoosyn, born 1839.

Nearly all the royal family dwell in the capital. The prince's residence is too insignificant to be called a palace, and has no appearance of splendour or magnificence. The habits and manners of the court have the character more of a nomade horde, than a settled government. Little etiquette is observed. The armed retainers of Meer Roostum crowd rudely into his presence, and though he is frank and affable, most of his followers are deficient not only in courtly polish, but the common forms of good breeding.

From the proximity of Sind to Northern India, and the easy means of communicating with that country by the Indus, it is strange that people have borrowed none of the comforts and luxuries of their neighbours. Sind was governed several hundred years by viceroys of the Moghul empire, and has maintained an intercourse with Delhi since the invasion of Moohummud Ghoree, in the end of the fourth century of our era. The arts and manufactures are notwithstanding in a barbarous state, and with exception of the silk fabrics of Thatta, exhibit no mark of good taste. The

carpenter unites the profession of bricklayer, and is ignorant of the use of the line and plummet. The smith can neither turn a hinge, nor fashion a screw. The hills produce excellent lime, which is turned to no account, and the public edifices which are at all remarkable, were built by foreign workmen, or at least under the superintendence of foreigners.*

The houses of the better class in towns, are often on a par externally with the cotter's hut of India, and equally deficient in accommodation within. While such is the state of the arts in towns, it is not surprising to find the peasant ignorant of the common mode of thatching and building, and though the banks of the Indus are clothed with grass, he covers his dwelling with tamarisk boughs put together without order or arrangement.

The princes keep large packs of dogs, of a powerful and ferocious breed peculiar to Sind, and pass much time chasing the boar in the preserves and tamarisk woods near the Indus. They hunt on the battu system, and sit in houses thatched with reeds, elevated many feet above the ground, in openings of the jungle, and shoot the game which are driven through the avenues by beaters and dogs. The Shikargah, or hunting preserves, are surrounded, like those in lower Sind, with hurdles, thornwood, and reeds, woven into a fence twelve feet high, and contain tigers, boars, wolves, porcupines, hog-deer, jackals, hares, and foxes. Some of the most fertile lands in Khyrpoor are reserved for this pastime, and overrun with accacia, tamarisk, and underwood, which the people are prohibited cutting under a severe penalty. Sometimes a multitude of peasants armed with sticks and clubs are mixed with matchlock men, and surround the hunting thickets, and by narrowing the circle, drive the wild beasts towards the Ameer, who dispatch them with long and heavy barrel guns with flint locks. The villagers are gathered together to assist in these expeditions, and view them with fear and alarm. They are often injured by gun-shots and the attacks of wild animals, and rarely paid for their labour. Sometimes they receive a small allowance of food, which is taken from the grain-seller at a fourth less than the market rate, and bankers support the chase with loans forced from them, and paid by an order on the revenue. They are left to settle with the land owners the best way they can; they have infinite trouble to collect their due, and never realize it in full.

* The great mosque at Thatta was built by a viceroy of Ourungzeeb, and is perhaps the finest public edifice in Sind, but far inferior in beauty to the same class of buildings in Northern India. The great mosque at Roree was founded in the end of the tenth century of the Hijra, by a Lieutenant of Ukbur. The minaret of Meer Masoom at Sukkur, was raised about the same period, and is a heavy, ill-proportioned column, without ornament. The carving of a few tombs of Kalhora and Talpooree chiefs at Thatta and Hydrabad is worth examination, but the architecture is deficient in lightness and elegance.

The princes besides keeping dogs, wear their hair long, drink wine, and indulge in other practices forbidden to Moosulmans. They easily acquire a taste for the delicacies of Europe, and sent to the British bazar at Sukkur for Maraschino, Curaçoa, and Cherry brandy, which they pronounced deficient in strength, but superior in flavour to the fermented liquor prepared from the date. Among the articles they purchased, were telescopes, knives and forks, and white and coloured earthenware. Like the relatives of Hydrabad, they have adopted the doctrines of the Sheas: though the largest portion of their subjects, both Belooch and Sindes, profess Sooneeism, which is the prevailing doctrine in Beloochistan, where a bitter feeling exists against the followers of Ulee. Though anxious to make converts whenever a pretext offers, they do not persecute the Hindoos for their faith, and I did not hear of their suffering cruelty and insult on that account. The Hindoo carefully avoids giving offence, and though not permitted to build temples and exercise his religion openly within the walls of towns, has usually a small place of worship in the suburbs; but he is forbidden to use music and bells, to blow the shell and fashion idols, and a little red paint alone indicates the situation of his gods.* The Hindoos visit the shrines of saints, and other places of Moosulman pilgrimage, which they have endowed with a sacred character. The Bhattees and Arores form the great body of Hindoos in Khyrpoor. The latter are the trading class, and nearly resemble a feature their brethren of Western India, from whence they originally emigrated, but are more neglectful of their dress and persons, and less in the observance of their faith. They eat and drink of forbidden things, partake of food that has been touched by Moosulmans, and smoke from their pipes, and are held, consequently, in disrepute by the pure Hindoo of Muthoor and Bunarus. Only very poor Moosulmans ride upon donkeys: but they are kept commonly by Brahmuns and wealthy Hindoo merchants and bankers, who do not consider it a disgrace to mount an ass, while it is, on the contrary, regarded by a Moosulman as degrading. It is hardly necessary to state that the Hindoo of India cannot touch an ass without being defiled: to mount him upon one is to degrade him. The

* At Shikarpoor, there are many wealthy Hindoos, who have a *Takoor Dwan* (Temple to Vishnoo,) and three temples to Mahadeo beyond the town walls. They have idols, *Artee* and *Sunkh*, and practice the observances of their faith unmolested. They say the privilege was obtained by a celebrated *Sadh*, who astonished the Moosulmans by his miracles. When they threatened to circumcise him, he turned their mosques away from Mecca, and his persecutors being alarmed at such conspicuous proof of his power, to get them righted permitted him to erect temples and worship the Deity in his own fashion. Tymoor, the son and successor of Ahmud Shah, first established Hindoos in the town, and the reason of the Ameers treating them with such indulgence, is owing to the benefits they confer on the country by their industry.

ass is introduced in Sind into marriage processions, and carries the bride and bridegroom. A great many Bhattees enter the service of government, and fill some of the most important and trust-worthy offices. They are treated with respect and consideration, but obliged, as the price of servitude, to conceal their caste, to wear beards, and adopt the dress and manners of their rulers. They fasten the collar of their *chola*, or shirt, on the left instead of the right side, which is the only difference in the costume of the rival sects. The mechanical arts and manufactures are conducted entirely by Moosulmans; but shopkeepers, and by far the greater part of the mercantile class are Hindoos, and cordially detest the Belooch. They are frugal, temperate, and industrious; their thoughts are directed exclusively to the acquisition of wealth, and I am inclined to think the exactions of their rulers not quite so burthensome as they represent. They are a great deal the richest members of the community, and contribute largely to the revenues of the country. Meer Roostum, it is said, makes scarcely any distinction between his Hindoo and Moosulman subjects, and is in this respect more tolerant than his father Sohrab Khan, who sought opportunities to convert them to Islam. During his reign, if a Hindoo was heard to speak lightly of the Moosulman creed, or to deny his own faith in jest, he was immediately circumcised. The law forbidding the Hindoo to exercise his religion should be abrogated; but in censuring the Talpoorees, we must not forget how recently the Jew was persecuted in the most civilized states of Europe, and that in the Punjab, and some Hindoo cities of western India, the Moosulman is not permitted to build mosques and call his brethren to prayer.

The government of Khyrpoor is a military despotism, and if the Ameers persist in their present arbitrary mode of raising revenue, they will shortly reduce the country to a desert. Moosulman and Hindoo are subject equally to extortion, though the last is, from the nature of his vocation, more frequently the sufferer. In their eagerness for wealth, the princes have permitted the forts and public works that rose under former rulers to fall into ruin, and trade and manufactures languish. The few who have wealth carefully conceal it, and assume an exterior of penury, to escape extortion. An irregular cess is levied from grain-dealers and shopkeepers, according to the means each is supposed to have of paying, and they are confined in the stocks and flogged if they withhold their quota. A sum varying from two to thirty rupees a shop was extorted in October 1839 from the grain-dealers at Sukhur, not a mile from the British camp. Before the arrival of our troops the dealers never exposed a quantity of grain on their counters, for fear it should be seized or plundered by the armed followers of the prince. They conducted business

in a small dark chamber behind their shops, but had latterly carried on their transactions openly, and were disappointed and alarmed when they found our civil and military officers were not authorised to protect them. Espionage is carried to an extraordinary length. The officers of the prince inform him when a merchant makes a successful speculation, and a mechanic a superior article, and he demands a share of their profits, which is regulated by no law, but by his own absolute will. The manufacturer is careless about improving his fabrics, from the little benefit he derives from his ingenuity. There are persons in every community who basely earn a livelihood by informing against their fellow citizens, and to this class the sovereign looks for information. Neighbour is against neighbour, and social intercourse destroyed, and each fears his associate will employ the knowledge he obtains of his affairs for some bad purpose. Under such a system it is not surprising that Sind exhibits the shadow of its former prosperity—that the revenues are decreasing, and yield a tithe of what an enlightened government would obtain from them. The advantage conferred by the Indus as a medium of communication with the ocean and Northern India and Central Asia is sacrificed. The skilful artificer departs to regions under a milder administration, where he reaps the profits of his industry. Useful arts are lost, and I witnessed the departure of weavers, dyers, and other industrious classes from their native towns, to escape the exactions of the governors. Many have relinquished trade, and prefer to live quietly on a little, than to amass a fortune which might tempt the cupidity of the government. The people are not inferior to their neighbours in talent, but it cannot develop itself under a withering despotism. Even the upper ranks are sunk in ignorance, and possess neither the mental acquirements, nor the polished manners of the Moosulman of India.

The laws are founded on the Koran, but corruptly administered, and an offender escapes punishment by bribing the judge. The poor have little chance of redress when their oppressor is a Suyud, or nobleman of the military class. Fines are levied on trifling pretexts, and whenever it is possible, the Hindoos settle their quarrels without an appeal to the governor, who, if a rigid Moosulman sometimes condemns one or both to circumcision. In general the punishments are not severe; life is seldom forfeited, and the principal Ameers alone exercise the power of life and death.

The revenue of the territory under the Ameers of Khyrpoor, including the purgunnah of Moghulee, Boordgah, and Keen, is computed at twelve lacks of rupees, of which Khyrpoor yields perhaps eight lacks. The Ameers obtain part of their land revenue from the farmer in grain, and part in money, regulated by the nature of the soil, and its proximity to

water. The rate is usually a third and fourth of the produce of wet land, and a fifth of irrigated land. They frequently alter the amount of the cess in kind in *Moghulee*, from caprice rather than the failure or productiveness of the crops; this was not usual with the Moghul and Afghan sovereigns.

Land in Khyrpoor is classed under three heads,—*Bosee* or *Belo*,* *Puko* or *Pirjain*,† and *Nohur*. The *Bosee* lies on the banks of rivers and canals, or it is flooded annually by the Indus, and requires no aid from the water wheel. The *Puko* is at a distance from water, and requires to be irrigated. *Nohur*, or waste land, is taxed at different rates, according to the obstacles it presents to agriculture. In the district of *Rosee*, *Meer Roostum* takes one-fifth of the produce the first year, and levies the full cess the season following. *Meer Mooreed Hydur*, who has a manor in the same district, taxes waste land the first year it is tilled one rupee the jureb, the second year two rupees, and so on, increasing one rupee yearly till the assessment reaches its maximum. In parts of Khyrpoor where there is an uncertain supply of water, crops are valued when ripe by a government officer, who levies according to the productiveness of the harvest. The landholder sometimes gathers the crops without the officer, but if he removes a sheaf before the prince has taken his portion, he is fined double the amount of his assessment. The value of land is extremely low. Wet land in the district of *Sukhur* is worth seven and eight rupees a jureb, and dry land four and five rupees. A landholder of my acquaintance paid 300 rupees, eight years ago, for thirty jurebs of land, but it is worth more than the average, from its proximity to the Indus, and town of *Sukhur*, where there is a better market for produce than the interior of the country. Garden land on the banks of streams, sells at from twenty to fifty rupees the jureb, according to the number and description of trees it contains. The mango yields the best return. The government, however, leave only a sixteenth of the produce of gardens to the proprietor, and the only fruits exempt from cess, are the *Hubsora* (*Cordia myxa*), the Plantain, and *Jummo* (*Eugenia jambos*.)

The revenues and town duties are frequently farmed out by the year to *Izardars*, who appoint collectors on a fixed salary, one to every large village, and one to a circle of small ones. In *Sukhur* the monthly stipend of these functionaries varies from 5 to 30 rupees. The *Izardars*, or farmers, are either *Moosulmans* or *Hindoos* (*Bhattees*), and are compelled to fulfil their engagements, and well beaten if they withhold payment. As the settlements are seldom for more than a year, they cannot, like the revenue farmer in some parts of British India, make their profits in a

* Pers. Silabee. † Khooshkdako.

good season cover their loss in a bad one. To the Rueeyuts both systems are the same, and he must pay under all circumstances the full assessment. In Khyrpoor he is often grievously oppressed by the farmer, who thus indemnifies himself for sums extorted by the prince. The prince appoints an officer, called a Darogha, to exercise a surveillance over the Izardar, and examine his accounts. He usually receives a monthly stipend of thirty or forty rupees, and it is through him that the prince ascertains the receipts from a district, and regulates his demands against it the following year.

Zumeendars hire labourers to till their lands, and let a portion of it to tenants for rent or part of the produce, and they usually receive from their landlord seed and agricultural implements. The lease seldom extends beyond a year, and the Zumeendar, after setting aside a third or a fourth of the crop for government, divides the remainder into four parts, three of which he gives to his tenant. The tenants often pay in kind to the landlord, and he settles with the government in cash. In the district of Syudabad of Moghulee, under Meer Roostum, they pay a third of the crop to government, and a sixteenth to the landlord, but provide seed and agricultural implements, and bear all charges of cultivation. The prince also lets his land to tenants, and relinquishes half the crop to them for the trouble and expense of cultivation. A similar system obtains in a great part of France and Savoy. The *Métayer* of France pays half the produce to the proprietor as rent. The proprietor supplies the stock, the grain required for the first sowing, as well as for the support of the *Métayer* and his family until the first harvest. The *Métayer* works, sows, reaps; and he and his family feed on the produce, after which the proprietor gets the remainder, (see *Revenue Trimestrielle* for April, 1828.) In the lowlands of Savoy the *Granger* (another word for *Métayer*) pays half the produce of his farm to the proprietor, mostly in kind.

There is a great deal of land in Khyrpoor subtracted from the revenues for *jaegeers* to military chiefs and their followers. When the Talpoorees conquered the country, they respected, as Asiatic princes usually do, the *sunnuds*, or title deeds of sovereigns, who preceded them. There are Suyuds, Puthans, and Moghuls in the purgunnah of Moghulee, who have *sunnuds* granted by Ourungzeeb, Nadir Shah, and the kings of Kabul to their ancestors, for services to the state, in virtue of which they pay only a fourth of the crop and the whole of their *ung* is remitted. Persons of this class without *sunnuds*, pay a half of the crop and half the established *ung*.

Some families of Sindee Zumeendars in Khyrpoor, whose ancestors were converted to Islamism ages ago by the Arabs, hold their estates rent free; a number of Suyuds enjoy the same immunity, and many more receive pensions. Provision is also made for the *Durgah*, and shrines of holy men.

which shelter a host of lazy *Moojauras*, who besides the allowance they derive from government, are otherwise a burthen on the people.

Sales of land are rather frequent, and the law compels a proprietor before he disposes of his estate to a stranger, to signify his intention to his neighbours whose property adjoins. If they all decline to purchase at the price offered by the stranger, the proprietor concludes the bargain, and presents him with a title deed, signed by the neighbours, to prevent any one disputing his claim hereafter.

Grain is trodden from the husk, out of doors, by six and eight oxen abreast, and beaten afterwards with sticks to remove what particles remain in the ear. It is winnowed in small shovel-shaped baskets of *moonj* grass, and removed from the field on carts or boats. The process of agriculture is cheap and slovenly, and two and three kinds of grain, and grain and vegetables, are mixed in the same field. The Ameers let their land to tenants by the year, and it is in a worse state than that of the farmer, who superintends his land himself. Tamarisk stumps half burnt encumber the fields, which are seldom weeded after the grain appears. The cuts from the Indus are narrow, crooked, and carelessly dug, and the earth constantly falls back into the cavities, and the peasant has to do his work again.

Cattle sheds are built of reeds and tamarisk boughs, which are an imperfect protection from the weather. There are no mangers and troughs to receive fodder, which is scattered about, trodden under foot, and much of it wasted.

In the Purgunnah of Moghulee, labourers who cut wheat, gram, sesamum, mustard, &c., receive two *patees*, or *pinkees** daily of the grain they reap, and their labours commence early, and terminate at noon, as it is impossible to work later in summer, from the intense heat. The payment is always in winnowed grain at the end of harvest. Women are not employed to reap corn and sugar-cane. Joowaree and Bajree, are reaped in November, and the labourer works from sunrise till sunset, and earns three *patees* or *pinkees* of grain; a woman only half the quantity. For cutting rice, the remuneration is two or three *pinkees* per diem. For sugar-cane two annas (3d.) a day, and five or six *pys* (2½d.) for hemp and tobacco; women earn only half the sum. The farmer divides the pea harvest into seven portions, two of which he gives to the reaper. Sometimes the Zumeendar gives servants, permanently in his employ, one-fourth of his share of the crop, which seems a better mode of remuneration than fixed wages, as it closely allies their interest with his own, and they gain and lose in proportion.

* A Pinkee is rather more than $\frac{1}{2}$ of a seer, and two Patees equal $1\frac{1}{2}$ seer.

The Ameers deal extensively in grain, which they hoard and bring into the market when a scarcity occurs, either from a failure of the inundations or the demands of levies in war time. Meer Roostum instead of alleviating the distress of his subjects, and thwarting the combinations of grain merchants, helps to raise the prices, and imitating Moohummud Alee in Egypt, buys up and monopolizes the produce of his country.

The following were the common rates of land assessment in the district of Roree on the north bank of the Indus,* for the harvest year 1250-51 corresponding with A.H. 1255 and A.D. 1839, levied in the Khyrpoor currency.

Rubbee Harvest.

									<i>Rs. As.</i>
Tobacco,	...	...	...	...	...	...	...	<i>per jureb,</i>	6 4
Opium,	...	...	...	...	...	...	...	_____	6 0
Wheat,	...	...	...	...	...	...	...	_____	4 14
Khiyar, Khonbee, or Masfur,	...	...	...	...	...	...	...	_____	4 12
Hemp, Cucumbers, Water and Musk Melons,	...	...	...	...	...	...	...	_____	4 10
Barley,	...	...	...	...	...	...	...	_____	4 0
Ekura or Shumleet, a kind of Spinach,	...	...	...	...	...	...	...	_____	3 14
Paluk, a kind of Spinach, Onions, the Egg plant,	...	...	...	...	...	...	...	_____	3 12
Keenu or Urzun, a kind of Millet,	...	...	...	...	...	...	...	_____	3 4
Surshuf mustard (which is also collected in kind) gar- lic, cummin, anise and Wadsh or Badiyanu,	...	...	...	...	...	...	...	_____	3 0
Surshuf or Sirson, Moong (<i>Phaseolus mungo</i>), Jan or Ujmood, and Pease (<i>Ruwa</i>), are collected in kind, (<i>bhutaee</i>) at the rate of a third of the produce per jureb of wet land.									

Khureef Harvest.

									<i>Rs. As.</i>
Sugar-cane,	...	...	...	...	...	...	...	<i>per jureb,</i>	10 8½
Cotton,	...	...	...	...	...	...	...	_____	4 12
Joowara (large maize) carrots, turnips, radishes, Toore, (a kind of cucumber) Eroun, pumpkin, Kurela, a vege- table, (<i>Momordica charantia</i>), and Mehra, another kind of vegetable,	...	...	...	...	...	...	...	_____	4 8

The following pay in kind, a third if grown upon land flooded by the Indus, and if irrigated by the wheel, only a fourth.—Rice, Bajra (*Holcus spicatus*), Indigo,

* The harvest year terminates in the middle of the year of Higma.

Mash, a kind of vetch (*Phaseolus max.*) Musoor (*Ervum lens.*) Sesamum, Sure (*Panicum italicum.*) and Chunna (*Cicer arietinum.*)

Land revenue of the district of Sukhur, on the south bank of the Indus for A.D. 1839 :—

Rubbee Harvest.

	<i>Rs.</i>	<i>As.</i>
Tobacco, Hemp, Onions, Cucumbers, per jureb,	5	4
Wheat, Joowaree, Cotton, Bajree, Moong, Pease, Gram, Ujwain, Gushneez, Surshuf, and Sesamum, are assessed in kind, at one-fourth of the crop per jureb of wet land.		

Khureef Harvest.

	<i>Rs.</i>	<i>As.</i>
Sugar-cane,... .. per jureb,	9	4
Carrots,	4	4
Turnips and Radishes,	3	4

The land revenue is calculated in Khurwars and Kasus, and a Zumeendar on paying the dues to the Kardar, or governor, imprints his signet ring on the officer's book, at the foot of his account, as security against mistakes and imposition hereafter.*

Table of Khyrpoor, or Shuhzadpoor, measures used in Khyrpoor and the purgunnah of Moghulee :—

4 Chouthace, or 2½ Pa,	1 Patee or Patoec.
5 Chouthace, or 3 Pa and ½ Ana,	1 Pinkee.
4 Patee, or 2½ Seers,	1 Toyn.
4 Toyen, or 10 Seers,	1 Kasu.
6 Kasu, or 1½ Mun,	1 Tokhu.
10 Tokhu, or 15 Muns,	1 Khurwar.

Weights and measures used in the districts of Roree and Sukhur, the lesser for precious metals, &c., and the rest for grain, oil, ghee, and other commodities. The small weights vary a trifle in some parts of the country.

* The entry in the Kardar's book is as follows :—

(Zumeendar's name.)

Wheat, 4 Khurwar.
Government share 2 Khurwar.
Zumeendar's share 2 Khurwar.
Government ung 6 Kasu.
Zumeendar's ung 1½ Kasu.

8	Ruttee,...	...	...	1 Mashu.
11½	Mashu,...	...	...	1 Sohrab, or Kyrpoor rupee.
42	Mashu,...	...	...	1 Tola.
6	Tolas, ...	...	...	1 Ana.
4	Anas, or Chhutanks, ...	...	...	1 Pa, or 24 rupees.
4	Pa, ...	...	...	1 Seer, or 96 Sohrab rupees.
40	Seers, ...	...	...	1 Mun (pukka.)
15	Muns, ...	...	...	1 Khurwar.
5	Seers, ...	...	...	1 Dhura.
8	Dhura, ...	...	...	1 Mun.

Land is measured by the cubit (Bootu,) Gundha, and Jureb.

5	Cubits make	1 Gundha.
20	Gundha	1 Jureb.

There are three kinds of Jureb. The first is measured by the Shahjuhanee gundha, and about 150 English feet square. The second measured by the Ruyutee gundha (the one in common use) 145 feet square, and the third measured by the Imdadee gundha, only 135 feet.

The Khyrpoor cubit is employed to measure land, and is the same length as that of India, or about 18 inches; it is measured from the point of the elbow to the tip of the middle finger.

The Shahzadpoor cubit takes its name from a town in Beloochistan, the birth-place of the Talpoorees, and is a measure extending from the point of the elbow, over the tip of the middle finger, to the setting on of the wrist, or about 26 inches. It is used to measure boats, cloth, &c.

The Shahjuhanee gundha is employed in the purchase and sale of land, and consists properly of five Shahjuhanee cubits (7½ feet); but the Talpoorees, to increase their revenues, have shortened it about three inches, by measuring four cubits only in the regular manner, and the fifth to the setting on of the little finger. This is the Ruyutee gundha.

The Imdadee Gundha is applied to *Inam* lands, and consists of five cubits, measured from the point of the elbow to the tips of the four fingers and thumb, equal to about 7 feet.

A few gold coins (Ushrufee) from India, find their way into the great markets, and pass for more than their value. Among them are the Pootlee, Gunga Ramee, Ukbur Shahee, Moohumud Shahee, and Sher Shahee.

The silver coins in circulation are:—

The Sohrab rupee, in which the assessment is calculated, struck at Khyrpoor in the name of the late Muhmood Shah of Kabul, and worth nearly one per cent. less than the New Company's Rupee.

The Korie, or Hyderabad rupee, in which pensions are sometimes paid, worth only 12 anas, or 25 per cent. less than the New Company's rupee.

When the British army arrived in Upper Sind, the people refused the New Company's rupee in payments for goods and labour, but prefer it now to their own coin, which it threatens to supersede. The Company's rupee stamped with the head of the late William IV. is worth one per cent. more than the Company's rupee without his head.

The Sohrab Rupee is divided into fractional parts, corresponding with those of the Company's rupee in Northern India, as exhibited in the following tables :

<i>Sind Coin.</i>		<i>Indian Coin.</i>	
6 to 12 Kourees	1 Udhree.	6 Kourees	1 Tolee.
2 Udhrees	1 Dumree.	2 Tolees	1 Dumree
2 Dumrees	1 Kuseera.	2 Dumrees	1 Chhudam
2 Kuseere	1 Udhela.	2 Chhudam	1 Udhela
2 Udhele	1 Pysa.	2 Udhele	1 Pysa
3 Pyse and 1 Kuseera }	1 Ana.	3 Pyse and 2 Chhudam }	1 Ana
2 Pyse	1 Tukka.	2 Pyse	1 Tukka
51 Pyse	1 Sohrab Rupee		

The implements of husbandry in Khyrpoor are cheap, and simple in their construction ; and even the poorest peasant has a plough, but sometimes hires bullocks to work it. The daily hire of a pair of oxen for agriculture is about the same every where, viz. four tukke, and the driver gets five pys, or an equivalent in grain, and is not allowed to be absent at noon to dine and repose. Two oxen are hired for a plough, or Persian wheel, from dawn till sunset, for six or eight tukke, and relieved at noon. Two pair will till a jureb of land in a day. The hire of a harrow (Sahur), including the services of two men to guide, and four bullocks to drag it, is one rupee per day, and half the sum if discharged at mid-day.

A plough, including a yoke for a pair of oxen, costs 18 tukke, or about 16*d.* English, half of which goes for labour. The items are as follow :—

	<i>Tukke.</i>
The yoke (Punjaree)	2
The handle (Koor) 3½ feet long	5
The shaft (Huriyn) 9 feet long	5
The share (Choonee)	6
Total,	18

The wood is acacia and other common forest timber. The share is about eighteen inches long, eight inches of which slide into a groove at the foot of the handle ; it is shod with a thin plate of iron, five inches long,

and weighs a quarter of a seer; but where the soil is sandy the plates are only half the length, and cost three tukke. The iron is of an inferior kind, and badly hammered, but strong enough to penetrate light and moist soils, and there are no stones on the lowlands to impede the farmer's labour.

The harrow is either a circular or flat beam of heavy wood roughly shaped with the axe, and costs one rupee. It measures about eight feet long, twelve inches wide, and six deep, and is drawn by four bullocks harnessed to ropes.

For digging fields, wells, and canals, the people use a large iron hoe with a handle two feet long, which costs two rupees. The iron weighs two seers, and is beaten into a surface twelve inches long and nine wide. This and the common axe are used to clear waste land; the pick-axe is unknown. Burnt sticks and grass are almost the only materials used for manure.

The peasant weeds his land with a *Rumbo*, or broad chisel of iron, similar to the *Khoorpu* used in India to dig the roots of grass. It costs either two anas or two tukke. The reaping hook is filled with small sharp teeth set edgewise, and costs two anas. A wooden fork of five or six prongs, two feet long, is used to collect the stalks of grain and briers for hedges.

The other articles that remain to be noticed are, a square basket to hold grain and food for cattle, fabricated by sweepers (Shekhree) of the stalk of moonj grass, and sold at two tukke each; two or three shallow baskets, shaped like an English dust-shovel, for winnowing grain, made of the same material as the above, and worth an ana each; and a small wooden rake and hoe for collecting the seed and grain stalks, worth together about two tukke.

Water is raised to irrigate land by the Persian wheel, worked by one or two oxen, or a camel, blindfolded, to prevent their shying; and a rude awning of boughs is built over the well to screen the driver from the sun. Sometimes the charge of the cattle is delegated to a woman, who sits like the man behind the yoke, with her legs doubled up, and urges forward the sluggish animals with a shrill cry and a whip of tamarisk twigs.

There are sometimes a dozen wells on a farm, and the same results might be obtained from half the number properly managed. The *Lut*, or beam, that connects the wheels with the ladder, is laid on the ground instead of under it, which subjects it to friction, and retards the bullocks who step over it at each revolution. Hemp and moonj rope are rarely procurable in the hamlets, and the peasant fastens the water jars to the ladder with flags and date leaves, which he gathers and twists himself. They are constantly broken and displaced by the loosening of the ties, and jars are seldom at hand to supply deficiencies. The narrow broken troughs which conduct water to the fields allow much of it to escape, and another

evil is the encroachment of the river, which undermines the scaffolding of the wheel, and compels the farmer to remove it to a new site.

A pair of bullocks perform a revolution in 15 or 18 seconds. A ladder holds thirty jars, each containing from $2\frac{1}{2}$ to 3 quarts of water. On an average they reach the top of a well three parts full, and an eighth of their contents is lost from defects in the troughs and machinery. The discharge per minute never exceeds fifty or sixty gallons.

A Persian wheel cannot usually be set in motion for less than sixty rupees. The machinery is worth about twenty-five, but in districts where wood is plenty and cut on the estate, it can be made for sixteen or twenty rupees; the earth pots for raising water cost two rupees a hundred, and a pair of bullocks thirty rupees.

The cost of a wheel in the districts of Roree and Sukhur is as follows:—

Rs. The.

The two wheels (<i>chukur</i>) which revolve at right angles,	15	0
(Where wood is plentiful 10 and 12 rupees.)		
The <i>kanjur</i> , a cross beam eighteen feet long, raised seven feet from the ground on the trunks of date trees. It receives the pivot of the horizontal wheel, and the oxen pass beneath it, ...	2	0
The driver's seat (<i>guddee</i>) a plank ten feet long fixed to the pivot, and inclined downwards,	1	4
The <i>lut</i> , a circular beam resting on the ground, and connecting the vertical wheel with the <i>ba-ir</i> , which it helps to support	2	3
The <i>ba-ir</i> or water wheel, about $3\frac{1}{2}$ feet wide, and 6 feet in diameter. A ladder (<i>mal</i>) made of date leaves, passes over it and holds from thirty to forty earthen pots (<i>keengur</i> .) A principal defect of the wheel might be cured by making the jars thicker, and glazing them, which would prevent the water escaping through the pores, and by separating the jars by a band of rope or mat, the breakage that constantly occurs by their falling on each other would be prevented.		
The <i>parch</i> , or trough, five feet long, made of half the hollow trunk of a date tree, to receive the water from the pots,	0	13
The <i>nesur</i> , a second trough of date wood twelve feet long, which conducts the water from the <i>parch</i> to the field.	1	0
In addition to the above there are six timbers which support the troughs and water wheel.		
The machinery is entirely wood, and those parts of which I have omitted the cost, are cut in the farm or forest by servants or hired labourers, and shaped free of charge by the carpenter who contracts to repair the wheel.		
The hire of men to cut the wood is about.	1	5

The farmer usually contracts with a potter by the year to supply him wells with pots, and remunerates him with a share of the crop. A Zameendar of an ancient Mogul family who owns 140 jurebs of land at Sukhur, pays the potter as follows :—

For every well in a sugar field, two rupees and seven tukke, and one seer of goor (molasses) per jureb at each harvest. The same for a jureb of cotton and tobacco, excepting that he gives a seer of dry tobacco and uncleaned cotton, instead of goor.

For a well in fields of wheat and joowaree, without reference to the number of jurebs, seven tukke and twenty-five seers of grain each harvest. For these sums the potter also supplies the Zumeendar with pots for domestic use.

The length of the well-ladder, and number of pots, depends of course on the distance the water is lifted. The pots are a few inches apart, and if a well is constantly worked, are replaced six or seven times in a year.

The carpenter contracts for a well on the same terms as the potter, and repairs the machinery each harvest for two rupees and seven tukke, and a seer of grain, or whatever is grown on the farm.

The cost of digging a cut or well (*kookh*) is five rupees in the Rubbee harvest, and two in the Khureef. The rise of the Indus makes the difference in favour of the last, and often renders a shaft unnecessary. None of the wells in Khyrpoor are faced with masonry, and when the soil is light and liable to injury, a well is sometimes re-made four times in a year: it is impossible to repair an inroad of the river, and the farmer always removes the wheel to a fresh site.

A pair of well-bullocks cost rupees 30, a very fine pair rupees 40, and an indifferent pair 15. Two pair will keep a wheel in motion from daylight till dusk, and are relieved at noon. Where a farm has only one well, it is worked all night, summer and winter, and the water jars are renewed every month. In Daodpootra three pair of bullocks are employed on a well in the day, and the same number at night. In the Delhi territory, and other parts of Northern India, bullocks are never worked at night; * a pair labour all day and are allowed an hour or two at noon to feed and repose. They are stronger and better fed than those on the banks of the Indus, and the labour of lifting water is less constant and severe in the Indian wells than Persian wheel, but the discharge of water is only one half. The peasants of Hindoostan give their labouring cattle oil cake and 1½ seer of *urhur* (pulse or barley) a day; or

* I have however frequently observed the contrary with sugar lands in the upper Doab.



double the quantity of cotton seed. Cattle on the banks of the Indus are subsisted on grain stalks.

The bullock-driver in Khyrpore gets five pys a day, and a boy only three pys (10 shillings, and 3s. 5d. a month). He works from morning till night, and eats his meals when he can, and frequently falls a sleep from fatigue, in his master's absence. Some Zumeendars hire bullocks for wells at two tukkes each per diem.

A tenant pays his landlord six rupees a harvest for the use of a wheel, calculated as follows :—

	<i>Rs.</i>	<i>As.</i>
The two wheels (<i>chukur</i>),	4	0
The Kanjur,	0	8
The Lut,	0	8
The Driver's seat,	0	4
The Parch trough,	0	4
The Nesur trough,	0	8
	<hr/>	<hr/>
	6	0

The tenant is at the charge of feeding and keeping the bullocks, and in some instances repairs the wheel.

The small quantity of rain that falls in Sind, makes it almost needless to store grain. The farmer heaps it in the air in a high and dry situation, digs a trench round it, to drain off rain, and covers it with two or three layers of mats made of *gondlee*, a kind of reed. He adds a compost of clay and chaff, which he beats into a cake, and smooths with his hands. A heap (*pulle*) plastered with cow-dung, will bear the weight of a horseman, and lasts several years. I saw their power to resist water at Sukhur in July 1839, where some heaps were exposed to remarkably heavy rain for two days without suffering injury.

The peasants of Moghulee purgunnah, where date trees are plentiful, cover their grain with mats made of the leaves, and to give additional strength to the heaps, sometimes put a second covering of mats of the peel of *moonj* grass, and over them one or two coats of clay and chopped straw. Grain is thus preserved in situations where there are no means of transporting it to the markets, and on the banks of rivers and canals where the people inhabit temporary huts. But the farmer transports his grain, whenever it is possible, to the mud floor of his cottage, which is smeared with cow-dung, but has neither mats nor carpet, and spreads it in the sun, five or six times a year to expel the weevils which would otherwise destroy it in a few months. Wheat, rice, chunna (*Cicer arietinum*), bajra (*Holcus spicatus*) and moong (*Phaseolus mungo*) will keep in

the air for three years, but the heaps are opened once in twelve months to preserve them from insects. Joowaree (maize) and peas are more liable to be injured by weevil than wheat, and will not keep beyond twelve or eighteen months in the air.

Grain is also preserved out of doors in circular jars (*goondee*) of sun-dried earth, capable of holding from eighty to twelve hundred pounds, and taken out once a year, through a hole near the bottom of the jar, and exposed a few days in the sun. A small quantity is kept in houses for daily use in jars of sun-baked earth.

Khyrpoor produces all the grains and pulse common to India. Wheat and joowaree are the staple, and belong to different harvests, and are consumed in nearly equal quantities. The district of Roopa in Moghulee produces fine crops of joowaree and barley, and bajree and moong are next to these the most common grains. Roree and Sukhur produce rice, but Chandkoh, and the country south of it, yield the largest quantity of any district in north Sind. Chunna (gram) is collected in kind. The land owners usually reserve their share of the crop for their cattle, and all that finds its way to the market belongs to government. Indigo is chiefly grown in the districts of Kyrpoor and Oobaro, and is the only dye used by the lower classes for their trowsers and turbans. It is inferior in quality to that of Bengal, but considerably cheaper. Sukhur and the village of Kundura, four kos from Roree, are considered to produce tobacco equal in quality to any in the province, but it undergoes no preparation beyond exposure to the sun, and is dry and distasteful to the native of India. Gotkee is famed for the quality of its opium, which fetches double the price of that raised at Shikarpoor and elsewhere. The sugar-cane of the villages of Ubdo and Napur, between Sukhur and Shikarpoor, has an excellent character, and it is cultivated pretty generally throughout the province, but is inferior to the produce of northern India and the Punjab. Sugar-candy of an impure colour is manufactured at Khyrpoor and Roree. Large quantities of poppy and garlic are grown at the Biriya Loh in the district of Khyrpoor, and hemp at Sukhur and elsewhere. Plenty of good cotton is raised in the northern part of Khyrpoor, and in the little district of Shahbelo, two kos north of Sukhur. It is one of the most important products, and supplies the inhabitants with clothing. Looms are established in all the principal places, but the quantity grown is not equal to the demand, and a good deal of the raw and manufactured material is imported.

Dry land (*puko*) intended to receive cotton, is watered before ploughing, and every four or five days afterwards till the crop is gathered. Wet land (*bosee*) is not irrigated, and the plough is passed over it three or four times,

and five and six times over *puko* land. A square beam of heavy wood serves for a harrow, and is drawn over the last as often as the plough, but *bosee* is only harrowed twice. The farmers of Moghulee purgunnah never manure land, but weed it when the sprout is a span high, and again when it has reached the height of four feet, at the same time they move the soil with a hoe, and throw it up round the roots to nourish and give them vigour. The seed is sown in April, and the produce gathered in July. The plant is often left in wet land till the following year, and yields a second crop in May. It is generally of inferior quality to the produce of India, but better than that of lower Sind. The gathering season lasts altogether three months, but reapers attend only once or twice a week, as the pods do not open in sufficient numbers to require their presence oftener. The crop depends on the swell of the river. A jureb of *bosee* land yields five muns of clean cotton, and a return of forty rupees after paying all expenses: after deducting from this the government tax, amounting to a fourth, it reduces the net profit of the cultivator to thirty rupees. Dry land yields two and a half muns of cotton per jureb, and return of thirty rupees after deducting the cost of labour, but government take a fifth, and leave the cultivator twenty-five rupees. Black soil is scarce, and considered rather better for cotton than *puko* land. It requires to be constantly watered, and yields about two muns of clean cotton per jureb, seldom three muns. *Bosee* cotton with seeds in it loses two parts in cleaning, and *puko* cotton one-third, but their quality and price are the same. Three and three and half seers were sold in 1838 for a rupee, and three seers in 1839, but a sixth less if a purchaser took the pick of the warehouse. From twenty to twenty-five seers of seed (*wounuh*) sold for the same money. Labourers in cotton fields get an eighth or ninth of what they collect, which is a good plan to stimulate their exertions. Some farmers give them only a sixth of the harvest after the first gathering.

There are a great variety of greens and spinach, and among the herbs eaten as vegetables that grow spontaneously, are purslain, and a species of *amaranthus*. The gardens produce carrots, turnips, radishes, onions, cucumbers, and several kinds of pumpkins, the egg-plant (*bangun*), three kinds of bean, pease, *kurela* (*Momordica*), turnee, and *mujoon*, or *dil pusund*. The leaves of the carrot, mustard, and pea (until the pulse forms) are eaten, and the root of the lotus (*Neerapur*), which covers the lakes and marshes. *Sesamum*, *capsicum*, garlic, and turmeric abound, and the last is used as a dye. Among the varieties of spinach are *chooka*, *pullee*, *thoon*, *mohra*, *loonuk*, *mureera*, *methee*, *paluk*, and the leaves of the *ekra* tree.

The fruits are—the date, mangoe, plantain, pomegranate, apple, grape, lime, citron, fig, apricot, water and musk melon, pistachio, and *keora*

nuts, several kinds of wild plum, the tamarind, &c. Khyrpoor produces two kinds of pomegranate: the best is full of large, white, juicy seeds and grows abundantly in the gardens of Roree, and at Ghotkee in north Khyrpoor. The other kind is made into an acid shurbut, and the seeds are dried and sold to poor people who cannot afford to purchase mangoes and form pickle with the addition of salt, dhuniyu, capsicums, and coconuts. Unripe grapes are used for the same purpose. The flowers of pomegranate are employed to dye leather for shoes and water bags. A refreshing beverage is prepared from Keora flowers. The grape of Khyrpoor is small and acid, and the only good kind procurable in the country comes from Kabul and Persia. The apricots are small, hard and insipid, and the apples are a little bigger than crab apples, and rather less acid.

Khyrpoor yields plenty of dates, and they form part of the food of the lower classes, who obtain a strong spirit from the juice by distillation. By far the largest quantity are at Shikarpoor and Bukur. The gardens on the banks of the Indus at Bukur, and several miles below it, are a delightful relief to the eye after the endless tamarisk woods of the lower Indus and rival the cocoanut groves of Bengal in beauty of foliage. The fruit is however, very inferior in size and flavour to the Arabian and Egyptian date, though it surpasses the spurious kind of Northern India. The tree emits, after rain, a disagreeable smell, and the leaves that fall into water change its colour in a few hours to a deep green, like that of a stagnant pool, and are said to render it poisonous. The *Kiya*, a reddish coloured maggot, about half an inch long, is born in the tree, and destroys the fruit: the people apply fire to the outer crust of the stem, which is about three quarters of an inch thick, and burn the coronet of leaves, where the insects breed. This severe treatment is seldom fatal to a tree situated in good soil: the leaves appear in about a month, and fruit in the usual course, and the tree is cut down if it does not recover soon after the period mentioned. The date is not irrigated, but low situations on the banks of rivers where the floods deposit a rich clay and fine loam are most favourable to its growth, and not one in a hundred trees that are burnt perish, but from five to ten per cent. in sterile soils. If rain falls on the date when nearly ripe it completely destroys the flavour, which happened in 1839. The harvest begins about the middle of June, and terminates from the seventh to the fifteenth of August, when the people consider the hot season at an end, and the weather becomes perceptibly cooler.

Dates are of four kinds, distinguished by their colour, shape, and flavour: one is a pale yellow, a second a dark brown, a third light purple, and a fourth a deep purple hue. The brown kind is the largest and best. The

wholesale price in Roree of a mun of prime quality at harvest time is two rupees, but one, and even two muns of inferior dates are sold for half the money. From Rs. $1\frac{1}{4}$ to $2\frac{1}{4}$ are usually paid for a mun in the bazar during harvest, but the price doubles after they are dried and pressed, and advances progressively. At Shikarpoor they are more plentiful than at Roree, and sell for about half the price.

The date is extremely heating if eaten in any quantity. Five or six days exposure to a bright sun are sufficient to dry them, and the peasants remove them to their huts in circular baskets (*pinda*) made of date leaves or tamarisk boughs, each containing about forty-five seers, and tread them into a solid mass. The fruit will not keep beyond twelve months, in consequence of the ravages of small maggots, called *kiya* and *soosra*.

The date is raised from seed, and sends forth many shoots from the foot of the stem. July and August are the best season for sowing seed, but it is put in the ground as late as October, and springs up in about a month. The tree bears fruit the third year in good moist land, but takes four or five years to come to maturity in salt sterile soils. A fine tree favourably situated, yields sometimes three muns of fruit, which is the maximum; a bad one not a third of the quantity; a jureb containing from eighty to a hundred trees, yields, on an average, a return of 320 rupees, but government only leave the cultivator 20 rupees, or 1-16th, and levy a duty of twenty pys on every mun of fruit exported to foreign countries, and carried for sale to other parts of Khyrpoor.

The people assert there are trees at Sukhur and Rooree two hundred years old, but probably no part of the original stems remain; they use the wood for door-posts, pillars, and water wheels, but never in the roofs of houses. Insects destroy the core, leaving it to appearance, perfectly sound, and it is not considered to last beyond five, or at the most, eight years. The English at Sukhur, either from ignorance of this circumstance, or the difficulty of procuring timber suitable for building, have converted the date into rafters. Trees are felled only when they give bad fruit, or have done bearing, and are worth from six to thirty anas, according to size.

(To be continued.)

A cursory Notice of Nayakote. By B. H. HODGSON, Esq. Resident at the Court of Nepal.

Nayakote, or the hither Nayakote as it is often called, to distinguish it from Nayakote of the Choubisi, is the name of a petty town and district lying WNW. seventeen miles from Cathmandoo, by the high road to Gorkha. The town (so to speak) is situated at the northern extremity of the district, upon a spur descending south-westerly from mount Dhaibung, or Jebjibiar, at about a mile distant from the river Trisool on the west, and the same from the river Tadi, or Surajmati, on the south and east. The town consists of from 60 to 100 paths three-storied houses, in the Chinese style of Cathmandoo, chiefly owned by the court and chiefs; of a durbar, called the upper, to distinguish it from the lower one on the banks of the Tadi, and of a temple to Bhairavi, all in the like style of architecture. The town forms only a single street, lying in an indentation on the crest of the ridge, and is consequently not visible from below on any side, though the durbar and temple, from being placed higher, are so partially. Nayakote, up to the late war with the English, was the winter residence of the present dynasty of Nepal: but as the situation of the town is bleak and uncomfortable at that season, the court and chiefs then usually resided in mansions still standing at the base of the hill towards the Tadi, but now a good deal dilapidated like the town residences, owing to the court having been stationary at Cathmandoo since 1813. The district, like the edifices of the great, bears marks of neglect, which are the more palpable by reason of a considerable portion of it being devoted to gardens and orchards, the property in a great measure of the owners of those edifices. The elevation of the town above the level of the Trisool must be from 800 to 1,000 feet, and the effect of this elevation in concealing it is aided on the side towards the Tadi by a fine forest of saul trees occupying the whole declivity. On other aspects the saul trees, inherent to the whole site, are reduced to scrubby brush-wood by perpetual injudicious cutting and defoliation, the leaves being used as plates to eat from, and being perpetually carried to Cathmandoo for sale there. This ridge has a soil of a deep red clay, and its general form is rounded, but broken by deep ruts and ravines in most directions. Towards the Trisool west, and towards the Tadi south and

east, the declivity of the ridge of Nayakote is precipitous ; but towards the junction of the two streams, in a south-westerly direction, the hill falls off more gently, and about a mile and a half below the town, spreads into an undulating plain, which occupies almost the whole space between the rivers to their junction, and the ridge on which the town stands. This tract may be represented as a nearly equilateral triangle, two of the sides of which are formed by the rivers, and the third by the ridge. This triangle is a plain, exclusive of the declining spur of the ridge—and is an *elevated* plain, exclusive of that north-easterly angle lying on either side the Tadi, towards, and to its junction with the Sindhu at the base of Bhaloo Danra. This north-east corner is on the level of the rivers, the rest are variously from 1 to 400 feet above their level ; and together they constitute the chief part and body, as it were, of the lowland district of Nayakote, the rest, or legs (so to speak with some aptness) of the district, being the glens of the Tadi and of the Sindhu as far upwards, respectively, as the confluence of the Likhoo, and the base of Burmandee. The mountain ridges enclosing the district of Nayakote, as above defined, are, beginning with the Nayakote ridge itself, and circling east back again to it—Maha Mandal, Nerja (north of Tadi), Kabilas (dividing the Tadi and the Likhoo), Bhaloo (dividing the Likhoo and the Sindhu), Dang-mai or Burmandee, Madompoor, and Ghoor (enclosing the glen of the Sindhu on the south), Belkote (carrying on the same southern barrier down the Tadi to Devi Ghaut), Jhiltoong (below the ghaut, but still on the south of the river), Phirkiab (opposite to Jhiltoong on the north of, and *across* the river), and Gowri and Samari-bhanjang (running northerly up the Trisool to the Sunga, or bridge at Khinchat), where we complete the circuit by linking the last to the Nayakote ridge, the two in that spot pressing close on either bank of the river. With regard to size, if we speak of this tract as a whole, it will not be easy to be at once precise and distinct ; but we may observe in regard to the body of the district inclusive of the north-east corner on the low level, that from Devi Ghaut direct, up the Trisool to the Sunga at Khinchat, the length is four miles, by the road five miles ; from Devi Ghaut to the town of Nayakote from four to five miles through the middle of the elevated portion of the district ; from Devi Ghaut up the Tadi to its junction with the Sindhu, four miles ; and the same from the

latter point to Khinchat across the base of the triangle, from the Tadi to the Trisool, again, and inclusively of the legs of the district from Devi Ghaut to Burmandee, up the glens of the Tadi and the Sindhu is six miles; and from the same point up the Tadi to its junction with the Likhoo, eight miles. The maximum breadth of the entire district is at the base of the triangle just adverted to, and here the distance by the road from Bhalu Dawra to Khinchat is four miles. The mean maximum of breadth however is not above three miles, that of the plateau alone between the principal river, two miles. But, in speaking of breadths especially, we should distinguish between those parts which have been called the legs and the body of the district, the legs being the subsidiary vales of the Sindhu and of the Tadi. The former of these, then, from the base of Burmandee to the apex of the Bhaloo ridge, where this glen merges in the larger one of the Tadi, is only from 200 to 400 yards wide; whilst the width of the vale of the Tadi in that portion of it which extends lengthwise from the apex of the Bhaloo ridge to that of Kabilas at Chonghora, is from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile: and if we distinguish (as well we may) the low tract lying on both banks of the Tadi, between the western extremity of the two last named divisions, and the point where the Tadi gets compressed into a mere gully on the upper confines of Belkote, (forming the north-east corner just spoken of inclusively) we have a third tract, which is some 1,200 yards in medium breadth. The length, again, of the first of the subdivisions of Nayakote is two miles; of the second, four miles; of the third, one mile. All these three are tracts of the same character: that is they are hot, swampy, rice beds on the level of the stream that water them, except in the instance of the glen of the Tadi, which upon the right bank of the river, possesses a widish strip of land considerably raised above the stream, and running under the Maba Mandal and Nayakote ridges (where the court and chiefs have houses) to where the latter spreads into the chief elevated plain of the district above spoken of. That plain cannot be watered from the Trisool or Tadi by reason of its elevation; and as the Nayakote ridge, whence it is derived, yields no efficient springs of water, the plain is condemned to exclusive dependence on rain. Every such plain or plateau is, in the language of Nepal, a Tar; whereas the lower and perpetually waterable tracts, above contradistinguished, are, in the same language, called

Byasi. The first of the three is the Sindhu Byasi, from the name of its streamlet, the Sindhu; the next the Tadi Byasi, from its river; and the third either Tadi Byasi also, or Sangum Byasi, from the confluence of the Sindhu and Tadi within it. The Tar, or chief tract, is numerously subappellated, as Pullo Tar, next Devi Ghaut; then Manjhi Tar; then Burr Tar, next the Nayakote hill; with various others parallel to these and nearer the Trisool, towards which the plateau in general has a tendency to sink step-wise, though never nearer the deep narrow bed of that river than several feet, twenty or more. These Tars are rather more wholesome and habitable than the Byasis, and capable of more various culture, though chiefly of trees, since trees alone can flourish deprived of water except from rain; and thus is, in part, explained the great predominance of mangoe and other groves over fields of agriculture in the Tar or Tars of Nayakote, which however lovely at all seasons, boast no winter or spring crops, despite of the high temperature of the place; the Tars are too dry, and the Byasis too wet for such spring crops, though they be common in the much colder valley of Nepal Proper. The difference of temperature between the valleys of Nayakote and of Nepal Proper is occasioned by the difference of elevation above the sea. This difference amounts to 2,250* feet; and the same cause affords us also the only apparent, but very far from satisfactory explanation of the fact, that, whilst Nayakote is pestilently malarious from March to November, Nepal Proper is free from this scourge, *all other circumstances being the same in each valley*. The lowlands of Nayakote, consequently, are but very thinly peopled, the only permanent dwellers therein being several singular and affined races of men, called Durri, Kumhal, Manjhee, Bramoo, and Dénwár, of whom more hereafter, and some few Parbuttiahs and Newars. The Newars build and dwell solely on the Tars. The Parbuttiahs will not adventure even so far, but usually have their houses on the hills around, and never suffer themselves to sleep in any part of the low lands for a single night between April and November. In the Byasis, then, are the houses of Denwars and their compeers only: in the Tars, those of the above people and of some few Parbuttiahs and Newars also, but in neither do the clusters of cottages hardly ever

* The valley of Nepal is 4,760 feet above the sea.

reach the size of a village, and the dwellings stand for the most part single and scanty. The whole district is said to contain 700 houses but I doubt it, even allowing 100 or 150 houses to the town; and half the number in either case would probably be nearer the mark.

The soil of Nayakote contains a juster proportion of clay to siliceous and calx than the soil of the greater valley of Nepal Proper, which is derived principally from the debris of granitic formations; and hence we obtain an explanation of the reputed eminent fertility of the former, and more, surely, of its celebrated potteries. The heights around Nayakote are of inferior size, consisting on the northern side especially, mostly of iron clay, of very deep red tint; and the superficial soil of the Tars is for the most part the same, the substratum being however, usually gravel, whence the dryness of their soil is increased.

The soil of the Byasis also is clayey, but untinted luteous white, and where unmixed with siliceous or other ingredients, even more tenacious than the red clay. The pottery clays are exclusively of the latter sort. Mica, so common in the great valley of Nepal, is here never witnessed. The high temperature of Nayakote admits of most of the trees, forest and fruit, as well as of the superior Cerealia of north Behar and the Tarai being cultivated with success, though they cannot be raised in the great valley. Nayakote has besides distinguished products of its own, which are not found, or not found so good, in the plains of Behar; these are the orange and the pine-apple. The forest trees peculiar to the district, not found in the great valley, and identifying this of Nayakote with the Tarai and plains, are the Saul (*Shorea robusta*), Barr and Pipal (*Ficus Indica et Religiosa*), Semal, or cotton tree, Pras, Neem, and Mohwa. The *Pinus longifolia*, and other mountain growths, are frequently found mixed with these on the declivities around.

The chief of the fruit trees is the mangoe of various sorts, many exotic and superior, though the celebrated Bombay mangoe is apt to lose its flavour by swelling into undue and dropsical dimensions; the tamarind, the Bair, the jack fruit or Bel, the Kathur, the Badhur, the Pukri, the guava, the custard-apple, or Sharifa, and, in a word, all the ordinary fruit trees of India, none of which, it should be added, flourish in the larger valley. To the above we must subjoin the following exotics grown in the gardens of Khinchat, belonging to the government. Naril, or cocoanut, Supari, or betel vine, pear, apple,

apricot (native), and plums of many kinds. All but the two first of these, however, flourish as well, or better, in the greater valley, being European products.

The smaller horticultural products of Nayakote are pine-apples, (excellent,) plantains of many kinds and good, Jamans four sorts, melons, but no grapes nor peaches; pines, plantains, and jamans are denied to the greater valley, where however the orange—that boast of Nayakote, flourishes. The better kinds of the Nayakote oranges are equal to any in the world, so that our horticulturists in India should endeavour to procure and propagate them. The agricultural products of Nayakote resemble in general those of the greater valley of Nepal Proper; and as the latter have been fully described in print, I shall on the present occasion specify only the peculiarities of Nayakote produce, resulting from its more tropical climate. It has already been observed that whereas there are two crops per annum in the greater valley, there is only one in the lesser, because of the excess of moisture in the Byasis, and of the total want of means of artificial irrigation in the Tars. The Byasis yield only rice, which is not planted nor reaped at the early periods prevalent in the greater valley, but at the later ones usual in the plains of Behar; and the like is true of the sugar-cane, which is grown on the skirts of the Byasis. In the great valley every blade of rice has disappeared by the beginning of November, and half the crop by the middle of October; the untransplanted sorts of Ghya even sooner. In Nayakote the rice-harvest lasts till the beginning of December, nay to the middle of that month, and there are then no means of desiccating the fields rapidly enough for a spring crop. The rice grown in the Byasis are different from those grown in the greater valley, with the exception of Malsi and Touli, and even of these two sorts there is but little. Munsera is the staple crop of Nayakote, and of its several kinds, as Doodia, Gouria, &c. It is of a bright golden hue, straw and grain, and longer in the stalk than our rices, to the best of which it is equal in quality. Among the seventeen to twenty sorts of rice grown at Nayakote, are the Mal-bhog, Krishen-bhog, and other fine descriptions for which Phillibheet is so famous. None of these last can be raised in the greater valley. The following are the names of the Nayakote rices—

Malsi,	Krishen-bhog,	Isegoon,
Touli,	Bairini,	Anandi,
Doodraj,	Charinagari,	Roodra,
Manseera,	Jara Sari,	Katonja,
Gouria,	Mal-bhog,	Tharia,
Kala Gouria,	Jhagri,	&c. &c.

The Ook, or sugar-cane of Nayakote, is incomparably superior to that of the greater valley, and indeed to that of most parts of India. There are five principal sorts, four of which are yellowish, and the fifth dark red. I purpose to send specimens of these to Calcutta for examination. Ook is grown on the skirts of the Byasis as well as on the declivities of the hills near them. On the Tars, or plateau, or upper levels, are grown, besides the ordinary rain's produce of similar sites in the greater valley, the superior sorts of Dall such as Arber, and cotton of inferior quality, neither of which can be raised at all in the greater valley. Of the whole surface of the Tars of Nayakote, a half probably is devoted to gardens and orchards; a quarter to fields of dry produce; an eighth to rice or wet produce, and the remaining eighth may be barren.

The genera of Mammals and Birds observed during a hurried visit, under disadvantageous circumstances, were *Nemorhedus* (Ghoral), *Styllocerus* (Katura), *Martes* (Flavigula), *Sciuropterus* (Magnifirus), *Sciurus* (Locria), all common to the greater valley; *Corvus*, *Pastor*, *Coracias*, *Alanda*, *Anthus*, *Motacilla*, *Budytes*, *Pyrgita*, *Phœnicura*, *Saxicola*, *Phœnicornis*, *Dicrurus*, *Musciapa* *Tichodroma* (*Muraria*) *Picus*, *Palœornis*, *Clorhynchus*, *Totanus*, *Tringa*, *Egretta*, *Anas*, *Querrquedula*, *Carbo*, *Mergus*, *Turtur*, *Euplocomus*, *Gallus*, (*Jungle-cock* *Baukria*), *Chotopus*, *Perdix*, *Coturnir*, *Hemipodius*. Of these *Gallus*, *Coracias*, and *Palœornis*, unknown to the greater valley, proclaim the *quasi-Indian* climate of Nayakote; as *Carbo* and *Mergus*, also unknown there, do its larger rivers. For the rest, the species as well as genera are those common to both districts. The wall-creeper of Europe, supposed to be confined thereto, is frequent in both.

The commerce and manufactures of Nayakote are too inconsiderable to claim specific notice; but in the cold season, in this as in all other smaller valleys of Nepal, booths are erected on the river-side by traders and craftsmen from the great valley, who reside there for the four coldest and salubrious months (December to March inclusive) ex-

changing grain for rock salt with the Bhoteahs, both Cis and Trans-Himalayan, dyeing the home-spun cloths of the neighbouring hill tribes with the madder supplied by them and the indigo of Tirhoot, and tinkering, and pedlaring, and huckstering, for the assembly collected at this petty sort of fair.

It has been already observed, that the inhabitants of Nayakote consist of several peculiar races, besides the ordinary Parbattia tribes, and the Mewars. Both the latter have been described elsewhere, I shall therefore confine myself in this place to a short notice of the former, or Denwar Darre, Manjhi, Brannoo, and Kumhal. These tribes are exceedingly ignorant, and moreover are disposed to use the little wit they have in cunning evasion of all inquiry into their origin and history, affecting to be hill men, employing the Parbattia language, and pretending to have forgotten their father-land and speech. In their dark-hued skin, slender forms, oval faces, elevated features, and peculiar dialect, barbarous *patios* as the last now is—may be traced, however, the indisputable signs of a southern origin. These men certainly do not belong to the Tartaric stock of the mountaineers of Nepal, but either to the ordinary stock of the Indian population (Indo-Germanic) or to some of those fragmentous branches of it which still here and there represent a preceding aboriginal race, as the Hos, Mundas, Gonds, Bhils across the Ganges, and the Tharus of the Nepalese Tarai. Between the last mentioned and the Denwars in particular, a distinct affinity may be traced; but to verify and illustrate this affinity through Tharoo helps, is as little feasible, as to do it through Denwar ones; and I shall only therefore venture to say at present, that whether the Tharoos of the Tarai, and the Denwars and their compeer cultivators of Nayakote, and of other similiar low and malarious valleys within the hills (for in many others they are found), belong to the aboriginal or to the ordinary stock of Indian population, they are closely connected among themselves, separate from the Tartar breed of the highland races, and, in the hills emigrants from the plains of north Behar several generations back.

The Manjhias, Kumhals, Bramoos, Denwars, and Darrees inhabit with impunity the lowest and hottest valleys of Nepal, just as the Tharoos do the Tarai; and the Mundas and Oorans of Chota Nagpore, both as recent servants and settlers, merely in the case of the last two, who are

chiefly mentioned here because of their participating with the races now before us, in that singular immunity from malarious affection which is not known to be the attribute of any other people whatever.

Wherever malaria rages from March till November, beyond the saul forest and within the hills, there the Denwars, Durres, Bramos, Kumbhals, and Manjhis dwell, and dwell exclusively; sometimes collected in small villages, more usually in scattered cottages comfortably built of unhewn stone, or wattles laid over with plaister, and furnished with a pent and overhung roof of grass or rice straw, which is verandahed towards the east. They follow the avocations of agriculturists, potters, fishermen, and ferrymen, and at all these crafts, and more especially at the second, they are very expert; the Kumbhals of Nayakote in particular being renowned for their workmanship even in the vicinity of the very able craftsmen in that kind, whom the great valley produces.

These races of men affect a distinctness among themselves which is fit only to make an enlightened stranger smile, though it may possibly indicate different periods of migration from below, and of settlement within the hills, or migrations from different parts of the plains. In general the five tribes or races will not intermarry among themselves, nor with any of the races around them; and they allege that their languages (dialects) as well as usages are distinct. But they all call themselves Hindoos, though they neither believe in the sacred scriptures of the Hindoos, nor accept the sacerdotal offices of the Brahmans. With a general resemblance of manners and customs, they have some trivial diversities of usage, as follows:—

Manjhis. Their priests are the old men of the tribe; in making burnt or other offerings to their deities, they use no sacred or other words or prayers. On account of births they are impure for four days: they cut the navel on the day of birth, and four days afterwards make a feast. On account of deaths the impurity lasts for ten days, but under stress of business one day's observance will suffice at the moment, so that the other nine are observed afterwards. *Denwars.* They allege that they came from the western hills; their priests are their husbands' daughters' and sisters' sons.* Impurity at births lasts for ten days, and the same at deaths: they will not eat pulse dressed by

* These purely arbitrary customs may serve hereafter as helps in tracing the affinity of these and other semi-barbarous races throughout the mountains and hills of the Indian continent, the *disjecta membra* of its original population.

Brahmans, but rice, if it have ghee in it, they will. They sometimes enter into trade and service. *Durree, Kumhal, Bramoo*, have a general resemblance of manners and customs with the last; but they will not eat rice dressed by Brahmans, whether it have ghee in it or not, but will eat other things of Brahman's dressing. None of the five races has any written language or characters; but the investigation of their common connexion, and of their affinity with other aboriginal races inhabiting other more or less secluded localities throughout the plains of India, might still be managed through their speech, their physical attributes, their manners and customs, if the Argus jealousy of the Nepal government could by any means be charmed into a more discriminating use of Chinese maxims of foreign policy.

Rivers falling within the above limits.

1. The *Sindhu*, rises from Sindhubhanjung, an offset from mount Manichur, or the most eastern part of Sivapoor, the northern barrier of the greater valley. The *Sindhu* has a course of about fifteen miles almost due west, behind, or to the north of Sivapoor and Burmandi, through a narrow fertile glen, which is somewhat interrupted by the projection of the base of Burmandi, where the main road from Cathmandoo runs. Above this point the glen often bears the name of Jansen; the river is a mere streamlet drawing half its water moreover from the west aspect of Burmandi, below the Resident's Powah, or bungalow. It falls into the Tadi at Narain, or Ghur Ghaut, being divided from the Likhu by Bhaloo Danra, or the bear's ridge.

2. The *Likhu*, a somewhat larger stream than the *Sindhu*, parallel to it on the north, and separated from it by Bhaloo Danra. The *Likhu* rises from above the Kabilas ridge, which divides it from the Tadi on the north. The course of the *Likhu*, though in general parallel to that of the *Sindhu*, yet radiates towards the north, as the Tadi does still more. The *Likhu* is about double the size of the *Sindhu*, and has a course of perhaps twenty miles; it falls into the Tadi at Choughora, four miles above the lower Durbar of Nayakote. Its glen is cultivated throughout, and has an average width of 300 yards in its lower part. It is not a third the size of the Tadi.

The *Tadi*, classically styled Suryavatti, from it taking its rise at Suryakund, or the Sun's Fount, which in the most easterly of the twenty-two little lakes of Gosainthan, is thrown off towards the east, as is the

Trisul from the same point towards the west, by the loftiest of the snowy peaks in the region of Nepal Proper, and which is consequently the point of divergency of the nearest seven Gandasi on the one hand and of the seven Consiki, or Cosis, on the other. The Tadi, however, though at first put off in an easterly direction, is drawn round westerly to mingle with the seven Gandacks, instead of joining the proximate Milamchi and Inalcini, or first feeders of the Sun Cousi, by a large ridge running south from Gosainthan nearly to Sivapoor, and putting off laterally towards the west the inferior ridges of Kabilas and Nerja, which separate the rivers Likhu and Tadi in all their lower and parallel courses. The Tadi proceeding at first easterly, is gradually bent to the west by the great ridge just mentioned. The whole course of the river to Devi Ghaut, where it merges in the Trisul, may be thirty miles, ten east and south, and the rest WSW. In its lower course, before reaching Nayakote, it is bounded on the left bank by the narrow ridge of Kabilas, and on the right by that of Nerja. It receives the Likhu at Choughora, four miles above, or east of, the lower Durbar of Nayakote, and the Sindhu at Narain Ghaut opposite to that Durbar. In the rest of its course of about four miles WSW. to Devi Ghaut it confines the great Tar plateau of Nayakote on the south, just as the Trisul does on the north. At Narain Ghaut the Tadi in December is thirty to forty yards wide, and two feet deep. It is but little wider or deeper at Devi Ghaut, and consequently is not a tenth of the size of the Trisul, which at the Sunga of Khinchat is thirty-six yards broad and twenty-two and a half feet deep. The glen of the Tadi is cultivated throughout, nearly, and in its uppermost parts is said not to be malarious.

The *Trisul*, or most easterly of the seven Gandacks of Nepal, rises from the principal of the twenty-two Kunds, or lakes of Gosainthan. These lakes occupy a flat summit of considerable extent, that cannot be less than 16,000 feet high, and lies immediately below the unrivalled peak variously called Nilkanth, Gosainthan and Dhanlogiri. The lake more especially called Gosainthan is probably a mile in circuit, and close behind, it from the perennial snow, issues by three principal clefts (hence the name *Trisul**) the river Trisul, or *Trisul*.

* The legend of the place states that Maha Deva went to the snow to cool his throat which had been burnt by swallowing the kal kut poison, that appearing at the chum-

Gandaki. Its course is at first due west almost, for perhaps fifteen miles, but then turns SSW. running in that direction for twenty miles, and more, to Devi Ghaut. It is a deep blue, arrowy, beautiful stream, conducting not only the pilgrim to Gosainthan, but the trader and traveller to Tibet; the road to Kerung in Tibet striking off from the river where it bends (as you ascend) to the east, and the town itself of Kerung being visible from Gosainthan in clear weather, at the distance of perhaps thirty miles. The Trisul, four miles above Nayakote, receives the Betravati at Dhaibung from the NE. It is a petty stream, not having a course of above fifteen miles from one of the resilient angles or bosoms of mount Dhaibung or Jibjibia, the continuation of which ridge towards the west, and across the Trisul, is called *Salima Bharsia*. This latter ridge conducts another feeder into the Trisul from the NW. called the Salankhu, of about the same size with the Betravati. Considerably south of the Selima ridge, is the ridge called Samribhanjang, whence flows a third and still smaller feeder of the Trisul, named the Samri Khola, which disembogues itself into the Trisul from the NW. half a mile to a mile below the Sunga of Khinchat. The valley of the Trisul is narrow, and without any Byasi, or plain on the level of its waters, which flow in a deep bed. The height, however, on one or both sides, supply numerous rills for occasional cultivation, which is maintained as far up as ten miles above Dhaibung, a considerable village, where the ordinary Parbuttiah population begins to yield to the race called Kachar Bhotiahs, or Cis-Himalayan Bhotiahs. At Devi Ghaut the river Trisul is passed by a ferry most jealously guarded; nor is the river thence to Devi Ghaut permitted to be used for any sort of transport, or even for the floating of timber, though the rapids (there are no cataracts) may help the prohibition. A few miles below Devi Ghaut the streamlets poured into the Trisul by the glen of Dhuniyasi, affords much better access to the great valley of Nepal, by the route of the Trisul, than that which follows that river to Nayakote and thence leads over Burmandi. These better routes issue into the great valley at Thankote, and at Ichangu Narain.

ing of the ocean threatened to consume the world. Maha Deva is called "blue throat," from the injury he sustained. He produced the river by striking his Trisul into the snows.

*Fossil Shells discovered by Capt. HAY, 1st European Regiment, in the neighbourhood of Bajgah, Afghanistan.**

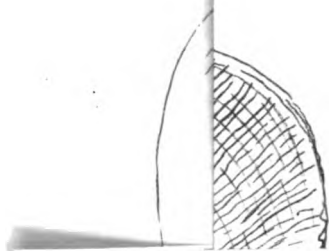
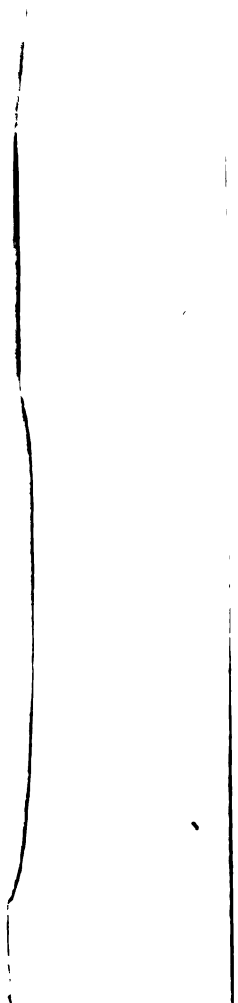
The fossil shells of which the accompanying are rough sketches, were all found by myself in the range of mountains between the Dundas, Shikun, and Karekotal passes; in fact nearly the whole at Bajgah. The formations in which they are found are so various, that I shall leave better geologists to describe them, but they are chiefly found in contorted strata.

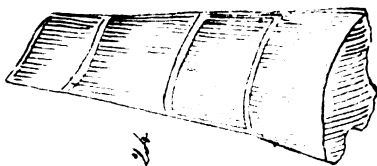
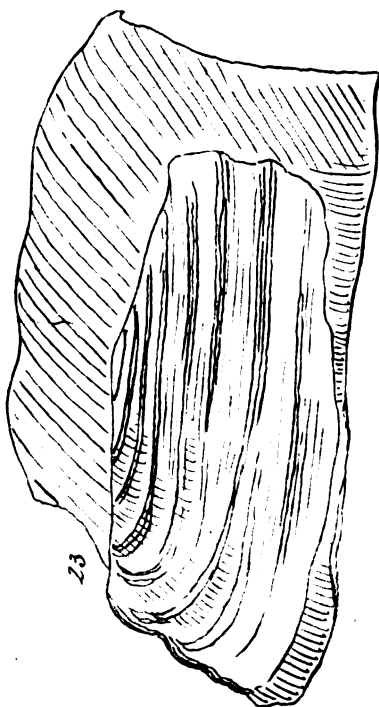
- No. 1. *a* and *b*. two views of the same shell.
 2. Upper and under views of, apparently, the inhabitant of a shell; edges carinated: it is imperfect.
 3. Tuberculated, and considerably depressed.
 4. Plagiostoma?
 5. A fragment only.
 6. Gryphæa. There are no less than six species of Gryphæa (I think) found here.
 7. Puzzles me. In appearance it is a Haliotis; but I have seen some specimens with the remains of a second valve; in which case it would approach the Gryphæa.
- So many of the Gryphæa being found here, would argue that the water had formerly been of a considerable depth. Masses of them are found, and apparently adhering to the rocks, which they cover so thick and regularly, as to be quite a coat of mail.
8. Apparently a Univalve.
 - 9, 10, 11, 12. Fragments of Bivalves.
 13. Univalve costated.
 - 14, 15, 16, 17. Bivalves. Specimens of 16 very perfect and closed.
 - 18, 19, 20, and 21. Outlines of four species of Gryphæa? all of natural size.

* NOTE.—The publication of these drawings has, I regret to say, been long delayed owing to circumstances I could not controul. The fossils whence these are taken "with many other valuable collections of geological specimens," says Capt. Hay, "and all my drawings," were lost when H. M. Shah Shooja's 4th Regt. of Infantry retired from Bajgah.



All these are





22. Piece of Coral ?

23. Has passed into Limestone.

24. Cavity formed in a conglomerate by a *Teredo* : but the fish itself, which is petrified, resembles a cork-screw ; they are of various sizes, all larger at one end than the other.

I have many other shells difficult to sketch, and two species of *Cidaris*

I should be glad to have correct drawings presented to the Society, as the distance is so great, that the probability is my collection may never reach India, or even the eyes of a connoisseur. Each shell having fragments of the rock adhering, will also enable me to classify their geology whenever I may meet an experienced individual.

It may be well to state, that I met with no shells in any of the mountain formations between Cabool and Syghan, where fragments are first observable in a yellow sandstone.

The level of Bajgah above the sea is about equal to that of Cabool.

Proceedings of the Asiatic Society.

(Friday Evening, 5th March, 1841.)

The Hon'ble Sir E. RYAN in the chair.

Capt. W. SMITH, proposed at the last Meeting, was ballotted for, and duly elected, to whom the necessary communication of his election, and rules of the Society for guidance, was ordered to be forwarded.

The following gentlemen were proposed as Members ; viz.

WELBY BROWN JACKSON, Esq. C. S. proposed by J. S. TORRENS, Esq., seconded by the Secretary.

FREDERICK BRAUFORD, Esq. C. S. proposed by J. S. TORRENS, Esq., seconded by the Secretary.

WILLIAM MASTERS, Esq. Head Teacher, La Martiniere, proposed by Dr. J. M'CLELLAND, seconded by the Secretary.

Library and Museum.

Lardner's Cabinet Cyclopædia;—Geometry,					1
Smith's Miner's Guide, London, 1836, 8vo...					1
Chart to ditto, ditto,			..		1
Naturalist's Library;—Mammalia; Natural History of Dogs, by H. Smith,					
vol. 1st, Edinburgh, 1840, 8vo.		..			1

Naturalist's Library;—Introduction to Entomology, by J. Duncan, Edinburgh, 1840, 8vo.	1
Sleeman's Report on the Depredations committed by the Thug Gangs of Upper and Central India, Calcutta, 1840, 8vo.	1
Society for the encouragement of Arts, Manufactures, and Commerce, London, 1840,	P
Oriental Christian Spectator, vol. 1st, No. 11, and vol. 2nd, No. 1st, ..	P
London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, vol. 17th, No. 110, October 1840, ..	P
London and Edinburgh New Philosophical Magazine and Journal of Science, 3d. Series vol. 15th, Nos. 98, 99, and vol. 16th, Nos. 100, 101, and 103,	P
Magazine of Natural History, New Series, vol. 4th, No. 40, ..	P
Calcutta Monthly Journal and Repository of Intelligence, 3d Series, No. 69, August 1840, and No. 70, 74, for 1841, ..	P
Annals and Magazine of Natural History, No 35, October 1840,	P
Letters and Papers from the Société Royale D'Agriculture et de Commerce de Caen (leaf,)	P
Journal des Savants, Aout, 1840,	P
Annals de Chimie et de Physique, per Gay, Lussac et Arago, Tome 72, October 1839,	P
Glossarium Sanscritum, a F. Bopp, fasciculus, 1, Berolini, 1840,	P
Geneological Table of the Posterity of Timur, (in Persian) in leaf, ..	P
On Batta; Manuscript, (in German,)	P

For Distribution.—

(Notice,) on Tea from Assam,	12 Copies.
(ditto,) on Bengal Silk,	12 ditto.
(ditto,) on Jungle Silk,	12 ditto.

A Frame containing various coloured glasses;—presented by D. McFARLAN, Esq.
Victoria Armenian Spelling Books;—presented by Mr. J. AVDALL.

Burmese palm-leaf book with figures;—presented by Capt. McLEOD.

A box containing several impressions of coins in Sealing-wax;—

The plan of the Ghât to be erected to the memory of the late JAS. PRINSEP, Esq.;—presented by R. H. RATTRAY, Esq.

The Secretary submitted a copy of the “Bon Zeen,” a Burmese Work on Eternal Philosophy, of ancient date;—presented by Captain W. McLEOD.

Read a letter from W. DUNBAR, Esq. Assistant Surgeon, 5th Irregular Cavalry, intimating the discovery of a coal bed in a village named *Bullea*, situated about 14 miles to the south of Hazareebaugh.

“On the banks of the *Suncherai*, a small nullah,” writes DR. DUNBAR, “running into the *Haharoo*, I first saw the coal, in a bed about three feet in thickness, with a gentle dip or inclination to the west. It was splintery, very black, lying below a friable sandstone and alluvium containing konkur. The bed seemed to be of great extent, and I have no doubt that any quantity of coal can be procured at this place.

I brought some specimens, and found that those from near the surface did not burn well, the other burned very well indeed, without a great deal of smoke, and leaving an inconsiderable quantity of ashes."

Read a letter from Mr. Secretary BUSHBY, of the 30th December 1840, enclosing copy of a dispatch from the Honorable the Court of Directors, requesting that the Asiatic Society will enable the Government to carry into effect the wishes of the Honorable Court in respect to all Zoological and Entomological Collections deposited in their Museum on the part of Government, or by persons conducting Missions on the part of the Government.

Resolved—That the papers be referred to the Officiating Curator for his Report.

Read a letter from Professor WILSON, of 12th October 1840, offering copy of two Lectures by him, on the religious belief and practices of the Hindoos.

Read a letter of 16th May 1840, from the Secretary to the Society of Antiquaries of London, forwarding the 28th vol. of *Archeologia*, for the use of the Library of the Society.

Read a letter from the late Lieut. W. LOVEDAY to Lieut. Col. STACY, with a sketch by the deceased of the Etawah Chuttree (in the vicinity of Neemuch) and copy of the inscription found there.

Lieut. LOVEDAY writes, "I have but little to add by way of information, merely that returning one day from shooting, wearied and unsuccessful, I was much struck with the elegant appearance of this Chuttree; and resting under its shade, examined with surprise, and no little gratification, the elaborate sculpture of the pillars, of one of which I send you a separate sketch; the date of the inscription (Sumbut 1130) caught my eye, when I immediately transcribed the whole. I do not send you a translation, as the Devce Nagree is clear and easily read, with the exception of two or three words, which our Calcutta friends will soon rectify. The inscription is on an upright stone slab, on the top of which are sculptured in alto-relievo, eight figures, representing the Rajah and his seven wives, to whose memory the edifice has been raised."

Read a letter, dated Cabool 24th December 1840, from Capt. W. E. HAY, reporting the loss of the whole of his fossil shells (sketches of which he had furnished) on the retreat of the Shah's 4th Infantry from Bajgah, together with many other valuable collections of coins and geological specimens, and all his drawings. Captain HAY adds, however, that he had accumulated a number of others from Bokhara, Samerkand, Balkh, &c. enclosing at the same time, some impressions of apparently ancient Hindoo coins.

Read a letter from Lieut. Alex. Murray MACGREGOR, of 31st January 1841, with casts of coins intaglio.

He writes "I have sent cast of a Jupiter seated on a throne, holding a Minerva on the palm of his right hand, a sceptre occupies his left, and the Eagle is

seated by his right foot; it is an intaglio found at Rome, during some excavations there, and given to me by a gentleman lately arrived from Europe, via Rome and Naples. The other is an *Ibex* of the Alps, found at Pompeii by the same person. Both are cut out of cinnamon-coloured agate, or perhaps a species of ruby, for it partakes of both, though more of an agate. The Cupid I found last February at Kanoe; it likewise is on a cinnamon-coloured agate, but does not seem a very well cut gem. I cannot find the gold coin mentioned in any of the Prinsep Plates. One of the casts is of a silver penny of George III; curious only in not now being a current coin."

Read a letter from Lieut. H. COMBE of 12th December 1840, forwarding a drawing of a coin in his possession for my information, with reference to the letters marked thereon. On the coin are figures; that with the spear is evidently male, with a gladius round the head, the other with a crescent is a female. On the obverse is a male figure naked to the waist, with a fanciful tail.

The Secretary informed the Meeting that the subjects of the four foregoing communications would be noticed in the Asiatic Journal more fully, with lithographed drawings of the sketches by Lieut. LOVEDAY, and of the impressions of such of the coins as have not been already noticed.

The Secretary noticed the presentation by D. McFARLAN, Esq. of a handsome stained window-glass.

Read a note by the Secretary, with an estimate of charges for preparing coloured lithographed copies of the late Dr. LORD's Zoological Sketches of Cabool, and suggesting the reference of the choice of sketches to be published to a Sub-Committee whom the President would request to undertake that duty, in communication with the Curator of the Society.

Dr. HUFFNAGLE and Dr. SPRY were selected by the President to form the Committee, and on the motion of Professor O'SHAUGHNESSY, the name of Dr. PEARSON was added. To the discretion of these gentlemen, was left the sketches to be selected for publication. On the motion of Professor O'SHAUGHNESSY, seconded by the President, Dr. PEARSON's name was also added to the Committee of Papers to supply a vacancy.

Read a letter of 18th May, 1840 (of which the following is a copy) from Professor FORBES, of King's College.

To the Secretary of the Asiatic Society of Bengal.

Sir,

London, 8 Alfred Street, Bedford Square, 18th May 1840

I should not have deemed the accompanying trifling essays of sufficient importance to be offered to your Society, were it not that a complete copy of the *Jāmi al-tawārīkh*

has been just discovered among the MSS. of the India House. It is a copy of the original Persian, transcribed A.H. 1081 and 1082, and belonged to the celebrated Dr. LEYDEN. It contains the whole of the author's Historical Works except the lives of Gházán Khán and Uljayto Khán, which may be considered biographical rather than historical. I have now the volume before me, through the kindness of Professor WILSON, who for many years was the ornament of your Society. Of this precious work, I am now engaged in drawing up an abstract for the next number of our Journal. The accompanying letter which appeared in our last number refers to the Arabic version of the work, which unfortunately is incomplete; perhaps by the exertions of your Society the lost fragments may yet be recovered, and I venture to say that we have still public spirit enough among us to publish this second volume both in Persian and Arabic if procurable. You have of course received Quatremère's magnificent volume on the life and reign of *Hulagun Khan*. The portion of the author's works which we wish to publish, would be infinitely more interesting, particularly the histories of *China*, *India*, and the *Franks*, all of which are perfect in the Persian volume now before me, though none of them is quite complete in the Arabic. Should your Society be in possession of either the Persian or Arabic, would you kindly inform me of the same, and oblige,

Yours obediently,

D. FORBES.

A letter, read at a late Meeting of the Royal Asiatic Society of Great Britain and Ireland, on the recovery of a (supposed) lost volume of the *Jámi al Tawárikh* of *Rashidud-dín*.

P. S.—Since the above letter was printed in the Society's Journal; a complete copy of the *Jámi al tawárikh* in Persian has been found in the *Leyden* collection of MSS. now in the East India House Library. An analysis of this rare volume will appear in the next number of the Society's Journal.

D. FORBES.

8 ALFRED STREET,
18th May, 1840.

'Letter of Professor Forbes, on the Recovery of a lost portion of the Jámi al Tawárikh.

'SIR,

'MR. W. MORLEY has kindly presented to me a copy of his interesting letter addressed to Major-General Briggs, respecting the portion of the *Jámi al Tawárikh*, now in the Society's Library. About the time when MR. MORLEY's communication was passing through the press, I accidentally fell in with a much larger portion of the *Jámi al Tawárikh*, comprising one half the original volume, of which the Society's fragment forms about one-fifth. The two fragments have been clearly proved (as you will perceive hereafter) to be parts of the same grand original; and it is curious enough, that after many years, perhaps centuries of separation, they should have at last met in a portion of the earth so remote from their native city.

'That portion of the *Jámi al Tawárikh*, which forms the subject of the present hasty and imperfect communication, belonged to the late Colonel John Baillie, a distinguished member of the Asiatic Society. Shortly after the death of that eminent Orientalist, his house in town was let, and his books and manuscripts were temporarily removed to the house of a friend in Soho Square, previous to their being con-

veyed to the family estate in Inverness-shire.* They have remained however undisturbed in Soho Square ever since. A few weeks ago I happened to have a pupil who lived in the same house, and from his description of some of the MSS. I felt and expressed my wishes to see them, in which request I was most readily indulged.

‘The first, indeed I may say the only, work that caught my attention was a large Arabic manuscript of a historical nature, written in a beautiful and very old Naskhi hand, with many pictures very creditably executed, all things considered. On the back of this rare volume is written in a distinct Persian hand “*Tārīkh i Tabarī*,” and as if this were not sufficient, there is a note written in Persian, on a blank page, folio 154, of which the following is a literal translation—“The name of this book is *The Tārīkh i Tabarī*, (the History or Chronicle of Tabari,) the author’s autograph. The whole number of leaves when complete, amounted to 303; now however, some one has stolen and carried off one half of it, or about 150 leaves. It was written by the author’s own hand, in the year of the Hegira 706 (A. D. 1306-7).”

‘The information intended to be conveyed in this note, is, unfortunately rendered very suspicious, by the date given in the conclusion; as Tabari had flourished some 450 lunar years earlier. On examining the work itself, I found that the Muhammadan history came down to the last of the Khalīfas of Bagdad; hence it could not be the original Tabari. As D’Herbelot, however, has mentioned two writers who have continued the history of Tabari down to their own times, I thought this might possibly be one of them, and in order to verify the circumstance, I took the Persian version with me next day to compare them; but after making the most liberal allowance for the freedom generally used by Oriental translators, I found that the two could never have been intended for the same work.

‘Resolved, if possible, to arrive at some satisfactory conclusion respecting the MS., I requested a very intelligent native† of India to accompany me to see it. The moment this gentleman looked at it, he told me that whether it was Tabari or not, he had seen the identical book some months back in a house where he visited. On further inquiry, I learned that the book to which he alluded belonged to the Asiatic Society. Next day I examined the Society’s MS. and found, as I had concluded, that it forms part of the *half* that is missing in Colonel Baillie’s MS. In proof of this, I may mention that the ink and the handwriting are the same in both. The length and breadth and number of lines in each page are the same, and the paintings are in the same style in both. The works had been numbered originally by leaves or folia, as is usual in Oriental MS.; these numbers still remain on the second page of each leaf, and every leaf of the Society’s fragment is missing in Colonel Baillie’s work. There is no question then, that as Sādi hath it, “they are limbs of one another,” for assuredly they originally consisted of but one work.

‘Colonel Baillie’s MS. contains at present 151 folia or leaves, being as nearly as possible one half the original number, as stated in the Persian note. The last leaf is numbered 218, so that sixty-seven leaves are wanting to complete the work from the beginning to the last leaf now remaining. Of these, there are seven leaves in the Society’s fragment on the history of Muhammad. They are numbered (in their order) 57, 58, 63, 64, 66, 70, and 74, all of which are, of course, missing in Colonel Baillie’s MS. If these seven leaves were restored to their places in Colonel

* Colonel Baillie’s Books and Manuscripts are entailed property.

† Mir Afzal Ali, Wakil from the Mahārāj of Satara.

B.'s MS. and the remainder of the Society's fragment subjoined, they would altogether form a volume of 210 folia, there being still a deficiency of ninety-three leaves. This goes on the supposition that the number originally consisted of 303 leaves, as stated in the Persian note.

The contents of Colonel Baillie's MS. may be conveniently classed under three distinct heads.

'1st. From the commencement to folio 41.

'This portion of the work is perfect, with the exception of the first and second leaves; but the loss of these is greatly to be lamented, as they may have contained a general account of the whole volume, and an outline of its contents. This part is occupied with the history of Persia and Arabia from the earliest times down to the birth of Muhammad. At the same time the author has inserted, apparently in chronological order, copious accounts of the patriarchs and prophets of the Old Testament; also of Alexander the Great and his successors.

'2nd. From folio 41 to folio 154.

'This portion commences with the genealogy and birth of Muhammad. It then gives a minute account of his life, and the history of his successors down to the capture of Bagdad by Hûlakû Khân, A.H. 654—A.D. 1256. This part of the work is strictly confined to the history of Muhammad and the Khalffas, the events of each year being detailed separately, with the date prefixed. In this division there are missing altogether forty-six leaves; but by replacing the seven leaves already mentioned as contained in the Society's MS., the lacuna will be reduced to thirty-nine, the greater part of which occurs between folios 70 and 107 inclusive, which treats of the history of the early Khalffas. From folio 107 to 154 there is no hiatus.

'3rd. From folio 154 to 217.

'The third part treats of the history of Persia under the Ghaznavi, the Saljûki, and the Atabeg dynasties. Like the first, it is of a somewhat miscellaneous character: the history of Persia is its leading feature. At the same time the author notices, in chronological order, such illustrious personages and remarkable events as came within his knowledge among other nations, particularly among the Christians. In this portion there are nineteen leaves missing, and these being towards the end, I cannot say how far the history extends—probably to the author's own times.

'Folios 217 and 218, (the last in the volume,) are occupied with the history of the kings of Kh'arizm. How much of the original volume this subject occupied is uncertain. From 219 to 248 inclusive, there is a breach which, for the present, we cannot repair. At folio 249 the Society's MS. commences the history of Khata, and proceeds uninterruptedly to folio 300, if we could put faith in numbers, of which more hereafter.

'Supposing then the two MSS. were re-united, there would still be *at least* the following deficiency:—

	Fol.
In Part 1st, containing the preface, &c.	2
In — 2nd, Muhammad and the early Khalffas,	39
In — 3rd, the latter history of Persia, &c.	19
Between fol. 219 and 248 inclusive, (subject uncertain)	30
Folia 301, 302, and 303, at the end	3
	—
Total	93

'I have reason to suspect, however, that the volume consisted originally of more than 303 leaves. In the Society's MS. there is a lacuna of some leaves in the life of Shakhmuni, while the numbers of the folia proceed without any interruption. This can be accounted for on the supposition that the folia were numbered some time after the work was written, but previous to its present dismemberment; and it will be perceived that the ink used in the numbers differs considerably from that of the text. The person who wrote the numbers may have known as little about the nature and contents of the work as the writer of the Persian note, who called it *The History of Tabarî*; and hence, I should think, arose the mistake.

'I have no means of ascertaining in what part of India Colonel Baillie procured his MS., but I should say, most probably at Lakhnau, where he was long resident. That the Society's fragment came from that quarter, within the last fifteen or sixteen years, can be easily proved. There is a duplicate of the life of Shakhmuni in the Society's Library, transcribed at Devî, a village or district of Lakhnau, in May, 1823*. That this was done from the Society's original is all but certain, for the same hiatus occurs in the copy as in the original. The transcriber there mentions, in a note, that "there is one leaf missing (in the original);" but I am afraid, if we judge from circumstances, that *ten* leaves would have been nearer the mark. In the life of Shakhmuni there are twenty-one sections, of which about ten are lost (from the seventh to the seventeenth). Each section before and after the last part occupies at an average a single leaf. I cannot believe, then, that the ten lost sections could have been comprised in one leaf, particularly as what remains of the seventeenth section alone occupies a leaf and half a page. It is not unlikely, then, that there may be other lacunæ which may have escaped the notice of the person who numbered the leaves—a point which can be ascertained only by a careful perusal of the work itself.

'Should this brief account be deemed worthy of insertion in the *Journal of the Asiatic Society*, (perhaps, in company with Mr. Morley's more ample communication,) it may prove the means of exciting our numerous Orientalists in India to make inquiries for the remaining fragments of this rare volume.

'There is every reason to suppose that both the portions of the work now in London, came from Lakhnau; and in that quarter it is probable the rest may yet be recovered. Mr. Morley has given an accurate fac-simile of a portion of folio 74, and I may add, that where no breaks occur, each page contains thirty-five of such lines. Finally, such numbers as I have stated to be missing, will, most probably, have remained on the leaves of the lost fragments, which may thus be easily identified.

'Nearly two years ago I had the honour of requesting the attention of the Society to some rare Oriental works mentioned in a Persian catalogue of the library of Farzîdâ Kulf, or some such name. In the historical department of that catalogue, one of the first books entered is, "*The Chronicle of Tabarî*, the author's autograph, in the Arabic language, with *seventy* pictures of Saints, his Eminence the Prophet, and sundry kings, very rare." Now I strongly suspect that the work here described, is none other than Colonel Baillie's MS. of the *Jâmi al Tawdrîkh*. The number of pictures in Col. Baillie's half, is really *seventy*, and among these is a portrait of Muhammad. The writer of the catalogue received the work as he found it marked on the back, and in the Persian note, folio 154, without troubling his head about its contents. What

* Vide Mr. Morley's Note, page 23.

renders this supposition still more probable is, that the *Jāmi al Tawdrīkh* is not mentioned in the catalogue as one of Farzáda Kuli's books. Upon the whole then, there is good reason to infer that Colonel Baillie's MS. some forty years back, was one of the many rare works described in the catalogue of Farzáda Kuli's library; and if that treasure be not ere now dispersed, I should suggest that search should be made for it in the kingdom of Oude.

'Before I conclude these hasty remarks, I cannot help observing that the *Jāmi al Tawdrīkh* does not seem so very scarce a book among eastern writers,* as M. de Quatremere would lead us to suppose. It is inferred, for instance, that Mirkhond and Khondemīr were either ignorant of its existence, or borrowed from it without acknowledgment. Now the fact is, that Mirkhond, in the preface to the *Rozat-al-saffa*, mentions this very work as one of the sources to which he was indebted for his materials. His words are,† "Kh'āja Rashīd tabīb, sāhib-i Jāmi, that is, Khāja Rashīd, the physician, author of the *Jāmi*," i. e., *The Collection*, or *Universal History*. Of Khondemīr, I do not happen to possess a copy, but at all events, there can be no reason to suppose that he was ignorant of the *Jāmi*, as he *must* have read the works of his immediate predecessor, Mirkhond. It would be endless, as well as useless, to mention other writers who allude to the *Jāmi al Tawdrīkh*. In the introduction to the fourth volume of the *Kimīya-e-Sa'adat*, the author expresses his obligations to the *Jāmi al Tawdrīkh*, of Kh'āja Rashīd, the wazīr. Even the very thieves who stole the Society's fragment out of the volume now in possession of Colonel Baillie's successor, seemed to have very well known what they were about, for the fragment is marked, "*as Jāmi al Tawdrīkh*," i. e. out of the *Collection of Histories*.

'In the Society's MS., No. 14, already alluded to as being a duplicate of the old fragment of the life of Shakmuni, there is prefixed (in Persian) an account of the author and his works, of which, as it is not long, a translation is here subjoined. "It is well known that the *Jāmi al Tawdrīkh*, compiled by Kh'āja Rashīd al-dīn, contains a history of the whole world, both as regards the lives of the prophets, and the manners and conduct of the kings of every region. In the same work the writer hath also given a sketch of the history of India; for he had learned something of the tenets of the sages of that country from (competent) people, and part (of his information) he had from the book of Abul rīshān Bīrūnī, who having frequently travelled to India in the service of Sultan Mahmūd, the son of Sabactagin, had held intercourse with the sages of that country. After he had made thorough proficiency in the science of the Indian philosophers, he translated, from the Indian language into the Arabic tongue, the book of Patankal, or Patanjali, which is a collection of all the sciences,

* It has been suggested to me, that the *Jāmi al Tawdrīkh*, alluded to by Mirkhond, &c., refers only to the *Tarīkh-i Ghāzāni*, or first volume, but not to the last three. I must say, however, that I cannot perceive why these writers should have so misapplied the term *Collection of Histories*, to the history of a particular nation, which, besides, had a separate title of its own. I may further mention that, in a MS. in my possession, entitled *Majma al Gharāib*, the *Jāmi al Tawdrīkh* is quoted on a matter of chronology which is assuredly from the latter volumes, stating that, "from the fall of Adam to the birth of Muhammad there had elapsed 6102 years, six months, and ten days!"

and one of the most valuable works of the sages of Hind, (like the *Kitab i Shaffa*, by Shaikh al-rasi.) It contains an account of all their various sects, and the history of their ancient kings, also the life of Shakhmuni, who according to their opinion, and the testimony of Kamakshari al Bakhsh al Kashmfrí, is the guiding prophet of the people of Hind and Khatá. To this work he gave the name of *Patanjal*, a copy of which he carried away with him.

"Since the history and actions of Shakhmuni, who was once the prophet of the people of India, have, through the lapse of time, sunk into oblivion, I, the meanest of God's servants, Abd ul Kádir, resident of Devi, of Lakhnau, have transcribed the following account of him from the *Jami al Tawdrikh*. And, at the request of the high in dignity and rank, Major Herbert, I have made a translation of it into easy Persian. In certain parts the original was defective and obliterated; these defects, with their proposed corrections, I have marked on the margin. Deo soli scientia."

"I have nothing further to add respecting this rare and ancient work, except to express my regret that it has not been deposited in the Society's library, where it might be accessible to Oriental scholars. There may be other valuable MSS. in Colonel Baillie's collection, which I have not had time to examine; and I shall only mention here, a very fine copy of the *Mahábhárata*. It is beautifully written on one roll of fine paper, laid on cotton or silk, and abounds with well-executed paintings, representing most of the complicated events described in Hindu mythology. I believe it contains the whole work, as the writing is extremely small, though very distinct. The roll is about 220 feet long, and I should say from four to five inches wide within the margin, which is ornamented and illumined throughout."

I am, Sir, yours faithfully,

8, Alfred-street, Bedford-square,
26th October, 1839.

D. FORBES'

"P.S. In the preceding letter I have alluded to a Persian MS. in the Society's possession, entitled a *Catalogue of the Library of Farzadda Kuli*. This work is frequently quoted by my friend M. Garcin de Tassy, in his *Histoire de la Littérature Hindoui et Hindoustani*, lately published; for which reason I beg leave to subjoin the following extract from an account of it, which was read at one of the meetings of the Royal Asiatic Society in 1838.

"The accompanying MS. is a catalogue of books in the Arabic, Persian, and Hindu languages, amounting, on a rough estimate, to upwards of 2,000 volumes. It is fairly written and well arranged, the works being classed under the different subjects of which they treat, as may be seen by referring to the second blank leaf at the beginning, where I have given an abstract of the contents.

"Of the works here mentioned, many, I believe, are unknown, even by name in this country; but there is one in particular which merits attention, as it has been long given up for lost by the Orientalists of Europe. I allude to the *original Arabic text* of the *Chronicles of Tabari*, which is here described (p. 10) as follows:—'The *Chronicles of Tabari—the Author's Autograph*, with seventy portraits of prophets, his Eminence the Apostle, and various princes, IN THE ARABIC LANGUAGE—RARE'

"Here then it is evident that the original of *Tabari* existed (in all probability) in India within the last forty or fifty years. Unfortunately there is no date, nor name of person or place mentioned in the book, from which we could discover of whose library

it is the catalogue. The last words are the writer's name, *Dávar Baksh*, a piece of information of no great consequence. On the first blank leaf some one has written, barbarously enough, in Roman characters*, what I believe is intended for Persian, and apparently signifies, 'A Catalogue of the Library of *Fersada Kole*;' but even this affords us very little enlightenment. I am led, however, to infer from circumstances—in the first place, that the book has been written within the last forty or fifty years; this is evident from its mentioning (p. 90) *the Diwdn of Sauda*, a Hindustani poet, who died only a few years before the commencement of the present century. Secondly, it is a catalogue of the library of *some prince*, as may indeed be inferred from its extent, but still more from an expression that occurs in page 95, viz., 'A list of the books remaining in the old chest belonging to his August and Sublime Highness.' Thirdly, and lastly, there is every reason to infer, that the prince alluded to was Indian, from the number of Hindí books mentioned in the Catalogue, and in the list referring to the old chest aforesaid.

"If the above inferences may be relied on, we have reason to hope that the original and genuine text of Tabarí, the Livy of Arabia, may yet be recovered. It would seem that an ancient manuscript of it did lately exist in India, and is, in all probability, there still. As to its being the *autograph* of the author, I believe we are to take that expression 'cum grano salis' as we do the *originals* of Corregio and Rubens, &c., so very plentiful among picture-dealers and amateurs. But whether the MS. here alluded to, be, or be not, the author's own copy, is a question of minor importance. The main object is to rescue it, ere it be too late, from that state of obscurity in which it at present lies, and to that end I have been induced to lay this brief and imperfect notice of it before the members of the Asiatic Society. It is probable that some individual out of that learned body may be able to trace the history of the MS. catalogue here presented. The booksellers from whom I had it, could tell me nothing as to whence it came, or whose it had been.

"It would be tedious to notice many of the rare works mentioned in the catalogue; there are a few, however, which I cannot pass over. In page 11, we have 'The *Mustafa Náma*, in the metre of the *Shahnáma*, containing the history of Persia (or rather of Islámism) from Muhammad to Tahmasp of the Sufi family, amounting to 104,000 couplets, beautifully written, and ornamented with gold dust.' Such is the literal translation of the description given of this stupendous work, which is very nearly *twice the size* of the *Shahnáma*, and embraces a period of about a thousand years.

"Further on, among the works on Philosophy, Logic, and Rhetoric, are mentioned several pieces translated from Aristotle, Plato, and other wise men of Greece, all of which are highly interesting. There is also a Persian translation of the *Makámát* of Harfí, which would be invaluable in explaining many passages of that learned, but, to us, obscure writer.'

"To the above remarks, written nearly two years ago, I must now add my altered belief that the *Tarikh i Tabarí*, mentioned in the catalogue, is nothing else than Colonel Baillie's MS. of the *Jdmi al Tawárikh*. This I infer from the identity of the description given of both, and, above all, from the number of pictures agreeing in both. The doubts which I might feel as to the genuineness of Tabarí's autograph, do

* It runs thus,—*Ferisht Khootab Khaona Fersada Kole*.

not apply to the *Jāmi al Tawārīkh*. Tabarī lived a thousand years ago; and Rashīd al Dīn finished his history only as far back as a little more than half that period. That the *Jāmi al Tawārīkh* is really and truly what it purports to be, viz, the author's own copy, written under his own inspection, I have not the least reason to doubt, as I have seen manuscripts of an older date in as good a state of preservation. Should any of your readers feel sceptical on this point, they may easily satisfy themselves by carefully examining the hand-writing and paper, and comparing the same with others of the corresponding era."

D. F.

The Secretary noticed that he had made inquiries through friends in the North-Western Provinces to procure a copy of this highly valuable work, and had intimation of the existence of a copy of the 1st vol. in Arabic said to be at Lahore. He however believed that his correspondent (a native bookseller at Delhi) possessed the work himself. He had made some exertions to ascertain the condition of the volume, which he subsequently gave up.

The Secretary communicated the intelligence of the discovery of papers of value among certain MSS. volumes which were deposited with the late Mr. JAMES PRINSEP's books at the Society's Rooms. They consisted chiefly of MSS. of Capt. Herbert, the greater part of which were notes Astronomical, Chemical, and Geological, together with results of his Himalaya Survey, observations which was thought not to have been published. At any rate it was incumbent on the Society, thought the Secretary, to examine these papers carefully by a Sub-Committee; agreeably to that suggestion, Major FORBES, Professor O'SHAUGHNESSY, and Lieut. BROWN were requested to afford their valuable aid on the occasion. The Secretary further reported that among some old records of the Physical Class, Asiatic Society, were found several Catalogues of Minerals in the Museum, supposed to have been lost, of the collections by Coulthard, Rose, Streave, &c. &c.

The Secretary reported to the Meeting that some months ago he had communicated with Mr. W. C. HURRY, on the subject of a Chinese Dictionary compiling by the Rev. J. M. CALLERY, and that he had requested from that gentleman certain documents connected with the undertaking. These were now received, and submitted. It was resolved, that these should be referred to the Committee of Papers for consideration and report.

Read letter from Mr. J. AYDALL, of the 5th March 1841, forwarding for presentation to the Asiatic Society, a copy of his "Victoria Spelling Book," in Armenian, divided into two parts, and embellished with 24 engravings.

Read the following report submitted by the Officiating Curator for the month of February last:—

"H. W. TORRENS, Esq.

Secretary Asiatic Society.

"Sir,

"I have the honour to submit as follows my report for the month of February.

"*Geological, Mineralogical, and Paleontological Departments.*—Proceeding at every spare moment, with Catalogues, of which a part are now at press : and with the numbering and arranging of collections.

"The two cases of specimens forwarded by the Honorable the Court of Directors, under the care of Captain TREMENER, as a basis for a Museum of Economic Geology, have been imported, and their contents temporarily arranged ; but before putting the labels we have to fit up the interior of two out of the three cases. Another case is wanting to exhibit this collection properly, and several others to contain the additions we can make to the Museum from the Society's collections and from donations, and for those expected from England. The report on this collection has been made and sent in to you.

"We have some valuable additions to these departments, which will be noticed in the account of additions to the Museum.

"*Mammological, Ornithological, and Osteological Departments.*—Several additions, which will be detailed at the conclusion. I beg to report that we can make up another box for the Honorable the Court of Directors ; it will consist nearly as follows :—

"1. Skeleton of a Fox (Indian) prepared by us.

"2. A small box of fresh-water shells, being part of a collection presented by Mr. Stocqueler.

"3 { 50 Skins of Birds,
2 Skulls with horns,
5 Horns,
8 Fishes of the Indus, } Duplicates from Sir A. BURNES' Collection.

"I may suggest here that we point out to the Curator of the Museum of the Court of Directors, the great facility with which, if approved of by the Court, he might procure, in exchange for such specimens as he already possesses, some of the many which we require for the Museum of Economic Geology. It is scarcely possible to send home a skin of a bird, a skeleton, or a skull from India for which some duplicate may not be obtained in exchange, which would be of utility to us here.

"Three large cases of specimens have been sent down by Mr. CLARKE, Political Agent at Umballa, which upon examination prove to be the collections made by Sir A. BURNES, on his mission to Scinde, to which many of his drawings now in the hands of the lithographers relate. They seem unfortunately to have remained for the whole time without any care whatsoever, and many are wholly destroyed !

"Mr. Clarke informs us that the collection has been inspected by Dr. JAMESON, who has promised a report upon it. The contents of the chests were as follows :—

<i>Birds.</i> —retained for the Museum,		19
— duplicates, to be sent home,		50
— rotten, and thrown away,		22

Total, 91

<i>Sculls with Horns.</i> —for the Museum,	1
—— duplicates, for sending home,	6
Total,	7
<i>Horns.</i> —for the Museum,	2
—— duplicates, for sending home,	5
Total,	7
<i>Fish.</i> —for the Museum,	1
—— duplicates for sending home,	8
Total,	9
Porpoise scull, Alligator, Iguana, Lizard, Turtle, &c. altogether.	7
Snakes in spirits of wine, rotten and thrown away.	13
Skins of animals rotten and thrown away.	8

N. B. Claws and beaks of birds, and sculls of animals, preserved when worth doing so.

Fish Reptiles &c.— Nothing more to report.

“*Donations.*— Have been numerous and important. I have already noticed Sir A. BURNES’ collection, to which we have to add the following:—

DR. SPILSBURY—a chest of Fossil bones from the Nerbudda.

Col. MACLEOD—two boxes, being series of geological specimens collected by the late Captain PEMBERTON on his mission to Bootan. No catalogue with them.

H. PIDDINGTON, *Acting Curator.*—A collection of Cotton, Coffee, Sugar, Tobacco, and Tea soils, &c. from India, Mauritius, United States, Singapore, &c. many of them analysed. 7 Specimens of Burdwan Iron ores analysed. Specimens of the earth used in the curious glazing of native Sugar-pans.

G. EWBANK, Esq.—A young panther. Skeleton for the Museum.

Mr. D. E. RODRIGUES.—A pink-headed Duck, *Fuligula caryophyllacea*—Museum.

Mr. H. P. VIERRE.—A Snipe, *Scolopax*?—Museum.

Purchased.—2 Wild Geese, *Anas indica* or black-hooded Goose. 1 Skeleton; 1 stuffed,—Museum.

I have the honor to be, Sir,

CALCUTTA,

Your obedient servant,

1st March, 1840.

H. PIDDINGTON,

Actg. Curator, As. Soc. Museum.

The Society having been requested by Government, by a letter from Mr. Secretary Bushby of the 3rd February last, to submit a report of their Curator on the specimens brought by Captain Tremenheere, and deposited with the Society for the basis of a Museum of Economic Geology, and in what manner they were of opinion additions to the present collection may most usefully be made to it—Read the following report from Mr. H. PIDDINGTON, dated 26th February, 1841.

H. TURRENS, Esq.

Secretary, Asiatic Society.

Sir,

In obedience to the commands of the Right Honorable the Governor General in Council, conveyed in Mr. Secretary BUSHBY's letter to you, under date 3rd February, I have now the honor to submit my report on the collection brought out by Captain TREMENHERR, as a basis for the proposed Museum of Economic Geology. I should state perhaps, that Mr. BUSHBY's letter only reached me on the 10th instant, and that I have also been delayed by the necessity of referring to Captain TREMENHERR's Memorandum, which I have only this day obtained from Bishop's College Press. I have incorporated with the report, my views as to the additions which may most usefully be made to the Museum, and as to the manner in which these may be best obtained. I remark, that the Society in general is referred to on these points, but as my ideas relative to them are necessarily connected with the facts and views comprised in the report, I have thought that I might, without presumption, and even with some convenience, as to perusal, combine them in one statement.

I.—The collection brought out by Captain TREMENHERR, is a valuable basis for a Museum of Economic Geology, but it should be borne in mind, first, that it is only a commencement; and next, that it is almost a purely English collection. The little we yet know of Indian Geology has taught us that, on many points, there are wide differences from the received systems at home, extending even to the absence, or great rarity, of whole formations, and the presence of others which have no known corresponding types in Europe, or indeed in any part of the world; and it is quite possible that her mineralogy, when better known, may also produce its novelties. Hence we require,—if we wish to render our proposed Museum complete, as a light to the acquisition of existing knowledge, and a guide to future research, and this more especially in an economic point of view—a complete English and foreign series of specimens, by which the student and speculator may well understand their systems and processes, and a complete Indian one, fully to comprehend and avail ourselves of our own. I mention this in the first place, that I may not appear desirous of embracing too much, or to be remarking in any spirit of depreciation upon what the liberality of the Honorable the Court of Directors and the Government of India have allotted to the Society.

II. *Coal*.—The present collection comprises 51 specimens of coal and anthracite, from various coal fields. Those from several other English coal fields, as I learn from Captain TREMENHERR's report, are to be sent out. To these I suggest should be added specimens from the Scotch, and if possible from the French, Belgian, and American coal fields; with a series of specimens from each, illustrating also the coal formations and pseudo-coal formations; as for instance, that of Brora in Sutherlandshire. As we improve our mining systems and our mining knowledge, we shall probably obtain better coal.* We require also a set of sections of the coal measures of

* It may be perhaps doubted if our Indian coal has yet had fair play! The amount of our experiments as yet seems to have been, the burning of Indian and English Coal upon grates and in furnaces made for the latter, and then to pronounce the Indian coal as inferior! It is so no doubt, but it *might* produce far better results in grates and in furnaces adapted to it, on the principle that every kind of coal requires a different arrangement of these, to produce its maximum effect. This remark is not perhaps exactly in place here, but the importance of the subject may excuse its introduction.

different districts. These are not always published, but many of those which are not so may perhaps be obtained for us by the Honorable Court, through Mr. Dr. Вакне, or by the efforts of members and friends of the Society through their connections at home.

I allude to American specimens here, and shall have occasion to do so again in the course of this report, because there are peculiarities connected with the Geology of both North and South America, which render every light obtainable from those countries of the greatest interest to us. The use of anthracite in metallurgical operations, is but recent in England, and I am not aware that it has yet been used there for steamers, though the Americans are said to use it very extensively in their steam-boats. Models of all kinds of anthracite furnaces are an object of much importance to India, where this combustible is so often found.

III. *Iron Ores and Smeltings*.—The collection comprises about forty specimens of iron ores, their lodes, smeltings, and slags. We must recollect, in relation to this most important metal, in which India is so rich, that a considerable portion of the Indian ores of it, are varieties of the black or *protoxided* class, as magnetic iron-ore, titaniferous iron-sand, iron, glance, &c. though we have, as in Burdwan, and many other places plenty of the other kinds, of the finest quality, while the majority of the English wrought ores belong to the Red and Brown, or *peroxidized* and carbonated classes. Again: the whole system of English iron-smelting in the present day is one of smelting by coke; whereas the finest European irons, as the Swedish, Biscayan, Catalonian, some of the German, and all our fine Indian irons, are made by the charcoal process. Many of our rich ores are moreover situated where wood is abundant, and even a nuisance, and likely to be so for a long period of years; while coal (or coke) were it only from the want of roads, must be for a long time out of the question in such situations, to say nothing of the limestone.

Hence I should say, that it is a great desideratum in an Indian Museum, to possess specimens of the Spanish, Swedish, German, Corsican, Elbese, Pyrenean, and other ores of iron, of known fine qualities, worked by charcoal only, and often affording excellent iron at a single operation, as many of our simple native smeltings are known to do. As a guide to the Indian speculator, these ores, with descriptions or models of their furnaces, and full accounts of their processes (when these are not to be found in standard works of easy reference here) may be invaluable, as shewing him how to direct his efforts most advantageously and upon a scale, perhaps, better suited to his means than are the vast operations which the English iron-master, from the confined rates of profit, and excessive competition at home, finds indispensable. I may add in reference to this matter, that strange as it may appear to those unacquainted with the subject, there is scarcely any question of metallurgic chemistry upon which so little is known as that of the ores of iron!

IV. *Tin Ores*.—In this department the collection is very complete; from the lodes and ores, their roasting, stamping, washing, and smelting, down to the refuse of the furnaces. In a word, almost nothing is here wanting, and I embrace with pleasure this opportunity of saying that the mass of the specimens in all classes appears to be what may truly be called *working* specimens, as distinguished from the *show* specimens of the mineralogist's cabinets, and thus of much higher value for our purpose.

The Tin assortment consists of about 20 specimens of ores and lodes of various kinds, and of about 24 of the ore in various states of preparation, its smeltings, refuse, &c.

Tin is an ore little found except in England, or in the Eastern Islands, and Malayan Peninsula (we know nothing of the Tin mines of Mawar or Ava) but with such additions as we shall be able to make to the collection, from specimens already in the Museum, we may consider it as tolerably complete with respect to this metal. The desiderata are—good accounts of the Saxon and Bohemian works, and ores, with specimens. Of the Chinese and Malay Tin smeltings of the Eastern Islands, with samples of their ores; and specially of their refuse or slags, which last are probably well worth examination. It is said that both silver and gold have been found in them; and there is a description of Tin brought from Borneo, which is sold to the Chinese at Sooloo, and other places, for exportation, at a very high price; this is said to contain one or both of the precious metals. For our Eastern provinces, the investigation of every fact of this kind is of high importance.

V. *Copper*.—The copper ores are about seventy in number. They are also mostly an English assortment, comprising only the ores most usually found and worked in England. Several of the Indian, Asiatic,* and American copper-ores now in the Museum, will form valuable additions to this series. Our desiderata here are however numerous, we require some of the continental ores of Europe, and a series from South America, especially of those which exhibit the mixtures (or combinations) of copper and silver, or copper and gold. We are promised, I observe, as with the tin ores, samples of the English ore in all the stages of its progress, from the mine till it leaves the smelting house, with its slags, which are so instructive to the working speculator. But we require these both from England, where the smelting of copper is a separate trade, and the poorest ores are turned to the best account, and where all is performed by coke; and also from such countries as South America, many parts of Germany, &c. where charcoal alone is used. It is evident that even under the most scientific management, the modes of smelting, as governed by the fuel, must greatly influence results. The preceding remarks (at p. 9.) on the fuel, which may be available in certain situations, fully apply to copper as to iron works.

VI. *Lead Ores*.—We have but nine of these (of but one or two varieties) in the collection; and these again, with one or two expectations, of the commonest kinds. Every thing therefore is to be acquired in this department. We can supply something as to Indian specimens from the Museum. The lead ores, independent of their value as lead, deserve high attention, particularly those of the argentiferous class, which in fact run into the silver ores, containing at times so much silver, as to render the lead of little or no importance.

VII. *Antimony, Manganese, Zinc, and Tellurium*.—We have in the collection but eight or ten specimens in all of the three first of these metals, though they are all of importance; we shall be able to supply a few from the Society's, but we may say pretty nearly, that every thing is wanting in this section. The Indian and Eastern ores of antimony are deserving of great attention, for none of them have been yet examined, and they are so commonly met with, that some will no doubt in the end be found to belong to the class of antimonial silver ores. I mention the auriferous Tellurium in the section on gold. Captain TREMENEER's paper announces, I observe, an assortment of ores and specimens relating to zinc and the manufacture of brass.

* *Asiatic copper ores*. With reference to my remarks at pp. 4 & 5, I may mention here as a confirmation, that we have in Colonel Burney's collection of minerals from Ava, an ore of copper (with the same half-roasted from the Burmese workings) which is certainly not a common one, and perhaps new to the English miner at least.

VIII. *Silver*.—We have but three of these ores, but we shall be able to supply several South American, and other specimens, from the Society's collections. We require, however, series of the European and American silver ores with their lodes, preparations, and smeltings. I mention particularly here, the Mexican and Peruvian silver ores, because some of them would, from their earthy appearance, and the small proportion of metal they contain, be passed by as mere red earthy soils or iron ores, which in fact they are. Some of these ores are from the staples of some of the great mines of Mexico and Peru, and it may be possible, that we have also deposits of these ores on the flanks of the Western Ghats; or in other situations of which the geological features approach to those of South America, though upon a smaller scale.

"IX. *Gold*.—There are no ores of this metal in the collection, and but very few in the Museum. It is indeed generally obtained from washings, but it is of importance to us to have specimens of all its ores, particularly of the auriferous iron ores, and of the telluretted gold ores of Hungary, which so much approach those of antimony. We require also the alluvial and diluvial soils in which gold is found; and especially drawings or models of the American washing-frames, which are so extensively used at the gold-washings of Virginia, Georgia, and the Carolinas. These are cheap and effective, and perform so much work in a day, that many tracts which had formerly been abandoned by the gold-washers as too poor, have been washed over again to a good profit. It is evident that this is what is required for the gold-washings of Southern India, (and for the auriferous sands of our rivers, where labour, though cheap, is made dear by being applied in the expensive and wasteful process of hand-washings.

"X. *Quicksilver*.—There are no ores of quicksilver in the collection. We shall perhaps be able to supply one or two, but this metal is both so important as an article of commerce, and as an agent in the separation of the precious metals by amalgamation, that we should by all means obtain an assortment of its few ores, and specimens of the deposits in which they occur, from Spain, Idria, and South America. We shall not I hope be thought too sanguine if we hope that when the numerous carboniferous deposits of India are better known and studied, mercury may be found. We know that it exists abundantly in Yunan, most probably in the formations in which it has always, hitherto been found, and it is therefore quite possible that it may be found on our Eastern (Assam or Cachar) frontier. Like silver, one or two of its known ores might easily be passed over. The metallic-looking ores of any mineral we know, are sure to attract attention; it is the rubbish-like, earthy-looking ones, therefore, which specially demand a place in a Museum of Instruction.

"XI. *Arsenic*.—We should not omit to collect all the ores and lodes of this metal which so much abounds in India and to the eastward. Independent of its value as an article of commerce, its frequent association with the precious metals may induce a hope that a careful examination of its ores might lead to some discoveries. It is probable that we are yet far from knowing all the combinations of this *Protoc* of the metals with others.

"XII. *Bismuth, Cobalt, Chrome, and Nickel*.—The ores, lodes, and every sort of information relative to these metals, should not be neglected. Some of these are

but little known, and new ones it is possible may be discovered. The uses of some of them (Bismuth, Cobalt, and Nickel) are probably only limited by their prices, and what they, or other metals now almost considered as curiosities, might become, if more abundant, the history of Chrome fully testifies.

"XIII. *Alum, Soda, Borax, Amber.*—Specimens of the Alum-slates of Europe, of the Soda earths of Egypt and India, of the Borax and Boracic acids of Italy and Thibet, and of the Indian ambers, are also desiderata. In reference to one of these only, I may mention that I have ascertained that the soda earths of India may be purified and discoloured by a very simple process, and thus great tracts of land now barren and valueless, may yield crops as valuable as the barilla-fields of Spain, or the kelp-shores of Scotland.

"XIV. *Agricultural Geology.*—Captain TREMENEER's report adverts so ably to the now well recognised importance of this branch of the science, that no remarks of mine in this respect are necessary. The collection contains a few specimens of soils from Cornwall, but there are no labels or descriptions with them. Capt. TREMENEER informed me, that on account of his hurried departure, he was not able to find his notes, but hoped to be able to send them to me. I have had the pleasure of contributing, from my own cabinet of soils, about forty specimens of Cotton, Sugar, Tobacco, and Tea soils; many of which are analysed. These are from America, the Mauritius, Singapore, various parts of India, &c.; and I am advised by Mr. STRICKMAN, Secretary to the East India and China Association, that through the active assistance of Lord John RUSSELL and Sir John CAM HOUSSE, a chest of West India Sugar soils is now on its way to me on the ship "Lord Melbourne," for the purpose of comparative analysis with those of India and the Mauritius. A great desiderata here are Sugar soils from the valley of the Mississippi, and from Demerara; for it is evident, that for Bengal the analogy mainly to be looked for is that between soils forming, as here, the alluvion of rivers. The volcanic soils are more likely to prove guides for those of Central and Western India. It should be borne in mind that we require for India not only the soils for tropical productions, but those also for the productions of temperate climates. At this moment, for example, one of the most valuable acquisitions we could obtain, would be a few specimens of soils from the hop gardens of Kent and Sussex! as a guide to the gentlemen who are so zealously endeavouring to introduce that valuable plant.* In this department, then, nothing can come amiss to us; for we may always dispose most advantageously of every thing. I forbear, for the sake of brevity, entering into the list of what we principally require.

"XV. *Mineral Manures.*—The Mineral manures, from the peat of the jheels, so extensively used in India, to gypsum, which is now the main support of a large portion of the agriculture of the older American states, though its use is unknown here, should not be omitted in our collection. The kunkers of all kinds might, there is no doubt, be often available as a valuable manure, if their use as such was known.

* Specimens of the soils of the best sheep-pastures from England, Germany, Spain, and particularly New South Wales, would be also valuable guides; for it is certain that the quality of wool depends as much on the soil as on the grasses.

" XVI. *Architectural Geology*—*Stones employed for Architectural or Engineering purposes ; Ornamental Stones, as Marbles, &c.*—Of these the collection contains but one or two specimens. We have many of cornices, capitals, and images, which would afford much instruction, though the antiquity of but very few of them can be known. The conditions of climate here are so different from those of Europe, that it may be difficult to establish correct comparative views, though we need not on that account neglect European specimens, and the results of their experience. We require however, more especially, specimens of stones, bricks, and marbles from ancient Indian buildings and fortifications ; with, of course, the dates of their erections, when these can be ascertained. These it should be remembered are desirable both when they have well, and when ill withstood the effects of the climate ; for both are lessons to the architect. It should be carefully noted if they appear ever to have been protected by plaster, paint, or casing ; specimens from more recent erections, particularly where exhibiting signs of early decay, should not be neglected. The tomb-stones of the early European settlements might perhaps afford good practical lessons in this respect. The church of Bandel here, I think, the date of 1680, and it is possible that many tombs of at least a century old, might be found, either European or native, of various materials.

" The foregoing remarks hold good for the ornamental stones and marbles. Our Museum affords a very few of these, and a geological series of specimens from the sandstone quarries of Chunar, by Captain FRANKLIN.

" XVII. *Mortars and Cements.*—We have nothing of this kind in the collection, as in the Museum, as far as I have yet seen ; but the field which these afford for curious and profitable research, and the great public and private advantage to be derived from a thorough investigation of it, is immense. It would appear that many of the native cements of former times were, like those of the ancient Romans, even more durable than the brick or stone with which they were used, and very far superior to any thing which can now be made, even with the greatest care. It is then, well worth our attention to procure also from the ancient buildings, both of India and Europe, specimens of the mortars and cements. All the limestones which can be obtained, from the kunkurs up to the pure marbles, are of course desiderata, as being the raw material of the cements. I should add to these, specimens of the corals, and of the fresh and salt-water shells so extensively used for making lime in India. We are quite ignorant as yet of what may be the effect of mixing the shell and stone limes in various proportions ; of what is owing to the Silica, alumina, and oxides of iron in the kunkurs, to the phosphates (from the shells or the iron of the kunkurs) and to all these with the various proportions of lime and magnesia, which form the bases of the cements. These are great objects of research, for which the first requisite is to have series of specimens at hand ; without which they must always be imperfectly examined, and most frequently will not be so at all.

" XVIII. *Materials for Road Making.*—These, I need not say, are of primary importance. It is true that expence frequently prevents their being carried far, though sometimes a road may carry the materials for its own extension. But there is another point of view in which the collection of both good and bad materials for road-making may be important, when the subject comes to be

scientifically considered. I mean that of the combinations of the different materials to be found at hand, or made at a small expence;—thus, we know that throughout the great basaltic district of India the elements of the Puzzolanas are every where found. We know that durable roads have been constructed of volcanic materials. We know that minute proportions of ferruginous or calcareous matters have often extraordinary effects in consolidating earthy materials. But of what is available, or how it should be used, in any given part of the country, we are totally ignorant. It is evident that Indian road-making requires, if possible, more than the careful aggregation of materials to resist the torrents of the rains, and the heats of the dry weather. It is probable that it is yet a science to be created between the chemist and the engineer.*

“XIX. *Plastic Geology.*—*Clays and earths for pottery and other manufactures.*—Of these we have none in the collection, and none, particularly so described in the Museum. Our first requisites are series of the English and other European pottery-clays, and of those from China, if obtainable. The scouring and pigment earths, and fire clays, of all kinds, are also required. Very good fire clays are found in Burdwan, Rajmahl, and near Moorsshedabad. I have been able to contribute specimens of the earths used in the curious red varnish of the native sugar-pans, which is of extraordinary durability.

“Apart from the improvement of our domestic manufactures, it is quite possible that some of our Indian clays may well pay for exportation.

“XX. With respect to how all these desiderata may be best obtained, the Society should, it is evident, first make known its wants, both in Europe and in India, by printing detailed memoranda, and offering exchanges where these can be desirable. From Europe we may doubtless count greatly upon the liberality of the Hon’ble the Court of Directors, and that of the many old and tried friends to India who seek but to know how they can best serve her. Scientific Institutions, and such associations as the Royal Agricultural Society† will no doubt be ready to meet our wishes. As a matter of purely commercial interest also, we must not forget to address the Chambers of Commerce, and the principal commercial houses connected with India both in England, on the Continent, and in America. There are doubtless many gentlemen amongst these who only desire to find individuals or public bodies ready to receive their suggestions and contributions, and assist their inquiries.

“In India we shall doubtless find many mercantile men, and members of the Services, ready to move their friends at home, or in various parts of India, in our behalf. To Capt. TREMENER’s suggestions of assistance from Officers and Assistants of the Revenue Surveys, I should add, that we may obtain much from the principal and subordinate Collectors of all ranks, the Civil Surgeons, Planters, &c. and I doubt not that it will be the pride of the Society to see justice done to their contributions.

* The recent introduction of Asphatum as a material for roads and pavements will occur here as a case in point.

† I am not sure that this is the correct title of this body.

“The foregoing report will I fear be thought too long, though I have endeavoured, by abstaining almost wholly from explanatory notes and quotations in support of some of the views advanced, to make it as brief as possible. It will not I hope be forgotten how vast are the questions to which almost every paragraph of it leads. I have adverted in it, more than once to the high importance of the proposed Museum, in common with all institutions of the kind, as affording a ready access to much of what the student and speculator could not otherwise hope to obtain a sight of. I would farther remark, for this cannot be too well borne in mind, that in India we require, of necessity, *much more* assistance than in Europe, to prosecute successfully researches of this kind. We require this from the vast unexplored fields on all sides, and because the labourers in them are so few, and so liable to be interrupted by illness or change of residence, that, unless the objects of research are within their immediate reach, the mere time occupied in collecting them involves a thousand chances of fatal interruptions. We require it, moreover, because it so seldom occurs in India that the talent, the time, and the pecuniary means, are all found together. Those who have the time and the talent, lack the means; and those who have amply the means and the knowledge, can rarely afford the time, unless at the sacrifice of their health, of which we all know more than one melancholy example. It is thus that so little has been done by the English in India in the way of researches of this kind, and that we have often, unjustly enough, borne the reproach of indifference or of ignorance. It is thus I would then respectfully urge, that we require far more assistance than in Europe, where, from the abundance of talent, means, disposable time, settled modes of life, great facilities of communication, and of reference; and almost perfect knowledge of every existing resource, the student or speculator has, so to say, a mere pastime, in comparison with the difficulties which beset him in India:—India! a field of research so vast, that no man can even guess the extent of it; and he would be a bold one who would venture to pronounce to what its investigation may not yet lead us.”

Calcutta,
ASIATIC SOCIETY'S ROOMS,
26th February, 1811.

I have the honor to be,
Sir,
Your obedient, humble Servant,
H. PIDDINGTON,
Actg. Curator As. Soc. Museum.

It was resolved—That a copy of this interesting document be forwarded to Mr. Secretary BUSHBY, for submission to the Right Honorable the Governor of Bengal.

The President noticed the presentation of the plan and section of the Ghaut about to be constructed to the memory of the late James PRINSEP, Esq. by R. H. RATTRAY, Esq.

Resolved—That Mr. RATTRAY be thanked for the same, and that it be hung up in the rooms of the Asiatic Society, as requested by that gentleman.

For the presentations and contributions, the thanks of the Society were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

The Galvanic Battery in its various Practical Applications as an Igniting Agent.—By Lieut. R. BAIRD SMITH, Bengal Engineers.

INTRODUCTORY REMARKS.

The dependence of the action of the Galvanic Battery on chemical principles, the excitation of that action by the employment of chemical agents, and the habit of considering the Battery as an instrument of scientific research rather than of practical utility, have tended, to a certain extent, to excite impressions unfavourable to its extensive applicability in engineering operations. Practical men naturally dread employing any agent of whose nature they are not thoroughly cognizant, and are therefore liable to be prejudiced against the Battery, by finding themselves unable to apprehend the rationale of its effects. To aid in the removal of such an impression, it may be remarked that an acquaintance with the theory of the Battery, is by no means essential to the comprehension of its mechanical details and applications, as a little experience would immediately prove. A few opportunities of observing the Battery in action, of noting the different manipulations, such as forming connections, apportioning solutions, &c. will, with common intelligence, enable any one to employ it independently. The remembrance of what has already been done, both at home and in this country, will also tend to remove any farther prejudice which may exist against the practical application of the Galvanic Battery.

Having long been impressed with a sense of the great economical importance of the Battery in all the varied operations in which the explosive force of gunpowder is employed, and having had an excellent opportunity of becoming acquainted with its details during the progress of the demolition of the barque "Equitable," in which I had the pleasure of being employed under Capt. Fitzgerald, I was led to prepare this paper, in the hope of rendering the experience then attained, available to the fullest extent for the benefit of others under similar circumstances. After a considerable portion of it had been written, I learned that a pamphlet by Col. Pasley on the same subject was in course of publication, and I therefore immediately laid my paper aside. On receiving Col. Pasley's pamphlet, however, I found it was entirely confined to details of his own plans, and as experience had proved that these admitted of most material improvements and modifications, I conceived my paper might still be useful, and accordingly resumed and completed it. The original plan has been extended by the addition of a section "on the Theory of the Battery," in which the recently published views of Sir Michael Faraday on this long disputed point, have been briefly developed; and as his researches have entirely removed it from the domain of "doubtful knowledge," as he himself terms it, to that of inductive certainty, the addition may prove interesting to those who desire to understand the principles as well as the practical applications of the Galvanic Battery.

SECTION I.—*The Construction of the Galvanic Battery.*

The elementary form of the Galvanic Battery consists simply in the interposition, between two plates of different metals, (usually copper and zinc) of a fluid capable of exerting some action on one of these plates, while it has none, or at least a different one, on the other. A communication established between the plates, either by direct contact, or by the interposition of some conducting substance, then admits of the circulation of a current of Galvanic electricity.

It would be foreign to the design of this paper, to dwell upon the various combinations and modifications of the above elementary Battery, by which different compound circles have been formed; and information concerning these is the less called for, since all have been recently

superseded by an arrangement due to Professor Daniel, in which the removal of the defects of former constructions has been accompanied by some most important and peculiar advantages. Of this alone, therefore, will the details be given, and as zinc is procurable in this country, both in the massive and laminar states, a simple modification of the constant Battery adapted for the use of each, will be described.

In the original form of the constant Battery in which the zinc is [Fig. I. a.] used in solid rods, the copper element consists of a cylinder of that metal in its thinnest obtainable state. The cylinder is formed, as shewn in Fig. I, with a small collar, and to one side of it a small copper cup to contain mercury, or a clamp-screw socket for facilitating metallic connections throughout the Battery, is attached.

The zinc element is a rod of that metal, varying in diameter and [Fig. I. b.] length, according to the strength required for the Battery, perforated at one extremity by a thin piece of wood, which, on the zinc being inserted within the cylinder, rests on the collar, and prevents any direct contact of the two metals. The rod is usually amalgamated with mercury, as will subsequently be described, and its exterior end is made to terminate in a small mercurial connecting cup, or clamp-screw.

The principal objection to the earlier forms of the Battery arose from the rapidity with which the energy of their action was found to decline. On this being traced to the deposition of particles of reduced oxide of zinc on the copper plate, in consequence of certain chemical actions within the cell, its recurrence was prevented in the constant [Fig. I. c.] Battery by the interposition of a membranous partition between the two metals. This membrane is usually made of ox gulleys, and is so constructed, as readily to fit on to the collar of the copper cylinder. Thus, then, the Battery when complete, with the exception of the solutions, consists, (1) of the copper cylinder; (2) of the membrane within this; and (3) of the zinc rod separated from the copper by the membrane. The dimensions vary according to the strength required for the Battery; that employed by Col. Pasley in his experiments in February 1839, consisted of 10 cylinders, 21 inches high, by $3\frac{1}{4}$ ditto in diameter, with zinc rods one inch in diameter.

The modification of the constant Battery necessary for the employment of sheet zinc, consists simply in making the copper cells rectangular instead of cylindrical, and the adoption of this form is much

accelerated by employing pasteboard instead of ox gullet partitions, a suggestion due to Dr. O'Shaughnessy of Calcutta. The details are as follow;—

1. The dimensions having been decided upon, a piece of sheet copper of [Fig. II. a.] the proper size, is to be formed into a rectangular cell, the junctions of the side pieces and bottom being soldered with hard brass solder. As the power of a Battery is considerably augmented by bringing the opposite surfaces of copper as near as possible to each other, the edge and bottom pieces of the cell are usually very small in proportion to its sides. When the latter are 14" or 15" square, the former may conveniently be made half an inch in breadth. A small connecting tube, about an inch in depth, or a connecting screw soldered at the top of one of the edge pieces completes the copper element.

2. The partition cases are made of common strong brown pasteboard, [Fig. II. c.] two pieces of this being laid together, and their edges or three sides compressed between strips of teak wood, half an inch in breadth, 1-8th in thickness, the length being regulated by the dimensions of the copper cell into which the case should slide easily. Screw nails of copper, if such are to be obtained, but otherwise of iron, passed through the teak binders and the pasteboards, render the case water-tight at the edges, and complete its manufacture.

The zinc element consists of a piece of the sheet zinc of commerce [Fig. II. b.] (spelter) of such a size, as to admit of its readily passing inside the pasteboard case, and rounded off, as shown in the sketch. A thick copper wire is soldered to it, to facilitate the connections throughout the Battery, by dipping into the mercurial cups above described.

A Battery of this rectangular form was used in the destruction of the barque "Equitable," having side pieces 14" $\times$ 14", edge and bottom ditto 14" $\times$ 1", pasteboard cases 13 $\frac{1}{2}$ " $\times$ 13 $\frac{1}{2}$ ", and zinc plates 12" $\times$ 12", the number of cells employed being 12.

SECTION II.—*Of the Exciting Solutions for the Battery—their nature, preparation, and proportions.*

It has been found by experience that strong chemical action on the zinc of a Battery, with the interposition of a good conducting solution between the zinc and the copper, are the conditions by which powerful galvanic action is insured.

With the constant Battery, solutions are always employed in pairs, of which sulphate of copper invariably forms one, and sulphate of soda or dilute sulphuric acid, may be used indiscriminately as the other. A saturated solution of sulphate of copper, or blue stone, is prepared by adding this substance to boiling water till the water ceases to dissolve it, and then allowing the mixture to cool. Should any crystals of the blue stone be deposited during the cooling, it is a satisfactory proof that the solution is fully saturated; if no such deposit takes place it is advisable to add more of the salt to the water. A simple method of ascertaining, during the progress of preparation, whether the solution has reached the point of saturation, is to place a single drop on a piece of glass, and mark if minute crystals, or solid matter, are immediately deposited, if so, the addition of blue stone may be discontinued. The proper strength will readily however be estimated after a little experience from the intensity of the blue colour of the solution. A proportion of one part of blue stone to three parts of water by weight, has been found by experiment to be most effective, and a large copper cooking vessel is perhaps the best utensil for boiling the mixture in. The sulphate of copper is obtained in the bazaar under the name of "Nila tutiya," and at an expense of from five to seven annas per lb.

The solution of sulphuric acid, or vitriol, hitherto employed in the cylindrical Battery, is made by mixing one part of strong acid with eight parts of water.

The solution of sulphate of soda, or Glauber's salts, which has been used with the blue water in all the experiments to be subsequently detailed, is prepared by dissolving one part of the salts in eight or nine parts of warm water, and allowing the mixture to cool before use. Its native name is "Kari nimuk," and it is obtainable to any extent at the trifling expense of two rupees per maund.

It is unnecessary to notice the numerous other kinds of solutions which have been proposed, as the preceding are at once effective, abundant, and simple, and will amply suffice for every practical purpose.

SECTION III.—*Of the Arrangements for bringing the Battery into action, and the precautions to be observed thereupon.*

The first step towards bringing the Battery into action after all the preceding details have been completed, is to charge the cells with

the exciting solutions. The membranous bag of the cylindrical Battery is to be filled with the dilute solution of vitriol, so that this may be in contact with the zinc rod, and the space between the membrane and the copper is to be charged with the saturated solution of blue stone.

In using the rectangular Battery, it is necessary to soak the paste-board cases in the dilute solution of sulphate of soda, till they are thoroughly saturated. Each copper cell is then to be made about two-thirds full of the blue stone water, and subsequently the damped paste-boards are to be respectively inserted. The solution of soda is then to be poured inside the cases till the blue water rises to within an inch of the mouths of the cells, care being taken that no extensive intermixture of the two liquids takes place. In this case sulphate of soda is in contact with the zinc, and sulphate of copper with the copper elements of the battery.

The cells having thus been charged, the small connecting cups are then to be partially filled with mercury, and to complete the circuit throughout the entire battery, the wire attached to zinc No. 1, is made to dip into the cup of copper No. 2; the wire of zinc No. 2 into the cup of copper No. 3; and thus the zincs of the series are to be each connected with the adjoining coppers. By this arrangement, a copper cup is left vacant at one extremity of the battery, and a zinc wire unemployed at the other. These are usually called the poles, and through them the power of the battery is directed as occasion may demand.

When the zinc plates are new, the solutions well made, and the connections perfect, indications of activity may usually be obtained a few minutes after the battery has been charged. The junction of the two poles by means of a short piece of copper wire having one of its extremities terminated by a small portion of very fine platinum or iron wire, will afford immediate proof of the circulation of the galvanic current, by the heating of the small wire to a degree dependent on the intensity of the action. Should it appear that the ignition is not so decided as might be expected from the size of the battery, it is probable some accidental interruption has occurred within the circuit, and the action of part of the cells been thereby neutralized. To ascertain the locality of this interruption, the test-wire is to be retained in contact with one pole, and the platinum at its extremity made to communicate with each

cell in succession, beginning with the most distant. Passing thus along the battery, the total cessation or marked diminution of the heating power at any one point will indicate the accident to have taken place there, and on examination it will usually be found that either the connecting wires have slipped out of the mercury cups, or that their extremities have become corroded, and unfit for insuring perfect metallic contact, or that the connections have been imperfectly made. The removal of the impediments will be indicated by the full development of the power of the battery, in the intense ignition or fusion of the fine test-wire.

When batteries of a considerable number of cells are employed, it increases materially their igniting power to make the cells act in pairs by connecting two zinc plates directly with two copper cells, so that they may act as one, but with double their former surface.

Reference was formerly made to the propriety of occasionally amalgamating the zinc plates and the extremities of the connecting wires. With the former this is effected by washing the surface of the zinc with a weak solution of sulphuric acid, and then applying a little mercury, which immediately combines with the zinc, and renders its surface bright and smooth. Care must however be taken in handling plates after amalgamation, as they become exceedingly brittle. To amalgamate copper wire, the simplest plan is to brighten the surface, and then to rub the brightened portion with a piece of soft leather to which a little mercury has been made to adhere by means of a thin coat of tallow. After continuing the friction for a short time, adhesion of the mercury to the copper is effected.

The mercury employed in these manipulations generally becomes impure, it may however be purified again sufficiently for use, by straining it through a piece of fine cloth of any kind, by which the dust &c. is removed.

When the object for which the battery was put in action has been accomplished, the zinc plates should be immediately withdrawn from the pasteboard cases, and well washed with pure water till all the black deposit which will be found upon them is removed.

Having recently had an opportunity of perusing Sir Michael Faraday's admirable "*Researches in Electricity*," I am indebted to that work for the following remarks relative to some farther precautions to

be observed in the use of the Galvanic Battery :—" *Weak and exhausted charges*, should never be used at the same time with *strong and fresh ones* in the different cells of a trough, or the different troughs of a battery ; the fluid in all the cells should be of the same strength, else the plates in the weaker cells, in place of assisting, retard the passage of the electricity generated in, and transmitted across the stronger cells."

"In the same manner, the association of *strong and weak* pair of plates should be carefully avoided." "The *reversal*, by accident or otherwise, of the plates in a Battery has an exceedingly injurious effect. It is not merely the counteraction of the current which the reversed plates can produce, but their effect also in retarding, even as indifferent plates, and requiring decomposition on their surface in *accordance* with the course of the current, before the latter can pass, is very deleterious. I find in a series of four pairs of plates of zinc and platina in dilute sulphuric acid, if one pair be reversed, it very nearly neutralizes the power of the whole." Another very serious impediment to the full action of the battery, is the deposition of copper on the surface of the zinc. This generally arises from the extensive intermixture of the solutions in consequence of imperfections in the partitions. Great attention ought therefore to be paid to keeping these water-tight at their edges, so that intermixture may only take place through the pores of the substance composing them. In my own experience, I have occasionally found the entire igniting power of a large twelve cell battery lost, from the preceding cause, and I find Faraday repeatedly cautions us against it.

SECTION IV.—Of Conductors—their nature, uses, and modes of construction.

When the Galvanic Battery is required to produce its igniting effects at a distance, as is the case in all mining operations, a path must be provided along which the generated current can find a ready and uninterrupted passage. Such a path is best furnished by metallic wires, the conducting power of the metals being very much superior to that of any other class of substances. Of the metals, copper is invariably preferred, in consequence of its high conducting power, its

ductility, flexibility, and cheapness. The dimensions and other details connected with the conductors are determined by the nature of the circumstances under which they are to be employed, which may be classed under three heads :—

I. When the conductors are simply led along the surface of the ground, as in blasting rocks in quarries.

II. When the conductors are led under the surface of the ground, as in military mining.

III. When the conductors are immersed in water, as in sub-aqueous mining operations, for the removal of sunken vessels, or rocks in the beds of navigable rivers, &c.

In the first case, the conductors require no protection whatever, and may be formed of naked wires, care being however taken that while the operations are in progress, no metallic contact takes place between them. This might be effectually guarded against by inserting corks or pieces of wood between the two wires, at convenient intervals, throughout their length.

Our information relative to the best arrangements for conductors employed in military mining operations is still very limited, a few experiments due to Colonel Pasley being all that has yet been published on this branch of the subject. It is only at establishments where military works are continually being executed, that facilities for experiments of this kind can be obtained, and it might be worth while on the part of Government to sanction a series of them, at the headquarters of the Sappers and Miners at Delhi, where, during the practice season, all the requisite facilities would be readily available. Colonel Pasley employed the same conductors in his military mining experiments as in his sub-aqueous explosions; they were elaborately insulated by repeated applications of water-proof composition, tape, and spun yarn, as will be more fully described hereafter. Although I feel considerable hesitation in venturing to express an opinion on a strictly experimental point, I am yet inclined to believe that, especially in dry earth, the minimum of insulation will suffice; a single covering of tarred tape to each wire, would, I believe, prove effectual under such circumstances.

In the third and last case, when conductors are immersed in water, the arrangements for insuring their efficiency are necessarily more

intricate. Water, especially when holding saline matters in solution, being a good conductor, its contact with the wires during the passage of a galvanic current would tend much to diminish the igniting power of this; to prevent such an effect is therefore of primary importance in the formation of conductors for sub-aqueous operations. Colonel Pasley, to whose zeal practical science is so much indebted, has described a very effectual method for insuring the insulation of conducting [Fig. III. a.] wires. In his plan "A $1\frac{1}{2}$ inch new tarred rope of the intended length of the conducting wires is passed slowly through boiling Stockholm tar, which renders it impervious to water,—a necessary process, or the rope on becoming wet after the wires are attached to it, as described below, would shrink one foot in 100 feet, and draw the wires into kinks." Two copper wires *b.* each 20 feet longer than the rope, after being annealed, are separately coated with water-proof composition (made by melting 1 lb. of pitch, 2 oz. of bees' wax, and 2 oz. of tallow together, taking care that it never boils) and are covered with cotton tape, which is bound round the wire while the composition is hot. The wires are then bound to the rope by strong packthread, *c.* a turn being taken round each wire every time to prevent the *d.* possibility of their shifting. This being done, they are to be bound round again with coarse tape $1\frac{1}{4}$ inch wide, after another *e.* coating of composition has been laid on. Lastly, the whole must be served with new tarred yarn, and again paid over with the composition, when the process is complete. These arrangements, there can be no doubt, would be most effective in preventing any water from reaching the wires, but the resulting conductor is objectionable on account of its very great weight, and the difficulty of managing it when its length is considerable, especially in situations where strong tides and currents [Fig. V.] are to be contended against. In a modification of this plan adopted in some experiments in Fort William, to be subsequently detailed, the preceding objections were, to a considerable extent, *a.* removed. The rope and coatings with tape were entirely dispensed with, the wires were each served with tarred rope yarn, over *b.* which a coat of dammer and grease was laid, the two wires were then lashed together by rope yarn, another coat of composition applied, and the conductor was complete. Five hundred feet of conductor, or one thousand feet of wire were thus prepared, immersed in salt water,

subjected to great strains, and were found most effective. The only objection to the plan arose from the tendency of the thick wire to break, and difficulty of reaching the fracture in consequence of the strong adhesion of the insulating material to the wire. This of course admits of being readily obviated by annealing the wire, or employing a rope of small wires, instead of one thick one.

Another method for making conductors for sub-aqueous explosions [Fig. IV.] characterised by great simplicity, and possessing several important advantages, has been suggested by Dr. O'Shaughnessy. In this

- a.* only one wire is insulated, by passing it through a series of corks, which are subsequently coated with water-proof composition, and wrapped round with wax cloth, or some other impervious substance.
- b.* The second wire remains unprotected, and is simply tied with twine to the corks. The chief objection to which, in practice, this plan has been found subject, has arisen from the breaking of the corks across, and the consequent exposure of the insulated wire to metallic contact
- c.* with the other, or with adjoining substances. This objection might be removed by serving the corks round with yarn, which, without destroying the buoyancy they possess, would effectually remove the danger of accidental contact, or by covering the wire with tape and water-proof composition, prior to its being passed through the corks.

In all cases, however, in which charges are employed at great depths, more perfect insulation than this plan affords would, it is conceived, be essential. Under pressure, the corks become saturated with water, and the consequence is that there is then no actual insulation of the wire. To form a perfect conductor, the plan for entire insulation ought therefore to be adapted for that portion of the wires passing vertically downwards, and the corks should be used for the horizontal portion; lightness and buoyancy will thus be combined with complete insulation of that part where insulation is essential, and all risk of failure from accidental metallic contact, or diminution of the heating power of the battery, avoided.

The length of conductors is regulated by the limits of danger from the effects of the explosions, beyond which it is essential to the security of those engaged in the operations, that they should extend. This limit will necessarily vary under varying circumstances, and cannot always be determined with perfect accuracy. In blasting rocks and

military mining, where the charges are carefully calculated to produce certain definite effects, the limit of danger may generally be known, or at least easily determined, but where large sur-charges are employed, experience is still required to shew accurately the extent to which their effects will reach. On this point Capt. Fitzgerald, in his report on the operations for destroying the "Equitable," remarks, "the limit of actual danger with a charge of 2050 lbs. of powder, in a depth of thirty feet of water, may from such experience as this single instance affords, be calculated as something beyond 120 feet. At 200 feet it is conceived that a person in a substantial boat would be perfectly safe, alike from the effects of the waves and the fragments of the wreck;" but should the charge be fired directly from a boat, he recommends "that for charges of the above description, the main conductors should not be less than 250 feet in length." These remarks must of course be received with the caution required by the limited experience on which they are founded, but they will furnish some standard to which, under similar circumstances, reference can be made. The depth of water most materially influences the limit of danger, which rapidly diminishes as that increases. In Colonel Pasley's operations at Spithead, when the depth was about ninety feet, the limit of danger appears to have been scarcely beyond fifty or sixty feet, although the charges ranged between 2000 and 2500 lbs., and instead of a lofty column of water being thrown up, the elevation of the surface over the charge appears to have been but slight, and the visible disturbance comparatively trifling.

In long conductors, it is impossible to have the wires continuous throughout, and the proper formation of the junctions is of essential consequence to their efficiency. The ends of the wires to be connected should either be strongly brazed together, or if this may be impracticable, they should be twisted together in the smallest possible twists for a length of at least six inches. A few turns, or imperfect contact, should never be considered sufficient, as such connections diminish the igniting power of a battery most seriously, while, on the other hand, well made junctions do not perceptibly affect it. To prove this, a thin wire, 1-20th of an inch in diameter, and 100 feet in length, was taken, and the minimum number of cells required to ignite dry saltpetre cloth ascertained. When the experiments commenced, five junctions existed in the conductor itself, while there were two more at the poles of the

battery, and other two at the extremities to which the platinum igniting wire was attached. With these nine junctions, five cells of a battery 14 by $\frac{1}{2}$ caused saltpetre cloth to ignite, but four cells were not able to effect this. New junctions were made at the termination of each experiment, till from nine they extended to *twenty-four*, and still the same strength of battery sufficed to insure the ignition. The junctions were carefully made, and the contact rendered as perfect as possible.

When the distance from which a charge is to be fired is increased, either the strength of the battery, or the diameter of the wires employed, must be increased also. The exact proportion existing between these increments has not yet been decided, and the results of experience, as far as it has extended, must on this point guide our proceedings. Colonel Pasley states that with a battery of 10 cylinders, 21 inches high and $3\frac{1}{2}$ inches in diameter, having zinc rods 21 inches long and one inch in diameter, he invariably succeeded in igniting charges at 500 feet distance with copper wires 1-5th of an inch in diameter. The following experiments were made in Fort William with a battery of the rectangular form, consisting of 12 cells, each 14 inches square on the sides, having edge and bottom pieces 14" by $\frac{1}{2}$." The zinc plates were new and unamalgamated, the pasteboard cases in good order. The solution of sulphate of copper in the proportion of 1 of salt to 3 of water, the sulphate of soda 1 salt to 8 water. The quantity of the former in each cell was $2\frac{1}{2}$ lbs. by measure, of the latter $\frac{3}{4}$ lb., and the battery was found to be in excellent action a few minutes after the solutions were poured in. The igniting effect was ascertained by bringing a small piece of platinum wire, forming part of the circuit, in contact first with dry cloth saturated with saltpetre, and afterwards with fine dry Dartford powder.

Experiment 1. The length of the circuit in this experiment was 300 feet, each conductor being 105 feet long, and composed of three strands of copper wire, each 1-20th of an inch in thickness, twisted like a rope. With four cells immediate ignition of saltpetre cloth was effected, but with three cells it was not till after some time, that the same effect was produced. With four cells the powder ignited readily, but I found it impossible to effect ignition with only three cells.

Experiment 2. The same conductors reduced to 50 feet.

2 cells produced immediately ignition of the cloth.

1 cell singed the cloth, and made it black, but could not ignite it.

2 cells caused the powder to explode directly.

1 cell caused the powder to smoke, but could not ignite it.

Experiment 3. Conductors of single wires, 1-20th of an inch in diameter and 50 feet in length each, were now employed, and the following results obtained:—

4 cells ignited saltpetre cloth immediately.

3 cells merely singed it.

4 cells ignited powder immediately.

3 cells had no effect whatever.

Experiment 4. The same conductors were employed, but thin brass wire was substituted for platinum.

5 cells caused the ignition of saltpetre cloth.

6 cells ditto of powder.

This experiment involves a question of some importance; viz. the substitution of some other material for platinum, which in this country is most exorbitantly expensive. An interesting series of experiments might be made on this point, by which our resources could not be increased.

With the full power of a 12 cell Battery, I have frequently ignited charges of powder in water, at distances varying from 450 to 500 feet employing insulated conductors; and by such a Battery was the destruction of the "Equitable" effected, where the conductors were 15 feet in length, 120 of which were placed horizontally, the remaining 30 vertically in the water.

Before concluding this Section, it may be well to describe some expedients which, under certain circumstances, have been employed for the purpose of diminishing the lengths of conductors. The idea of effecting the completion of the galvanic circuit by means of a self-acting mechanical arrangement, appears to have originated with Mr. Mary Roberts, who claims to have been one of the first who applied a Battery to useful purposes. With the details of Mr. Roberts' apparatus employed in his blasting experiments in Craig Leith Quarry, I am not sufficiently conversant to be able to describe it, but in blasting, "a

an apparatus would seldom, if ever, be necessary. It is in removing obstructions to river navigation, where strong tides and currents are to be contended with, making it essential that the conductors employed should be reduced to their minimum length, that self-acting dischargers may be employed to the greatest advantage. We are indebted to Dr. W. B. O'Shaughnessy for an ingenious plan for such a [Fig. VI.] discharger, of which the following are the details. The discharger consists of two distinct parts, having distinct offices, one being intended for completing the circuit, and effecting the ignition of the powder, the other for breaking the circuit, should any accident delay the explosion, and so rendering it perfectly safe to approach the Battery, and if possible ascertain and remove the cause of failure. These two objects [Fig. VI.] are effected by causing wires to pass, as shewn in diagram No. 6, into four glass tubes partially filled with mercury. Over these, fixed in a small wooden framework, is placed a watch, for the hands of which a thin piece of sheet copper is substituted. This is fixed on the arbor of the hands, and each extremity carries, suspended from a short arm, a copper wire, bent like the letter U. The length of the legs designed for completing the circuit is so regulated, that on the copper hand being set to any specified number of minutes, they will not come in contact with the mercury in the tubes till that time has elapsed. Meanwhile the legs of the other wire have been immersed in the mercury of their tubes, but if the circuit is completed without ignition, then the copper hand continuing to traverse the dial of the watch in four or five minutes more lifts them out, breaks the metallic continuity of the circuit, and thus effectually prevents all risk in approaching the Battery. This form of discharger was successfully employed on the occasion of the first explosion of the "Equitable" in the river Hooghly, but it was then apparent that the utmost delicacy was requisite in making its adjustment. This delicacy and minuteness of detail must always prove serious defects in any form of apparatus employed in practical operations, in which so many risks of derangement are incurred, and in the case of the watch-discharger, the expense is an additional objection. The idea of employing such an apparatus, having however been suggested, there was comparatively little difficulty in designing a form of it which should not be liable to the preceding objections, and one was accordingly contrived, which was successfully employed throughout the remaining operations for destroying the "Equitable." The principle of

this will readily be understood by a reference to Diagram No. 7, by [Fig. VII.] which it will be seen that only two mercurial tubes, with one bent wire, are employed. The wire *c. c.* suspended with its legs dipping a little way into the tubes, is attached by means of a thin metallic chain and hook to a loop of string (saturated either in saltpetre or powder, so as to make it readily combustible) which passes through the composition of a portfire *a.* from which, prior to its being fixed in the wooden stand, part of the paper casing has been removed, as shewn at *h. h.* This portfire burning down, ignites the combustible string, and the bent wire falls by its own weight into the mercury, thus completing the circuit. Should any accident delay the explosion, then another portfire *b.* calculated to burn four or five minutes longer than *a.* discharges a weight *d. d.* attached to it by means of a loop of string, rendered combustible as before. This weight on falling, raises the bent wire to which it is fixed by means of a thin chain, completely out of the tubes, and thus effectually breaks the circuit. On the first occasion on which this portfire stand was employed, it was discovered that the composition of the portfire *a.* just as it burnt out, fell into the tubes and checked the free action of the apparatus, but this was immediately afterwards rectified by the addition of a small copper plate *e.* for the portfire to rest upon, in the centre of which an aperture was pierced, just large enough to admit of the combustible string passing through. Throughout the very extensive series of experiments, which was made to test the action of the apparatus prior to its employment, on the occasion of the final demolition of the "Equitable," no instance occurred in which the composition, even in the smallest quantity, fell into the mercurial tubes, and this result was the more satisfactory, as some considered the above defect fatal to the practical utility of the plan. Its susceptibility of derangement was severely tested on the day of the explosion, as the water was very rough, and the wind high, so that the boat in which the apparatus was fixed, was continually coming in collision with the neighbouring row-boats, and although large quantities of the solutions of the batteries were thrown out in consequence, no part of the portfire stand was in the least degree disturbed, its subsequent action being as complete as could have been wished. The expence of the portfire stand is extremely trifling, as it may be made of any old materials which may be available.

SECTION V.—Of the Application of the Galvanic Battery in Blasting Rocks.

The arrangements necessary for the employment of the Battery in blasting operations, are exceedingly simple. The blast hole having been prepared, and the charge introduced, the igniting wires must be inlaid in a conical piece of wood, and fixed in the grooves prepared for them by a thin wedge of wood, as shewn in Diagram No. 8. The [Fig VIII. a.] igniting wires project about an inch beyond the base, or larger end of the cone, must be connected by a fine platinum or iron wire, and round this a cartridge of finer priming powder must be placed. The cone is then to be inserted in the blast hole, and by gently pressing it down and turning it round, the larger end should be made to rest on the charge. A tamping of small fragments of rock must then be poured in over the cone, and the whole arrangements are complete. The main conductors should then be attached to the priming wires, and on the circuit being completed at the Battery explosion will ensue. In the event of the common methods of tamping being employed, it would perhaps be the best plan to continue the use of the priming needle, and have an open communication from the surface through the tamping to the charge. The priming wires, inlaid in opposite sides of a bamboo, could then be introduced, and the igniting wire placed in direct contact with the powder of the charge. Had there been satisfactory grounds for believing sand a good tamping material, the use of the battery would have been much facilitated, as it would only have been necessary to pour the sand into the blast hole after the wires had been properly arranged; but I have in another place detailed some experiments, which, as far as they extend, militate against the employment of this material in blasting, and confirm Colonel Pasley's previously expressed unfavourable opinion of it.*

For blasting rocks under water, a very slight modification of the existing plan will admit of the use of the Battery. The tin case in [Fig. IX. a.] which the charge is to be lodged, must be made with a collar about three inches high, and $1\frac{1}{4}$ inch in diameter. A wooden plug *b*, must be turned to fit closely into this collar, and grooves $\frac{1}{4}$

* Professional Papers of the Madras Engineers, Vol. I.

of an inch deep, cut on its opposite sides. These grooves *c.* are then partially filled, either with common sealing wax or dammer, and the priming wires, previously heated, are made to bury themselves in this. The wax being again softened, a strip of wood is to be forced into each groove over the wire, and every aperture through which the water could force its way, is thus closed. The plug having its inlaid wires connected by the igniting wire, and having a small cartridge attached, must then be driven into the collar of the case, and it only remains to connect the priming wires with the main conductors, lower the charge into the blast hole, and complete the circuit. An arrangement like the preceding was employed in an attempt to fire a charge of powder at the bottom of an artesian well in Fort William, and although the pressure of the water was so great that case after case was burst, yet on no occasion could it be discovered that the water had reached the charge through the plug. A coating of sealing wax, and a tin cap, protected the exterior end of the plug, and prevented the water from passing through the pores of the wood, but this was rendered necessary only by the great depth of water, which was nearly 480 feet.

In some operations, as those for deepening the Pambaum Passage, [Fig. X.] common quart bottles have been used to contain the charges, and when the depth is moderate, I have found, by a great many experiments, that if the priming wires in these are carefully passed through good corks, driven home and coated exteriorly with water-proof composition, the Battery seldom fails to insure their explosion.

SECTION VI.—*Of the Application of the Galvanic Battery in Operations for removing Sunken Vessels from the Channels of Rivers, &c. &c.*

The great value of the Galvanic Battery as an addition to the resources of the engineer, has in no instance been so fully demonstrated as in operations for removing the wrecks of vessels from the channels of navigable rivers, &c. Every one who has obtained his experience from actual practice in such operations, will be ready to bear testimony to the uncertainty, the danger, and the expense of the arrangements previously necessary for effecting the ignition of the

sub-aqueous charges. The employment of the Galvanic Battery as the igniting agent, removes, to a great extent, these objections, and although, in sub-aqueous operations it is at present next to impossible to foresee and provide against every source of failure, yet the probabilities are now strongly in favour of success, whereas formerly they inclined in the opposite direction. Every successive series of operations will furnish us with new information, and every failure of which the cause is detected, will point out to us new precautions, so that in time we may expect to see the arrangements for employing the battery so fully matured in all their details, as to illuminate entirely those sources of accident, which in the existing state of our practical acquaintance with the subject, are so apt to escape undetected.

An object of primary importance in all sub-aqueous explosions, is to render the cylinder in which the charge is to be placed, perfectly water-tight; for, as Colonel Pasley remarks, "if there be even so much as a *pin hole* to admit the water, it will inevitably reach the powder. The material of which the cylinder must be made, will be determined by the depth of water over it. For any depth less than 50 feet, experience warrants me in stating, that a cylinder of wood, prepared like a common cask, bound with iron hoops, having staves an inch thick, and carefully coated exteriorly with sheet lead, will be found effective. Such a cask or cylinder, five feet nine inches long, three feet eight inches bulge diameter, and three feet three and a half inches end diameter, was on one occasion of failure during the operations against the "Equitable," left at the bottom of the river Hooghly, under a pressure of fifty-one feet of water, for twenty-six hours, and on being raised and immediately opened, it was found that the entire charge of 2050 lbs. of powder it contained, was as dry and serviceable as when it was originally put in, and was in fact the identical powder with which, a fortnight afterwards, the final demolition of the vessel was effected. This may be considered sufficient to shew that within depths of fifty feet, wooden cylinders cased with sheet lead, can with safety be employed. With a depth of ninety feet Colonel Pasley appears to have found it necessary to have recourse to wrought iron cylinders, but the limit at which the employment of wood becomes impracticable, has not yet been ascertained. We must wait the results of other experiments ere any decided opinions can be expressed; but I am inclined to think that

when the depth exceeds sixty-five feet, a wrought iron cylinder will be found necessary.

For the priming apparatus, the following will, I conceive, be found [Fig. XI.] the safest, and most simple plan. The priming wires *a* must be inlaid in grooves on opposite sides of a circular rod of teak wood, *b*, about 1' 3" long, in the manner formerly described (when detailing the experiments in Fort William) with sealing wax and wedges, *c*. An iron tube, formed of a part of an old gun-barrel about 1' long, and having an iron flange 4" square, carefully soldered upon it *d*. at about three inches from one extremity, must be prepared, and into this the teak rod with its inlaid wires must be carefully driven, till one end is flush with the exterior end of the tube, or the nearest to the flange. Over this must then be laid a thick coating *e*. of melted sealing wax, which both prevents the water forcing its way through the pores of the wood, and also keeps the priming wires at their points of issue from metallic contact with each other. The interior extremities of the priming wires, *f*, must then be connected by the igniting platinum wire, which it has always, as far as my experience goes, been found necessary to solder to the copper with gold solder. A small cartridge of fine dry Dartford or meal powder must then be placed in immediate contact with the platinum. The apparatus might now be introduced into the cylinder, and by means of the flange and screws, fixed there; but it is of much importance to have the means of insulating the priming from the main charge, so that in the event of water penetrating to the one, it may not communicate with the other, and it is also very desirable to have the means of inserting and withdrawing the priming apparatus with facility, so as to rectify any accidental derangement which may take place, and these two objects are fully effected by the following plan *g*, due to Capt. Fitzgerald. A metallic protecting case is provided for the priming apparatus, and made a fixture within the cylinder *h*. At its mouth a fine screw, at least an inch in length is made, and on the iron tube, immediately beneath the flange, there must be cut a corresponding screw. By these means the priming apparatus can be screwed in, or removed at pleasure. In finally fixing it in the cylinder, washers of leather covered with white lead must be placed beneath its flange, and the small fixing screws must be carefully

brought home. Over all a disc of sheet lead, must be soldered, &c. and the arrangements of the cylinder, with the exception of the loading, are then complete. The latter is to be effected by setting the cylinder on one end, and pouring in the powder through an aperture, about an inch in diameter, in the other. This aperture must afterwards be filled by a wooden plug, and all the stray grains of powder being carefully removed, a piece of sheet lead must be soldered over it.

It is an object of some importance to those conducting sub-aqueous operations, to be enabled at any time to assure themselves that the interior circuit of the wires is complete, without being obliged to withdraw the priming apparatus itself. Col. Pasley recommends that this should be done by introducing a portion of slightly acidulated water into the circuit, and noting whether decomposition occurs; but this is a most dangerous plan, and ought never to be adopted. The decomposition of a single grain of water, according to Faraday's recent researches, requires a current of electricity sufficiently strong to keep a platinum wire $1\text{-}104\text{th}$ of an inch in diameter and eight inches* long, at a dull red heat as long as the decomposition is in progress, the *quantity* of electricity maintained undiminished. The platinum wire we employ is considerably thicker than the preceding, but still the risk of premature explosion by Colonel Pasley's plan is very great. The danger is removed by employing a very weak galvanic circle and a galvanometer, but as the latter can seldom be met with in this country in its perfect form, I may be permitted, before concluding this section, to describe a simple substitute for it, employed during the operations against the "Equitable" [Fig. XII.] safely and successfully. A piece of copper wire about $1\text{-}12\text{th}$ of an inch in diameter, and fourteen feet long, was coiled on a rectangular wooden frame-work, *a.* 6" long, 3" broad, and 1" deep, care being taken to preserve the metallic coils throughout from mutual contact, *b.* The magnetic needle of a small theodolite was then mounted on the point of a common needle, fixed in a thin wooden stand. On placing this within the frame-work, with the coils passing above and beneath it, and directing a galvanic current excited by the

* The above length is stated merely to give some definite idea of the danger incurred; but Faraday states that if the wire were a hundred or a thousand inches in length, and the cooling circumstances alike, the same effect would be produced as if it were no more than half an inch.

insertion of a circle, composed of a single piece of copper and zinc each 2" by 1', into a glass of very slightly acidulated water, through the wire, the needle was immediately affected. Sometimes it merely trembled violently on its pivot; at other times its deflection was considerable, and it never failed to indicate the passing of a current when the circuit was complete. It is only therefore necessary to make the apparatus to be tested a part of the circuit, and if it does not interrupt the circulation of the current, the same appearances will be observed.

The cylinder is lowered to its position near the wreck to be destroyed by means of rope slings and guys. It is usually slung under the bows of a vessel, having davits or fixed pulleys, through which the suspension ropes are led. At the time appointed for lowering the cylinder, this vessel is moored directly over the wreck, the bows being just over the spot destined for the cylinder, and the lowering is effected by gradually allowing the suspenders to glide over the davits till it is felt that the bottom of the river has been reached. A very simple and ingenious plan for insuring the descent of the cylinder in a horizontal position has been suggested by Capt. Bowman, and consists in marking the two suspending ropes at intervals of a foot or eighteen inches apart. By noting these marks, which are alike at corresponding distances in each suspender, the position of the cylinder can immediately be seen, and if one end is lower than the other, the proper correction can be made.

On connecting the main conductors with the priming wires, the greatest possible care must be taken to ensure perfect contact throughout the junctions. Over each junction a piece of wax cloth or canvas should be wrapped, so as to prevent any contact of the conducting wires at those points, and it is sometimes advisable to lash a rough wooden case over the whole of this part of the apparatus.

SECTION VII.—*On the Theory of the Galvanic Battery.*

The first step towards the establishment of Galvanism as a branch of physical science, was made by Galvani, Professor of Anatomy at Bologna, in the year 1790. The accidental observation of certain muscular contractions in the limbs of a frog lying in the immediate vicinity

of an active electrical machine, and the subsequent discovery that the same movements were produced by touching the limbs with two pieces of different metals, led him to announce that he had discovered a new kind of electricity resident in the muscles of animals. This announcement caused great excitement among men of science at the time, and Galvani's experiments were repeated, with various modifications, in all parts of Europe, being viewed with much curiosity, and giving rise to numerous speculations. The convulsions in the limbs of the frog only took place, it was observed, while sparks passed from the machine, and this fact therefore proved no more than that the muscles or nerves, or the two together, formed a very sensitive indicator of electrical action. It is on the subsequent remark, that by the contact of dissimilar metals, the same convulsions were produced, the science of Galvanism is founded.

The theory by which Galvani accounted for the phenomena he had discovered, was that the electricity originating in the brains of animals is distributed to every part of their systems, and resides especially in the muscles. The different parts of each muscular fibril he conceived to be in opposite states of electrical excitement, and the contractions to be produced whenever the electric equilibrium was restored. This during life was effected through the medium of the nerves, and after death by the intervention of metallic conductors. To the metals themselves he traced none of the peculiar effects produced, considering them quite passive, and only necessary as furnishing channels of conduction for the animal electricity.

These opinions of Galvani were very decidedly opposed, and foremost among his opponents stood Alex. Volta, Professor of Natural Philosophy at Pavia. By him it was maintained that the electricity was developed entirely by the contact of the two metals, and that the muscular convulsions were merely the effects of the passage of the electricity, thus developed, through the nerves and muscles of the animal. The views of Volta were far clearer and more distinct than those of Galvani, and to him belongs the true credit of having called into being the science, which in compliment to him, has been called Voltaic electricity as well as Galvanism. The latter is perhaps the more common of the two, and I have therefore retained it in this paper, but it must be remarked, that the term Galvanic Battery

involves an anachronism, since this instrument was invented some time after the promulgation of Galvani's experiments, and no portion whatever of the credit due to its invention can be claimed for him, it being the result of original and independent investigations by his opponent Volta. In explaining the action of the Battery, Volta assumed that during the whole time the two dissimilar metals were in contact, a certain force was in constant operation, tending to effect the transfer of electricity from the one metal to the other. To this he gave the name of *electro-motive force*. Thus when zinc, and copper are in contact the alleged operation of this force is to impel the electricity from the copper to the zinc, so as to maintain the latter in a positive state relative to the former, which is itself in this case negative. If therefore the redundant electricity of the zinc be by any means carried off, and the deficiency of the electricity of the copper be supplied from other sources, the electro-motive force will immediately renew this difference of condition, and thus maintain a continual current of electric power, flowing always in the same direction. The office of the fluid in a Battery, according to Volta's theory, is simply to conduct the electricity from one metal to the other, and its conducting power determines the effective quantity of electricity which actually circulates in the Battery. The force ultimately generated was conceived to be the sum of all the forces acting in each cell separately; since the impulses given by the electro-motive force to the circulating electricity, were all in the same direction, and each added its effect to that of the preceding ones. Hence then the interposition of any substance between the two poles of a Battery subjected it to the influence of this powerful electric current. The chemical action of the fluid on either of the metal plates was considered by Volta as in no way connected with the origin of the electricity developed, and his theory consequently took no cognizance whatever of its existence. It was soon however observed, that in thus neglecting chemical action Volta had committed an important, indeed a fundamental error, since it was found that the quantity of Galvanic effect was always in proportion to the energy of the chemical action, and that the extent of surface of contact between the metals, had no relation to the quantity of electricity developed. It was farther found, that metals did not invariably stand in the same electrical relation to each other, but that this rela-

tion was determined by the chemical properties of the fluid, with which they were placed in contact. Facts like these were quite irreconcilable with Volta's hypothesis, and pointed clearly to the very important relation which obtained between the chemical action of the fluid on the immersed metals, and the development of the Galvanic energy. Dr. Wollaston, by whom chiefly Volta's theory was shewn to be untenable, conceived that the current of electricity was originally determined by the oxidation of the zinc, that the fluid of the circle served both to oxidise the zinc and to conduct the electricity which was excited, and that the contact between the plates served only to conduct electricity, and thereby complete the circuit. Succeeding philosophers, did not receive Dr. Wollaston's views as thus stated, and Sir Humphry Davy proposed another theory intermediate between that of Volta and the preceding. He adduced many experiments in support of Volta's statement, that the electric equilibrium, is disturbed by the contact of different substances, without any chemical action taking place between them. He acknowledged however with Wollaston, that the chemical changes contribute to the general result, and he maintained that though not the primary movers of the electric current, they are essential to the continued and energetic action of every Voltaic circle. The electric excitement was *begun*, he thought, by metallic contact, and *maintained* by chemical action.

Such was the state of the question, when, in 1834, Sir Michael Faraday undertook the investigation of the source of the electricity in the Voltaic or Galvanic Battery. The contradictory evidence, the equilibrium of opinion, and the variation and combination of theory, which he found to characterise the labours of all preceding writers on this subject, forced him to repeat and examine the facts stated, and use his own judgment upon them in preference to receiving that of others. His previous discoveries of the identity of electricity and chemical affinity, of the power derived from the action of the Battery, with the power to be overcome in any body subjected to its influence, gave him the means of examining the question with advantages not before possessed by any, and of which he has made such admirable use, that doubt can no longer be said to obscure the subject.

Faraday had always coincided in opinion with those who maintained, that *action* of the Battery was *continued* by chemical action, and that

the *supply* constituting the current was almost entirely derived from that source, but whether metallic contact or chemical action *originates* and determined the current, was by no means clear to him. To *rest* this point at rest, was therefore the first step in his investigations, *not* seeing no reason if metallic contact was not *essential*, why true decomposition by an electric current should not be produced without it, *even* in a simple circuit composed of two pieces of metal and an intervening fluid, he accordingly instituted some beautiful experiments under *his* impression, and persevering, ultimately succeeded in obtaining the most satisfactory evidence that *metallic contact was not necessary to the production of the Galvanic current*. This was farther *applied* proved by referring to the spark which appears when the wires of a pair of plates in vigorous action are brought in contact with each other. This spark is occasioned by the electricity passing through a thin stratum of air, and its production proves that electro-motion really occurred while the wires were separated, and anterior to any actual contact between them being the result of the action of pure, unmixed chemical forces.

From his experiments, Faraday accordingly felt warranted in concluding that the electricity of the Voltaic pile is not dependant, *even* in its origin or its continuance, upon the contact of the dissimilar metals with each other; that it is entirely due to chemical action: proportionate in its *intensity* to the intensity of the affinities concerned in its production, and in its *quantity* to the quantity of material which has been chemically active during its evolution. Thus when zinc, copper, and dilute sulphuric acid are used, it is the union of zinc with the oxygen of the water which determines the current, although the acid is essential to the removal of the oxide so formed, in order that another portion of zinc may act on another portion of water: it does not, by combination with that oxide, produce any sensible portion of the current of electricity which circulates: for the quantity of electricity is dependent on the quantity of zinc oxidised, and is in a definite proportion to it: its intensity is in proportion to the intensity of the chemical affinity of the zinc for the oxygen under the circumstances: it is scarcely, if at all, affected by the use either of strong or weak acid. But in considering this oxidation or other direct action upon the metal itself, as the cause and source of the electric current, it is of the utmost

importance to observe, that the oxygen or other body must be in a state of *combination*, and not only so, but combined in such proportions as will constitute a substance capable of decomposition, since without decomposition the transmission of a current cannot take place. The presence of such a substance is therefore essential to the action of a Voltaic circuit, and so intimate is the connection between its decomposition and power of transmitting a current, that if the one be checked, the other is checked also, and if the one be stopped entirely, the other stops with it. No Voltaic Battery has been constructed in which the chemical action is that only of combination; *decomposition is always included*, and is, according to Faraday's belief, an essential chemical part.

But as the quantity of electricity set in motion by the decomposition of a certain quantity of an electrolyte or decomposable substance, is definite in its action, and cannot by any means be increased beyond a fixed limit, it is evident that the action of each cell of a Battery is not to increase the *quantity*, but the *intensity* of the current circulating. A single pair of zinc and platinum plates throws as much electricity into the form of a current by the oxidation of 32.5 grains of zinc, as would be circulated by the same alteration of a thousand times that quantity, or nearly 5lbs. of metal oxidised at the surfaces of the zinc plates of a 1000 pairs, placed in regular Battery order, because at *each* cell, the quantity of electricity is expended in producing the decomposition of its equivalent of the exciting electrolyte, without which decomposition, as was before remarked, the current could not circulate at all. Hence then the action of each cell is to impel forward the quantity of electricity due to the oxidation of the zinc in any one cell, and thereby to exalt that peculiar property of the current, which we designate intensity, without increasing the quantity beyond that due to the zinc oxidised in that one cell. The waste of power in our common Batteries, in which the zinc of commerce is used, is so enormous as to be almost incredible. Faraday asserts that the chemical action of a grain of water upon four grains of zinc can evolve electricity equal in quantity to that of a powerful thunder-storm, and that with zinc and platinum wires one-eighteenth of an inch in diameter, and about half an inch long, dipped in dilute sulphuric acid, so weak as not to be sensibly sour to the tongue, more electricity will be evolved in

one-twentieth of a minute, than any man would willingly allow to pass through his body at once. The loss with ordinary zinc appears to arise from portions of copper, lead, cadmium, and other metals being set free on its surface by the action of the dilute acid, and these being in contact with the zinc, form small, but very active Voltaic circles which cause great destruction of the zinc, and in the same proportion as they serve to discharge or convey the electricity back to the zinc, do they diminish its power of producing an electric current, which shall extend to a greater distance across the acid, and be discharged only through the copper or platinum plate which is associated with it, for the purpose of forming a Voltaic apparatus.

These evils are remedied entirely by adopting that process of amalgamation of the zinc described in a former section of this paper, by which its surface is brought into one uniform condition, and those differences of character between one spot and another, which are essential to the formation of the minute Voltaic circles, above alluded to, effectually prevented. Hence the full equivalent of electricity is obtained for the zinc oxidised, and a Battery so constructed is only active while the poles, or, as Faraday calls them, the electrodes, are in connection, ceasing to act, or be acted on, the moment this connection is broken. The superiority of the amalgamated zinc is farther due to the state of the solution in contact with it, for as the unprepared zinc acts directly and alone upon the fluid, which the amalgamated does not, the former by the oxide it produces quickly neutralises the acid in contact with its surface, so that the progress of oxidation is retarded, whilst at the surface of the amalgamated zinc, any oxide formed is rapidly removed by the free acid present, and the clean metallic surface is always ready to act with full energy on the water.

When an amalgamated zinc plate is immersed in dilute sulphuric acid, the force of chemical affinity exerted between the metal and the fluid, is not sufficiently powerful to cause sensible action at the surface of contact, and occasion the decomposition of water by the oxidation of the metal, but it is sufficiently powerful to produce such a condition of the electricity (or the power upon which chemical affinity depends) as would produce a current, if there were a path open for it. Now the presence of a piece of copper touching both the zinc and the fluid opens such a path, and its direct communication with the zinc is far

more effectual than any connection formed between that metal and it by means of any decomposable bodies or electrolytes, because when they are used, the chemical affinities between them and the zinc produce a contrary and opposing effect to that which is influential in the dilute acid; or if that opposing action be but small, still the affinity of their component parts for each other has to be overcome, for they cannot conduct without suffering decomposition, and this decomposition is found *experimentally* to re-act upon the forces which in the acid tend to produce the current, and in some cases entirely to neutralise them. Where direct contact of the copper and zinc takes place, these obstructing forces are not brought into action, and therefore the production and circulation of the electric current are highly favoured. Hence the cause of the very great importance of *metallic contact* in the Voltaic Battery.

The liquid in the cells of the Battery has the power of retarding the circulation of the electricity generated, and it acts injuriously in greater or less proportion, according to the quantity of it between the zinc and copper plates, or, in other words, according to the distances between their surfaces. Hence then the reason of the great increase of power obtained by approximating the two metals, and Faraday states that not only is this power greater on the instant, but also that the sum of the transferable power in relation to the whole sum of the chemical action at the plates is much increased. *Double coppers* owe their advantages in part to the same cause, but derive their superiority chiefly from the circumstance that they virtually double the acting surface of the zinc, or nearly so, the action on both sides of the metal being converted into transferable force, and the power of the Battery, as to the *quantity* of electricity evolved, highly exalted in consequence.

The cause of the heat excited during the passage of a Voltaic current, remains still enveloped in considerable obscurity, and a more intimate acquaintance with the modes of action of electrical forces will be required, ere the difficulty can be fully removed. Uncertain as we still are of the precise nature of the electric current, the conclusion that the ultimate atoms of matter are in some way endowed or associated with electrical powers, is forced upon us by nearly all the great facts of the science. The researches of Faraday have led him to notice the truly enormous quantity of this electrical power, associated with

these particles, and he has found, on evidence to which it is difficult to refuse our assent, that no less than 800,000 charges of a Leyden Battery consisting of fifteen large jars, charged by thirty turns of a powerful Plate Electrical Machine in excellent order, are required to produce electricity sufficient to decompose one single grain of water into its elementary constituents! That the heat developed by the action of a Battery, is due to the mutual electrical action of the particles of matter thus highly charged, was originally suggested by Berzelius, the celebrated Swedish chemist, and of this idea Faraday, in the seventh series of his researches, speaks with great commendation, but in the succeeding series, he finds reason to modify his praise, and states that the heat or light exhibit but a small portion of the electric power which acts, and "are merely incidental results, incomparably small in relation to the forces concerned, and supplying no information of the way in which the particles are active on each other, or in which their forces are finally arranged.

Such being therefore the state of doubt in which the immediate cause of the development of heat by the Voltaic current is involved, I do not dwell longer upon the point; but I cannot close this section without briefly adverting to the very beautiful and comprehensive theory proposed by Faraday to explain the varied phenomena of conduction and discharge, as well as many others to which, as being unconnected with the subject of this paper, I do not allude.

The division of bodies into conductors and non-conductors, or insulators, is nearly contemporaneous with the origin of the science of electricity itself, and the states of conduction and insulation have in all electrical theories been assumed as essentially different, although no one has ever shewn in what their difference consists. By a series of most beautiful experiments, Faraday has however shewn indisputably that they are only extreme degrees of *one common condition*, and that they consist in an action of the contiguous particles of matter dependent on the forces developed by electrical excitements. The first effect of an excited body on other matter in its vicinity is, according to Faraday's theory, the production among the particles of that matter of a peculiar state of polarization, which constitutes *induction*. If this inductive or polarised state continues undiminished, then perfect *insulation* is the consequence. If, on the contrary, contiguous parti-

cles of the matter, whatever it may, be metallic or non-metallic, have the power to communicate their forces, then *conduction* occurs, and is a distinct act of discharge between these contiguous particles. The lower the state of tension at which this discharge takes place, the higher is the conducting power of the matter. Hence then throughout a wire conveying a charge of electricity, there is a constant series of discharges taking place between the contiguous particles of which it is composed ; and Faraday intimates, in the form of a query, the possibility that these discharges may be similar in kind, though almost infinitely different in degree, to those which take place between two charged bodies through the medium of the air, or other insulating substance. A wire, it has been experimentally proved, has the power of sensibly retarding the passage of a current, and this power of retardation may be traced through a chain of substances till it reaches its maximum in air, but nothing can be detected during this process to shew that its nature has in any way been changed or modified otherwise than in degree, and therefore Faraday asks, " may not the retardation and ignition of a wire be effects exactly correspondent in their nature to the retention of charge and spark in air ?"

To enter farther upon the various theoretical questions naturally brought before our view in examining the principles of the Galvanic Battery, would extend this paper to a great, and indeed unnecessary, length, and I trust that what has already been said, will suffice to point out the great principles of its action. The chemical theory of the Battery, and indeed the entire identity of chemical and electrical forces, may now be considered as indisputably established by the researches of Sir Michael Faraday, and the question, as was previously remarked, thereby removed for ever from " the domain of *doubtful knowledge* to that of *inductive certainty*."

APPENDIX.

Experimental Desiderata.

As many of the details connected with the practical application of the Galvanic Battery still require to be experimentally determined or confirmed, I have thought it might prove useful to append to the paper a few Tabular Forms, shewing to a certain extent the experiments required. Having no higher object than the establishment of rules for guidance in common practice, these forms have not been prepared with a view to great minuteness of quantitative measurement, but they are still, it is conceived, sufficiently extensive to admit of the deduction of valuable practical inferences, and should they be considered so, they can readily be modified.

In recording experiments, all particulars connected with the Battery employed should be minutely and carefully specified, and it should never be forgotten, that if these are neglected or imperfectly stated, the value of the result obtained is most seriously diminished, and in some cases entirely destroyed. Each series of experiments should be prefaced by a detail of the dimensions of the copper and zinc elements of the Battery; of the state of the zinc rods or plates; of the number of times they may have previously been used; of the state of their surfaces whether amalgamated or not; of the nature and quantities of the solutions employed; of the nature and state of the partitions of the connections throughout the Battery, and of such other points as the experimenter may consider it useful to note. The same careful details should be entered into, relative to the conductors used. The results of the experiments should, whenever it is practicable, be entered in the proper columns in the forms immediately on being obtained, as it is impossible to trust to memory for a series of numerical statements, and a single error may cast doubt on a whole set of experiments.

TABLES OF EXPERIMENTS.

To determine the number of cells of a Galvanic Battery (Dimensions, &c., previously specified) required for effecting the Ignition of different substances, at different distances, and with different Igniting Wires.

FIRST SERIES.

Conductors dry and uninsulated.

No. of Experiments.	Length of Conductor.	Diameter of Conductor.	No. of Junctions in Conductors.	Platinum Igniting Wire, 1½ in.			Iron Igniting Wire, 1½ in.			Brass Igniting Wire, 1½ in.			REMARKS.
				No. of Cells to Ignite. S. P. C.	Ditto, F. P.	Ditto, C. P.	Ditto, S. P. C.	Ditto, F. P.	Ditto, C. P.	Ditto, S. P. C.	Ditto, F. P.	Ditto, C. P.	
1	40	1-6th	8	2	2	3	3	4	5	6	7	8	
2	60	0	0	0	0	0	0	0	0	0	0	0	
3	80	0	0	0	0	0	0	0	0	0	0	0	
4	100	0	0	0	0	0	0	0	0	0	0	0	
5	120	0	0	0	0	0	0	0	0	0	0	0	
6	140	0	0	0	0	0	0	0	0	0	0	0	
7	160	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	
24	500	0	0	0	0	0	0	0	0	0	0	0	

* S. P. C., Saltpetre Cloth,
F. P., Fine Powder,
C. P., Coarse Powder,

Conductors increase in length in arithmetical progression, the common difference being 20.

SECOND SERIES.

Conductors in water and uninsulated.

A. Water Fresh.

No. of Experiments.	Length of Conductor.	Diam. of Conductor.	No. of Junctions in Conductor.	Depth of Water.	Platinum Igniting Wire.			Iron Igniting Wire.			Brass Igniting Wire.			REMARKS.
					S. P. C.	F. P.	C. P.	S. P. C.	F. P.	C. P.	S. P. C.	F. P.	C. P.	
1	40	1-6th	8	5	3	3	4	4	5	6	6	7	8	
2	60	0	0	0	0	0	0	0	0	0	0	0	0	
3	80	0	0	0	0	0	0	0	0	0	0	0	0	
4	100	0	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
"	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
24	500	0	0	0	0	0	0	0	0	0	0	0	0	

B. Water Salt.

Form similar to the preceding.

7 M

THIRD SERIES.

*Conductors in water, but insulated.***A.** *By Colonel Pasley's method.*

Form similar to the preceding.

B. *By Lieut. R. B. Smith's modification of ditto.*

Form similar to the preceding.

C. *By Dr. W. B. O'Shaughnessy's method.*

Form similar to the preceding.

FOURTH SERIES.

*Conductors under ground and uninsulated,***A.** *In Dry Soil.*

No. of Experiments.	Length of Conductor.	Diam. of Conductor.	No. of Junctions in Conductors.	Depth of Soil over Conductor.	Platinum Igniting Wire.			Iron Igniting Wire.			Brass Igniting Wire.			REMARKS.
					S. P. C.	F. P.	C. P.	S. P. C.	F. P.	C. P.	S. P. C.	F. P.	C. P.	
1	40	1-6th	8	4	2	2	3	3	3	4	4	5	6	
2	60	0	0	0	0	0	0	0	0	0	0	0	0	
3	80	0	0	0	0	0	0	0	0	0	0	0	0	
4	100	0	0	0	0	0	0	0	0	0	0	0	0	
„	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
„	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
„	&c.	0	0	0	0	0	0	0	0	0	0	0	0	
24	500	0	0	0	0	0	0	0	0	0	0	0	0	

B. *In Wet Soil.*

Form similar to the preceding.

C. *In Rocky Soil.*

Form similar to the preceding.—Nature, and if possible, the ingredients of the rock to be specified.

FIFTH SERIES.

Conductors underground, but insulated.

Form similar to the preceding.—Nature and extent of insulation to be detailed.

On the Common Hare of the Gangetic Provinces, and of the Sub-Himalaya ; with a slight notice of a strictly Himalayan species. By B. H. HODGSON, Esq., Resident at the Court of Nepal.

(*LEPUS MACROTUS ET OIOSTOLUS, NOBIS.*)

It has often been remarked that the ordinary type of the genus *Lepus* in the Gangetic provinces, differs materially from that of England, and it has been further alleged that the Hare of the Sub-Himalayan ranges of hills is not similar to that of the plains below them. No one however has, I believe, heretofore been at the pains to verify or refute these allegations, which I therefore now purpose to test, and to show that the former is sound, the latter unsound. I have specimens of the ordinary Hare of the plains and of the hills now before me, and after the most careful comparison, can discern no difference between them in size, proportions, or even in intensity of hue in the colours, further than as such every where varies with age, health, and seasons. The type therefore of this genus in the mountains and in their subjacent plains (on this side the Ganges at least) is the same; and of this species, which we shall call *Macrotus* (from the large size of its ears) the females are, as usual, somewhat larger than the males, being from snout to rump nineteen to twenty inches, with an average weight of 6 lbs. and a maximum of $8\frac{1}{2}$ to 9, whilst the males fall short by one inch or more of this size, and seldom surpass 5 lbs. in weight. The general structure and proportions are those of *Lepus timidus*, but the size is much less, the English hare being ordinarily 8 lbs. and frequently reaching 12 lbs.; and if I may trust my notes, as well as the fresh specimens now on the table before me, the females of *Macrotus* invariably have six teats, of which two are placed on the very top of the thorax, and four remotely from them in a parallelogram in the central part of the abdominal region. This is a noticeable circumstance if the six to ten mammæ of authors be ascribed to the genus with sufficient care, and if *Timidus*, or the European type, may be thence presumed to have ever more than six. If so, the invariably restricted number of mammæ in *Macrotus* will form one feature of specific independency; another will be deduced from its inferior size; and a third from the greater length of the ears as compared with *Timidus*, to which, in its general proportions and colours, it certainly bears a close resemblance; even in colours however, there is at least one material and constant difference, that whereas the dorsal aspect of the scut or tail in *Timidus* is black, in *Macrotus* it is of similar hue with the back, but paler. Nor do I notice in *Macrotus* any peculiarity of structure in the hair (towards tips enlarged, acuminate, and recurved) such as is ascribed to

that of *Timidus*. The general colour of the Indian Hare is a deep cinnamon red, copiously mixed with black on the body superiorly, but unmixed upon the limbs and front of the neck and chest, and also on the nape and dorsal aspect of the neck near it; pure white upon the head and body below, as well upon the insides of the limbs near it, upon the genital region, posterior margin of the buttocks, and whole inferior and lateral surfaces of the tail. The front of the upper lip, the margin of the mouth, a circle round the eye, and a line thence to the nostril are always pale, rufescent, hoary, or purer white, and so also the bases of the ears dorsally, and a strip thence continued towards the shoulder and bounding the purely ruddy hue of the soft nape. The superior margin of the ears on both sides is black, but the general hue of the fur on the ears antecially is similar to that of the head, whilst postecially and interiorly the ears are nearly nude. The mustachios (which are not undulated) are half black and half white, and though the arms and cubits are usually unmixed with black, yet this is not always the case: the animal in very high fur having the cubits, like the tibiae (externally) powdered with black. The fur in general is very rich, full, and soft: both the woolly and hairy portions, the former of which seldom exceeds an inch in length, whilst the latter varies from $1\frac{1}{8}$ to $1\frac{1}{2}$ inch. The hair has mostly four rings from the base, thus—bluish hoary, black, red, and black. The wool wants the terminal black ring every where, and is for the most part white, but ruddy apically: the hair wants it on the purely red parts of the animal, such as the abdominal aspect of the neck and the limbs; and both wool and hair are devoid of all rings, and wholly white upon the belly and parts adjacent, as well as upon the inferior surface of the head. Some hairs are wholly black or dusky on the back; but in general besides its bluish hoary base, every hair on that surface of the animal, has two black rings divided by a red one, which latter is of a deep cinnamon hue, almost exactly, or if the reader pleases, brownish-red. The buttocks postecially are less dashed with black than the middle of the back, which in fine furred animals is very dark: but the ordinary dorsal colouring of the hair and wool prevails on the buttocks, as well as on the dorsal aspect of the tail, both parts being like the back, though somewhat paler. Occasionally the wool and base of the hair are dusky, rather than hoary, and the intensity of the red hue, as well as the quantity of black tipt hairs, depend on health, age, and season, both in the hills and the plains. There are of course five digits on the fore extremities, and four on the hind ones, but the thumb consists of a nail only, and the other anterior digits are gradated, as in our hand: whilst in the posterior extremities the central digits are equal, and of the

laterals the interior is the longer. The mustachios are ample, extending much beyond the base of the ears, not harsh, nor adpressed, nor undulated as in *Timidus*, and of many lengths. Above the eye are four to six lesser bristles, and two or three longer ones below it on each cheek. Eyes remote, and much nearer to the ears than to the snout; ears considerably (or $\frac{1}{5}$) longer than the head, so that when pulled forward they may be extended from $1\frac{1}{4}$ to 2 inches beyond the tip of the nose. Head compressed, and arched entirely along the vertical line. Scut without the hair extending only half way from the knee towards the heel of the straightened leg, and with the hair falling considerably short of the os calcis.

The following dimensions will complete the illustration of this species as found in the mountains and plains.

	Plains.			Hills.		
	Mas.			Mas. Fem.		
Snout to base of scut,	1-6	1-6	1-7			
Snout to occiput straight,	4	4	$4\frac{1}{8}$			
Ditto ditto, by curve,	$4\frac{1}{4}$	$4\frac{1}{4}$ plus	$4\frac{1}{4}$			
Snout to fore angle of eye,	2 less	2 plus	2			
Thence to antéal base of ear,	$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{1}{2}$			
Ears length from scull,	$4\frac{1}{4}$	$4\frac{1}{4}$	5			
Ditto ditto from anterior inner base,	$3\frac{5}{8}$	$3\frac{5}{8}$	$4\frac{1}{4}$			
Width between eyes,	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{6}{16}$			
Scut only,	$3\frac{1}{4}$	$3\frac{5}{8}$	$3\frac{5}{8}$			
Scut and hair,	$4\frac{7}{8}$	5	5			
Olecranon to carpus,	$3\frac{11}{16}$	$3\frac{10}{16}$	$3\frac{11}{16}$			
Thence to tip, long finger (not nail,)	2	2	$2\frac{1}{16}$			
Tibia or knee to os calcis,	$4\frac{14}{16}$	$4\frac{15}{16}$	$5\frac{1}{16}$			
Thence to tip long toe (not nail,)	$4\frac{1}{16}$	4	$4\frac{1}{4}$			
Girth behind shoulder,	$9\frac{1}{2}$	$9\frac{1}{4}$	$10\frac{1}{4}$			
Weight (very thin)	$4\frac{1}{4}$ lbs.	$4\frac{1}{4}$ lbs.	5 lbs.			

The following specific character may perhaps serve to distinguish our animal: *Lepus macrotus*, with black tipped ears longer than the head. General colour, full cinnamonaceous red, shaded above with a black: tail dorsally concolorous with the buttocks, head below and belly pure white: in size less than *Timidus*. Snout to rump 18 to 20 inches, and weight 5 to 7 lbs. Head (straight) 4. Ears five inches. *Habitat*. Gangetic plains and sub-Himalayas. Of the Tibetan species I possess only some wretched remains, which enable me however to indicate the species thus:—

Lepus Oicostolus, with fur consisting almost wholly of wool, considerably curved and interspersed rarely with very soft hairs. Slaty grey blue for the most part and internally, but externally fawn-tinted above, and whitish below and on the limbs: some hairs on the back tipped with black beneath a subrufous ring. Tail white, with a grey blue strip towards the back. Apparent size of the last. *Habitat*, the snowy region of the Himalaya, and perhaps also Tibet.

Hares of the first species are exceedingly abundant in the Nepalese Tarai and British districts near it, but less so in the mountains, though there also they may be found in most districts wherein the declivities of the mountains are not very precipitous nor wholly covered with dense forest. Hares love the lower and more level tracts within the mountains, where grassy open spots are interspersed with copsewood under which they may safely rest and breed; for in the mountains the hare never resorts to holes or burrows; nor, I believe, voluntarily in the plains, though I have heard the assertion that it does so. In the plains patches of grass interspersed with cultivation are the favourite resorts of this species, or Jhow shrubberies fringing the banks of nullahs, where, occasionally the animals congregate in numbers wholly unknown to the mountains. The Indian Hare, or *Macrotus*, breeds frequently during the whole year, and produces usually two young ones at a birth. The young are born with the eyes open, and furnished with teeth. In June 1835 I took two from the left horn of the uterus (none in the right) of a female; and these young, though unborn, had the eyes open, and the fur quite perfect. In fact, the young follow their dam as soon as they are born.

CATHMANDOO,
February 1841.

Nepal, March 1st, 1841.

The account of the Hares which I sent you was written *currente calamo*, and without my being at the trouble to look (shame on me) at my own Catalogue of Mammals apud Linnæan Transactions, where the Hare of the plains is named *Indicus*, and that of the Himalaya *Æmodius*. These names might do, and changes are bad: but tropical appellations are objected to, and in the plains there is another Hare, *Nigricollis*, wherefore the names affixed to my paper with you should perhaps stand; but a note at the foot of the page should identify them with *Indicus* et *Æmodius* respectively of the Catalogue, thus: "These species are named respectively *Indicus* and *Æmodius* in my published Catalogue. Nor perhaps was it worth while to drop the local appellations, though *Nigricollis* constitute a second species in the plains of India."

B. HODGSON.

*A short account of Khyrpoor and the Fortress of Bukur, in North Sind. By
Captain G. E. WESTMACOTT, 37th Regt. Bengal N. I.*

[Concluded from page 1113.]

The Indus generally begins to rise in March and abate in the early part of October, but varies in different seasons. In 1839 it just rose in the end of March, but did not overflow until May. It commenced decreasing on the 21st of August, and had fallen twelve feet at Bukur in the end of September, and about four more the close of the month following. The suddenness with which it rises and falls are only equalled by the snow torrents of the Himalayas and Switzerland. I have known the river increase several feet in a few hours, and people are frequently carried away while bathing by a rush of water, which bears them along without the power to resist it. On these occasions boats are driven against the banks, and if old and crazy, break in pieces, and the passengers are drowned.

The shores of the river are fertilized by the annual inundations, and artificial channels are cut from it in the interior of the country to prepare the land for tillage. Some of these useful and munificent works belong to the time of the Mogul emperors of Delhi. A great navigable canal called the "Sind" leaves the river about thirty miles above Bukur, and after passing Shikarpoor pursues a southerly direction to Noushuhra, the boundary of the Purgunnah of Moghulee, and enters that of Chandkoh. Lower down it joins the Nara, which tumbles into lake Munchar after a circuitous course of about 120 miles. Another great canal was cut on the east bank by the late Meer Sohrab. It receives its water from the Indus, a few miles below Bukur, and terminates in the desert soon after passing the city of Khyrpoor. In the height of the floods, however, it flows southwards in a continuous stream, diffusing plenty over a wide extent of country, which would be, without it, an unprofitable waste, and a portion of its waters find their way back through different channels to the Indus. The supplies of this canal have failed within the last two years, and unless pains are taken to deepen it, will soon cease to flow. It would be a serious loss to the people of the capital, who depend on it for wholesome water several months of the year, that which they draw from wells being soft and brackish, and hardly drinkable by persons unused to it. The filling up the canal would occasion a diminution of the revenues, which will probably induce Meer Roostum to repair it. Both the Shikarpoor and Khyrpoor canals frequently overflow their banks during the freshes of the Indus, and dry up when the river subsides. The small cuts that irrigate

the country are exclusively at the charge of the farmer, who contributes likewise to the expense of making and repairing the large canals within his property.

As soon as the waters of inundation evaporate, the soil is ready to receive all kinds of seed almost without preparation. It is sown in the month of October, and always yields an abundant harvest. The river does not occupy above a fourth of its channel in the dry months, and not more than a tenth of the soil on its banks, capable of cultivation, is turned to account. There are vast tracts in north Khyrpoor, which the inhabitants of Bengal would seize with avidity, overrun with tamarisk, and the long feathering grass known in India by the name of Moonj.

The tamarisk springs from the soil within a month after it is deserted by the water, and villagers at a distance from the stream drive their buffaloes to graze on the shoots and young grass which cover the banks. The herbage is extremely nutritious, and communicates great sweetness to the milk of cattle that feed on it. Cow's milk is inferior to buffalo's milk in richness and flavour. The people convert the milk to ghee, and dispose of it to merchants and boatmen, who carry it for sale to the markets of Roree and Sukhur. The peasants remain at the river in tamarisk sheds until the floods oblige them to retire. Some of the sheds cover an area of several hundred yards, and contain 400 and 500 buffaloes, with the herdsmen, their wives and children. Half a dozen families often crowd into a narrow space divided from the herd by a railing, and cook, eat, and sleep on the ground among milk pots, platters, spinning wheels, and a few articles of common furniture.

There are no rocks in the river above Bukur, and the extent of cultivation on the Khyrpoor side much exceeds that on the shore opposite; the bank is cut to receive Persian wheels, and the peasant removes them when the floods cease to another locality.

The stream of the Indus is foul and turbid, and though little encumbered in the dry months with reeds and drift wood, is sufficiently rapid to hold in solution quantities of sand and other matter it washes along in its course. The number of shoals that perpetually shift their position obstruct the navigation, and render it necessary in the dry season to stop boats while one of the crew is sent forward to sound the channel. Vessels are constantly obliged to cross from one bank to the other, and the want of paths through the dense jungle makes it difficult to carry the track line, and serves materially to lengthen a voyage.

The east part of Khyrpoor is nearly desert, and the scanty supply of well-water loathsome to the taste. The few spots which yield good pasture depend on the rains, which often fail. The supply in 1839 was said to exceed

what had fallen for years, but lasted only four days. In the two preceding years a drought destroyed thousands of cattle.

The *lye*, or tamarisk, is the most abundant production of the wilds, and almost as useful to the Sindee as the bamboo to the native of India. The flowers (*sakoor*) are dried, pulverized, and infused in water, and form a red fluid in which cottons are steeped to prepare them for dye. A considerable quantity of flowers are exported to Persia and the Punjab. The wood supplies the inhabitants almost exclusively with fuel, and they employ it in the construction of houses, boats, and agricultural implements. The boughs are used for fences and cattle sheds, to line wells, and to thatch houses, and are plaited into baskets, and mats for boats, for which their strength and toughness admirably fit them. The young shoots form a nutritious diet for goats and cattle.

Next to the tamarisk in point of usefulness is the *Moonj*, a species of grass which rises twenty or thirty feet high. The peel is twisted into rope for masts and track lines, the texture depending a good deal on the length of time the grass is beaten. The ropes last a twelve month if kept constantly wet, but hot and dry weather destroys them in a third of the time. The string made from the plant is used to lace the common country bedsteads, and the thick part of the stem for screens (*shutees*) for the ceiling and walls of houses. The upper stem bears a long feathering flower, and is made into screens and baskets to hold grain and chaff for cattle.

The *Kas* is another description of wild grass, sometimes used to thatch huts, and cattle browse on the shoots. The *Pees* reed grows on the hills, and is much used for rope, and more pliable than *Moonj*, but wet destroys it; and there is a long flag called *putar* found on the banks of streams and lakes, made into soft pliable ropes, which boatmen pass round their loins in tracking.

Nitre is found in great abundance effloresced on the surface of the soil, and the people manufacture salt more than enough to supply their wants. Coarse salt sells in Roree at four and five muns the rupee, and a fine kind at ten seers.

Coarse cotton cloth (*Khasa*) is manufactured in the principal towns and villages, chiefly for home consumption, and a little is exported to Afghanistan and Persia. Common *loongees* are fabricated at the villages of Raneepoor, Gumbut, Khoora, and Duraz, situated together to the south of the capital. They are chiefly cotton with silk borders, and a few of silk and cotton mixed, and very inferior to the fabrics of Thalfa and Buhawulpoor. Silk cloths are woven at Roree, Khyrpoor, and Shikarpoor, but the weavers are ignorant how to flower and variegate them. Sind caps are

chiefly made at Shikarpoor and Roree, and a common one with a cotton top and silk sides costs a rupee. Common shoes of brown leather are made every where at from four to sixteen anas a pair. They are inferior to those of Buhawalpoor, and the people are unacquainted with the art of embroidering them. Manufactories of paper and gunpowder are established in all the large towns. The best paper factories are at Shikarpoor and Larkhanu, but produce paper of inferior quality to that of Kashmeer and Delhi.

Dromedaries and asses constitute the principal means of conveyance. The duty on grain is often levied on the load, and merchants to save money overload their cattle, and put 800 lbs. on a camel and 250 on an ass. A fine camel will carry this weight easily, but six hundred weight is an average burthen on a long journey, and a female carries one hundred pounds less. The latter is only employed in case of necessity. The best saddle camels come from Kuchee and Jussulmeer, and sell in Khyrpoor at from 100 to 150 rupees, and baggage camels at from 30 to 60 rupees. These were the prices before the British approach; they are now almost double. Camels are ridden on a journey by people of rank, and carry their clothes, provisions, and a servant armed with a sword and matchlock. Merchandise is brought overland from India and central Asia exclusively on the camel, as it is the only animal that can endure the heat and fatigue of the desert in the summer months. It finds nourishment in the most inhospitable spots and performs a stage of twelve and fifteen miles with ease. Caravans travel at night in the hot months, and the camels are left to browse in the day-time, but in winter the day is devoted to the journey, and the night to repose. These animals are not used to carry swivels, as in Rajisthan, but they turn mills and water-wheels. The Sind camel is the species with one hump, or Arabian camel, usually called the dromedary, and the small breed of Khyrpoor is not capable of supporting much fatigue, nor of lifting the load a good camel of western India will carry. Disease, hard work, and poor diet occasion a great mortality among them every summer. The lower classes have a large number, and cannot afford them grain, and they feed in the wilds on *juwasee*, and other nutritious shrubs. These depend on the rain, and in seasons of drought, such as 1837 and 1838, the animal is reduced to a state of great misery, and numbers perish. Large herds are pastured by a single peasant, whose maintenance is almost the only charge on the proprietor.

Part of the *Thur*, or Indian desert to the south-east of Khyrpoor, belongs to the Ameers of Hyderabad, and is celebrated for a very superior breed.

* During the hot months of 1839 the camels of the British Commissariat at Sukkur died at the rate of one per cent. ?

cription of goats and cattle. The ghee is excellent, but the dealers adulterate it with flour before they carry it to the markets.* A Khyrpoor goat gives commonly three-quarters of a seer of milk, and a fine one that yields a seer is worth two rupees. Goats kept for the table sell at from twelve to twenty anas a piece. A male costs one rupee, and when trained to fight, which is a rather favourite pastime, twice and thrice the sum, and a kid from eight to twelve anas. A good breed comes from Gumao, in the district of Khyrpoor, but Boordgah is considered to produce the finest goats, sheep, and cattle, of any place in the prince's territory. Oobaro, in north Khyrpoor, produces ghee in great abundance, and immense herds of buffaloes are grazed on the banks of the Indus in the districts of Boong and Bara.† The females cost from twenty-five to forty rupees,‡ according to the quantity of milk they yield, a calf ten, and the highest price of a male is twenty-five rupees. A ram costs 1½ rupee: a ewe that gives half or three quarters of a seer of milk, the same: ewes reserved for slaughter one rupee, and a lamb from ten to twenty anas.

The best horses and asses come from Afghanistan and Persia. The horse of Sind is small, lean, and of miserable aspect, but hardy, and capable of enduring great fatigue. Mules for burthen and hire are kept chiefly at Khyrpoor by Talpoorees, who are too poor to entertain servants, and usually accompany the animals.

The ass, like his fellow of Arabia and Egypt, is a small active animal, with considerable power of endurance, and so useful that there is hardly a

* In India ghee is adulterated with Muhoosa oil, the *shukurkund*, or sweet potatoe, and the ghoiya vegetable, &c.

† The width of the Khyrpoor territory at Bara and Boong is only ten or twelve miles, and extends along the Indus about thirty miles north of Sulzulkot, and terminates between Boong and Rajinpoor. The possessions of the Ameer of Khyrpoor are represented in Arrowsmith's map to include Rojhan, the chief town of the Muzaree Belooch, but do not project north of Keen in Kuchee, which is nearly opposite Boong. The late Rajah Runjeet Sing seized and annexed Miyan Rojhan to his dominions in the middle of 1836, because of an attack by the Khyrpoorees on his frontier post. Arrowsmith's map of central Asia, dedicated to Lieutenant, now Lieut. Colonel Sir A. Burnes, is I believe the most correct chart of the Indus that has been printed, and at that time (1834) Rojhan belonged to Khyrpoor.

The travelling distance from Buhawulpoor, in Daoodpootra, to Feerozpoor is 160 kos, or 225 English miles. The kos in Daoodpootra is about one mile and three furlongs English, and the frontier extends within 56 miles of Feerozpoor. The Indus constantly changes its channel, and a survey of its course this year might give a very inaccurate representation of it the next. In the summer of 1839 upwards of 4000 bighas of land, partly cultivated, situated midway between Ooch and Mittun, were transferred by a caprice of the stream from the Sikh territory to Buhawulpoor on the east bank. The river is gradually deserting Ooch, which is now upwards of three miles from the bank in the dry season.

‡ These were the prices at Roree and Sukhur before the British entered Sind, and may be taken as the average throughout the country.

family of Moosulmans and Hindoos without one. He brings grass and fuel, carries the merchant and his grain, and the poor keep him for him. He is never fed on grain, and subsists in the wilds the best way he can but is always in sleek and comfortable condition.

The pig is not found in Sind in a domestic state, but the villages like those of India, swarm with a breed of half-wild disgusting dog, who subsist almost entirely on offal.

Tigers, wolves, jackals, boars, porcupines, deer, and hares, harbour in the forests; and among the amphibious animals are the alligator, otter, badger, and porpoise. Alligators inhabit the creeks and minor streams that diverge from the Indus, and are held sacred by Hindoos and Moosulmans. Tigers are rare, and kept by Moojawurs attached to the tombs of eminent saints to attract visitors. The hog is the scourge of the farmer and he is obliged to employ watchmen at night to preserve his fields from their ravages. Wolves carry off poultry, but seldom attack grown-up persons. Badger and otter skins form an article of export to Afghanistan. Snakes, scorpions, and centipedes abound in rocky situations, and they attain a large size. Flies, mosquitoes, and many varieties of beetle and grasshopper appear when the inundations subside, but are less numerous and troublesome than in the wet season in India. Leeches are plentiful and extensively used for venesection. Among the birds are a peculiar kind of Myrops or bee-eater; the black partridge, similar to that of Kutch but differing from the species found in the north provinces of India; the grey partridge. Two kinds of woodpecker found also in the Konkan the razor-beak, similar to that of Gujerat; several kinds of gull; the pelican; a species of plover, peculiar, I believe, to Sind; and the Kunch or Bhooketta of India, a black bird with long feathers in the tail, remarkable for its antipathy to the crow. Though a third less in size than is the Bhooketta attacks it with so much vigour and determination, that it trembles with fear, and endeavours to escape without offering resistance. Geese, ducks, divers, snipe, and other water-fowl are uncommonly plentiful. The first congregate in thousands on the banks of the Indus and the extensive lakes and morasses formed by its overflow, and form part of the food of the lower classes.

The multitude of fish in the Indus, and the lakes and streams that flow from it, also supply the inhabitants with food. The saleswomen dispose of the small fish by weight, and sell the large ones to purchasers in any quantity they require, by guess. The following catalogue of sixteen, includes, I believe, all the species found in the Indus in Upper Sind. I have added the price in the Roree market of the largest and best of the kind, but it varies of course with the season and drought.

The Khuggur* ranks first in point of flavour and wholesomeness, and is called par excellence, "The fowl of the Indus." It attains the length of ten or twelve inches, and sells for about three pys.

The Dumra† (Rohoo of the Ganges) is considered next to the Khuggur in excellence. It comes into season in September, and is plentiful the following month. It grows to the length of 4½ feet, and sells for twenty pys.

The Pulla, a kind of carp (Roree of the Ganges, and Hilsa of Bengal.)

The Theleet is a dark coloured fish, of good flavour, twenty-six inches long, and sells for nine pys.

The Shakirt is eighteen inches long, and sells for five pys, but is not a favourite. There are a few always in the market, but October is the best month for them.

The Singarat is well flavoured, and much eaten. The largest measure about twenty-four inches, and sell for six pys.

The Pundun* (Ruya of the Ganges and Jumna) spawns in the month, of Sawun. The largest are six and seven feet long, and sell for eighteen pys, but are not prized from being full of small bones.

The Goj* (eel) grows three feet long, but is little eaten, from its resemblance to a snake. It sells for four pys.

The Lahoor,*† Mookör,* and Putonee* are each about eighteen inches long, and cost three and four pys. The first is much eaten, but the last is disliked from being full of small bones.

The Dumun† (Kutera of the Ganges?) is nine inches long, and costs two pys. It is full of bones.

The Soneet measures eight inches long, and sells at three pys the seer. Like all bony fish it is eaten sparingly.

The Pullura is three inches long, and sells at the same price.

The Ghar† and Kooreet are each two inches long, and cost four and five pys the seer. They are great favourites.

When the river is in a state of flood the fishermen live in boats, and at other times on the banks in temporary huts built of reeds and tamarisk cut in the forest. They farm tracts of the river, one or two miles long, by the year, and sometimes pay in kind at the rate of a third or a fifth, and at others head money every second month. Two or three men residing under the same roof, pay less than a single individual.

A fisherman of Roree pays every two months, Rs.	...	...	3
Two fishermen together, ...	...	...	5
Three fishermen together, ...	...	...	7

* Always in the market.

† In season in October and November.

The Pulla fish has been sometimes compared to the salmon, from the extreme richness of its flavour, and is excellent either fresh or salted. When full grown it measures about eighteen inches long, and comes in season in Upper Sind in the month of *Sawun*, when the river is full, and is in its prime about six weeks. The people prize it less than others of the finny tribe from its heating quality, which is said to generate *leish* and another disagreeable disorder in those who eat it constantly, and is filled with small bones. The poor Sindees, among other dirty practices broil and eat the entrails. The price of Pulla depends on the drought. In 1838 a full grown one sold in the Roree market for two pys, but the supply failed in the season following, and the demand made for it by the British, raised the price to six pys.

The peculiar manner of fishing for Pulla has been well described by Burnes in his voyage up the Indus. It is a novel spectacle to see the stream in the floods covered with men floating fearlessly on vessels of baked clay. A vessel (*muttee*) will usually contain twenty gallons of water, and is much flattened at the sides. Those half the size have handles through which the fishermen pass a rope to tie to their waists. The fisher covers the opening at the top of the jar with the pit of his stomach and swims into mid-stream, with a net ready for use on his shoulder. The net is woven in large meshes, and fixed at the upper end of a bamboo, twelve or fourteen feet long, with branches at the top like a fork. He plunges the net vertically into the water and remains motionless with his thighs drawn up on the jar until the fish are snared, when he tightens the mouth of the net, disengages the fish, spears them, and drops them into the vessel.

The fisher usually selects a reach of the river for his employment, and after floating the length of his beat, gains the shore to deposit his spoil. He either transfers the jar to his head, or leaves it hanging to his loins. He then with the net on his shoulder walks across the point he swam round, and again commits himself to the water. Fallen trees swept along by the current sometimes break the earthen vessel, and endanger the fisherman's life. In situations liable to this accident, he substitutes for the *muttee* a large gourd enclosed in netting, which he binds over the pit of his stomach. This obliges him to swim low in the water, and often his head and shoulders alone are visible.

The fishermen of the Indus have spare figures and swarthy complexions; they wear beards like the other Sindees, and a wrapper of blue or red calico round their heads and loins.

A *muttee*, or earthen jar, costs from 12 to 16 anas.

A net with a handle of bamboo, or bank wood, 12 anas.

A gourd, 1 or 2 pys.

In lakes, and shoal water produced from an overflow of the Indus, large quantities of Pulla are taken in nets, called *jalee*, fabricated and worked by eight fishermen (*Mohone*.)

Another kind of net used by one man is six-sided, five feet in diameter at the opening, and shaped something like an umbrella without a handle: sticks, four feet long, supply the place of whalebone, and the intervals are filled with net, strong enough to hold fish three feet long. The cost of making does not exceed twelve annas.

The military of Khyrpoor may amount to 10,000 or 12,000 men (*Moolsulmans*), and are paid part in cash, and part in grain at harvest. The Ameer grants lands to chiefs and *jaegeerdars* on condition of their supporting a certain number of troops for the service of the state in war time. They usually belong to the tribe of their chief, and work in his farm and household when not employed by Government. The soldier's stipend is disbursed half-yearly at harvest, but is frequently in arrears. The infantry get from thirty-six to forty-eight rupees per six months from their chiefs, and half a rupee a month extra in war time from Government. The cavalry receive from ten to thirty rupees a month, and are divided into five grades.

A few of approved courage receive 10 *Khurwars** of grain, and 400 rupees in cash half-yearly.

The 2nd class about 8 *Khurwars* of grain, and 200 Rs. half-yearly.

The 3rd class about 6 *Khurwars* of grain, and 140 Rs. half-yearly.

The 4th class about 4 *Khurwars* of grain, and 100 Rs. half-yearly.

The 5th class about 2 *Khurwars* of grain, and 80 Rs. half-yearly.

In actual war the pay of the first class is increased to 2 rupees a day.

2nd class, 1½ rupee per diem.

3rd and 4th classes, 1 rupee per diem.

Most of the chiefs are *Talpoorees*, and also receive an increase of pay when employed, according to their rank.

A Moghul officer in the service of Shah Nuwaz Khan, the minister of Meer Ulee Moorad, receives twenty *khurwars* of grain and two hundred and fifty rupees in cash yearly to furnish four infantry soldiers. The grain is wheat and *joowaree*, delivered in equal quantities; the first in the Rubbee harvest, and the last in the *Khureef*, and the officer is at the charge of conveying it to his farm. The soldiers are Moghuls of his own tribe, and only serve in war, at other times they till his lands free of expence. If the officer's services are required in peace he gets his food from the minister, and always a suit of clothes yearly. The Moghul pays his soldiers at the rate of seven rupees a month, calculated at twenty-one

* One *khurwar* is equal to 15 muns, or 600 seers.

rupees worth of grain and the same amount in cash each harvest, as they furnish their arms, and when travelling mess with their chief.

Before the British troops occupied Sind there was scarcely any mark for grain, but the demand for it has increased since 1839 to such an extent that the Ameers will be obliged probably to reduce the allowance to their troops, and place their pay on a new footing.

The soldiers of the Principality are chiefly cavalry, half of whom ride ponies, and the others camels, horses, and mules. Their arms are swords, shields, matchlocks, and knives. The Ameer's secretary inscribes the name of the recruit and that of his tribe in a register, and it is said that the whole military force could be assembled at the capital within eight days.

The soldier is never punished with stripes, and rarely abused. Meer Roostum makes the chiefs responsible for the conduct of their men, and deprives the guilty of part of their jaegeers. They receive their discharge if dissatisfied. The military are proud, and impatient of rebuke; although faithful to a commander whom they love, are easily induced by treatment to offer their allegiance to another.

There are no forts in Khyrpoor of any importance except Bukur and Dijee, and they are in bad repair, and incapable of resisting European artillery. There are *Kots* at Shergurh, Moobarukpoor, Oodur, Shahgurh on the Jeysulmeer frontier, Subzul on the Daoodpootra frontier, Kandura between Roree and Khyrpoor, and a few other places. They are merely high mud walls built round a square, and pierced for musketry, but without guns.

Dijee-Kot, or Ahmudabad, merits notice from having been the capital of the Soomras, and was destroyed by Ullah-ood-Deen, Emperor of Delhi towards the end of the fourteenth century of our era. It has not yet been visited by a European, and I am chiefly indebted for the following account of it to a Moghul officer lately in the service of the governor Ali Meer, youngest brother of Meer Roostum.

Dijee stands on a hill about eight kos south of Khyrpoor, and three hundred yards from the east bank of the river Meerwah, which is fed from the Indus, but contains water only three months in the year. The place uses it as a depôt for treasure, grain, and military stores, and resides in a walled village below. There are four or five houses in the fort, and a supply of brackish water, which supplies the garrison in time of siege. The fort is surrounded by a stone and brick wall, about thirty feet high and four feet thick without a ditch. The only entrance is from the east through four gates connected by walls, and a *ghorchu* is mounted over the inner one, but the others are defended by cannon. The following guns of iron and brass are on the rampart :—

1 Eight cubits long.

3 Seven cubits long.

5 Ghorchu (so called from being drawn by horses) of four or five cubits.

8 Ramjungiyō, or Jinjalls, six or seven cubits.

3 Gobare (mortars) 2½ cubits.

Each Ghorchu requires eight horses to draw it. Most of the guns are new, but would do little against a European army, and the miserable condition of the Sind artillery is proverbial.* The small village of Dijee is surrounded by a wall and rampart twenty feet high, and seven thick at the base; it mounts six Ghorchus, but is too much decayed to offer resistance. Two of the eight gates are closed, and the others without shutters. A sheet of water, ten or twelve feet deep, and 150 or 200 yards wide, which has been formed partly by digging earth for the fortifications, encircles the place during the floods of the Indus, and dries up in the cold months. The village contains three wells of good water, and the country is cultivated on all sides except the east, where there are hills. The crops are Joowaree, Bajree, and Indigo. Fuel is brought from a distance of two kos, and consists of tamarisk, *Kundee*, and *Ber*, (wild bullace). Ali Morad is probably entrusted with the command of Dijee because he is the martial genius of the family, and can assemble between 2,000 and 3,000 picked warriors in two days, from villages within a circle of twenty kos of his residence; they are chiefly Belooch, with some Afghans and indees, and one-half cavalry and the other half infantry.

The town of Bukur fills an important place in the history of Sind, and I have abridged the following account of it from a work in the possession of the Suyud family at Roree and Sukhur. The dates in native manuscripts are often faulty, and should be received in this instance with caution.

About the middle of the seventh century of the Hijra a Suyud of illustrious family, named Moohummud Mukae, arrived at Bukur. He was the offspring of Ameer Moohummud Soojan and a daughter of the then king of Persia (a Turk), who presented him on his marriage with the tract of country situated between Mushud and Kandahar. Moohummud Shoojan subsequently made an expedition to the south of his principality as far as the banks of the Indus, and liking the situation determined to revisit it. He directed his attendants to write an account of the spot, and retraced his steps to Mushud, where he died soon after, and was buried in the mau-

* The Sindees have an exaggerated notion of the destructive power of our guns. When the Ameens of Hydrabad threatened in 1838 to oppose the march of our troops, a nobleman of their Court, who had heard strange accounts of our shells and shrapnels, advised them to desist, as it would be rash to attack an enemy whose cannon charge balls from both ends.

soleum of his grandfather Huzrut Iman Human Sooltan Khoorasan Uboi Husun Ulee, son of Moosa Ruza. He left a son named Uhmud, and is widow pregnant of another. When the period of mourning was expired she went on a pilgrimage to Mudina, and from thence to Mukka, where she brought forth Meer Moohummud, surnamed Mukae, from his birth-place. On her return to Persia she married a relation, and travelled with him and Moohummud Mukae to Bughdad, where they were hospitably received by a nobleman named Shuekh Shahab-ood-deen Soohrwade. He formed a great friendship for Mukae, and determined to give him his daughter in marriage, but his relatives supposing him a person of obscure birth, opposed it. The young man was indignant at their conduct, and asked them to accompany him to the burial place of Moohummud, that he might convince them of his holy origin. On reaching Mudina they entered the tomb of the prophet, when Mukae exclaimed, "Salutation to the O ancestor," and a voice from the sepulchre replied, "Salutation to the son;" which proof of sanctity so affected his companions and the town people that they fell at his feet, and after showing him extraordinary respect begged him to confer a blessing on their city by tarrying some time in it. He declined, on the plea of returning immediately to Bagdad, but determined first to visit Nujab, to give his companions another proof of his holy lineage. On entering the tomb of Ulee he addressed the spirit of the departed as he had done Moohummud, and a voice from the sepulchre confirmed his origin.

Shahab-ood-deen was overwhelmed with shame at what had happened, and after asking and receiving his forgiveness gave him his daughter in wedlock. In due time the lady brought forth a son called Sudee, whose tomb is in the fort of Bukur, she died immediately afterwards, and her father followed A. H. 587.

Among the papers that came into Moohummud Mukae's possession after his father's death was the account of the Indus, already mentioned, and being curious to see the spot he travelled thither in the year of Hijri 658. His companions agreed in considering it favourable for a settlement, and having mounted the hills to reconnoitre they discovered two herds of men grazing cattle. These men undertook to point out the spot that was so much admired by Moohummud Shoojan, and departing at night they arrived at dawn the following day at the foot of a hill, which the herds

* The late Captain Macmurdo of the Bombay army, states that Bukur was taken by the Arabs, and built from the ruins of Atore. He mentions, on the authority of Tohfut al Girami, that the town did not exist in the time of the Hindoo government, and that it got its name Bukur from Moohummud Mukae some years after its foundation.

and camels of the caravan, although urged repeatedly forwards, would not pass.* Moohummud Mukae declared this a proof it was the site chosen by his father, and kneeling down offered thanksgiving, and because a cowherd conducted the caravan, and it arrived at the place at dawn, he called it Bukur, which means in the Arabic tongue "a cow," and "the morning."

At this period the inhabitants of the country were infidels, and when the governor† Alim Khan Urghoon heard of the new worship he proceeded to seize and punish the offender; on appearing however before Moohummud Mukae he suddenly lost the power of injuring him, and his disposition changed entirely: he entreated to be admitted to the bosom of Islam, and became one of its most devoted followers. He offered to assign lands to Moohummud Mukae which the latter declined, and wished to purchase a spot where he could build temples to God. Alim Khan accompanied Sudr-deen to Sehwan to choose a site, and Suyud Ali, a friend of his father's, persuaded him to settle there, and gave him his daughter in marriage. He purchased lands in the vicinity, which he called "Rusool-poor," but had not been long there when Moohummud Mukae disapproved of his residing so far from Bukur, and recalled him. He then desired him to mount a domestic on a camel, and promised to purchase of Alim Khan and bestow on him as much land as the animal could traverse between dawn and dusk. The man rode through a district on the east bank of the Indus, which became thence forward the property of Sudr-deen, who cultivated and peopled it. The district is two kos from the town of Roree, and retains the name of Alee-wahun it received from Sudr-deen. It contains the villages of Machee and Turee Chanee, and part still belongs to the descendants of Moohummud Mukae, and they pay no revenue to government.

Mohummud Mukae died A. H. 691, and the Suyuds raised his son Sudr-deen to the chief dignity. Alim Khan's death followed soon after, and in the year 697 Sudr-deen invited Nusrut Khan, of the Khilchee tribe, the then Sooltan of Mooltan, to take possession of Bukur. The Sooltan on his arrival gave his daughter in marriage to Budr-deen, son of Sudr-deen, and swore on the Koran to assign a third of his dominions to her in dower, but broke his engagement and gave in lieu of it the country of Umeer Wuhun, now called Surjudpoor, in North Khyrpoor, which continued in the possession of Budr-deen's descendants until the Kalhoras deprived them

* This seems to confirm Captain Macmurdo's opinion that Bukur was not originally surrounded by water.

† He must have received this title on his conversion to Islam; his former name is not given.

of it.* The issue of this union was two sons and two daughters, one of whom married her cousin, the son of Tajood-deen, and received half of Umeer Wuhun for a dowry, Sudr-deen married first the daughter of his uncle Uhmud, by whom he had six sons and two daughters, and secondly the daughter of Suyud Ali of Sehwan, who brought him four sons and two daughters. On his death his eldest son Budr-deen succeeded to the rule of the Suyuds. Sometime afterwards his brothers Ullah-ood-deen and Tajood-deen went to hunt in the forest of Ali Wuhun, and applied to a steward of the chase to defray their expenses; this he declined without Budr-deen's order, and his brothers enraged at his refusal slew him. Budr-deen was restrained by his relations and the Ulema from punishing this atrocious act, but their counsel displeased him, and he left Bukur resolved to fix his residence for the future at Mooltan. He was met, however, at Ooch by Hoosen Khan, a powerful Zumeendar of the Langa tribe, who had heard that the chief Suyud of Bukur was approaching, and went forth to his family to greet him, prevailed upon him by offers of service to settle at that city. He married Hoosen Khan's daughter, and his brothers afterwards expressed regret for their conduct, returned with his wife to Bukur; about this time he betrothed his daughter to Suyud Julal of Bokhar who lived on the island of Khwaju-ka-than in the Indus above Bukur which gave great offence to his brothers, with exception of Tajood-deen, whom Moohummud revealed in a dream his approbation of the match. His brothers continued in the same mind, and Budr-deen withdrew from the wedding with Julal and his wife to Ooch, and never returned to his native city. The descendants of Tajood-deen, son of Sudr-deen by his second wife, and grandson of Moohummud Mukae, now occupy the place among the Suyuds of Bukur and Roree. His great-grandson Sulaiman sat on the cushion A. H. 980. The posterity of Moohummud Mukae are scattered over the country between Lahor and Thutta, and are chiefly at Lahoor, Ooch, Mooltan, Bukur, Sukhur, Roree, Shikar, and Pulot.

I did not ascertain the date Bukur was first fortified. Capt. Macgregor mentions that when the Urghoons made it their capital it stood on a small island in the Indus, and Shah Beg built a brick wall round it for its defence. I find in the history of the Suyuds that Shah Hoosen Khan Urghoon was the government towards the middle of the tenth century of the

* Nusrut Khan died A. H. 717, and left a brother named Allah-ood-deen, who succeeded him at Bukur at the time of his death. This event was followed by a revolution, and competitors started for the throne, but I am not aware who succeeded to it. The history states briefly that the Jam of the Soomra tribe arrived about this time at Bukur and assumed the government.

and rebuilt the fort ninety* tunab, or 1350 yards in circuit. Nadir Shah is said to have destroyed the works when he invaded Sind in 1747-48, but they differ little at this day from the description given of them in the time of Shah Hoosen. He made the wall fifteen yards high and four thick, and pierced it with four gates. The Koon, SE. facing Roree, is now shut; the Kingree S.; the Khurree N. towards Sukhur also shut; and the Nag to the N. E.; none of the gates have outworks or barbicans, but steps are cut in the rock for the convenience of obtaining water. The fort is an irregular oval, and has sixty-one bastions of different sizes connected by an embattled curtain, and the diameter, measured from the Koon to the Khurree gate, and from the Nag to the Kingree gate, is the same, namely twenty-one tunab, or 315 yards. Hoosen Khan appointed Muhmood Khan, a noble of his court, to command the fort while he travelled between Mooltan and Thutta, and it was at this period (A. H. 928) that the emperor Humayoon was defeated by Sher Shah the Afghan, and fled towards Bukur. When Muhmood Khan heard of his approach he hastily built an Alum Punab, or outer-wall to the fort, which embraced the whole of the limestone rock in the Indus, and was 125 tunab, or 1875 yards circuit, twelve yards high, and four thick, with four gates opposite those on the inner wall. It had seventy bastions, and two gardens called Nuzurgah and Goozrgah, which are now planted with date trees. Muhmood Khan had scarcely completed the defences when Humayoon arrived, and requested admittance. The governor gave no answer, and closed the gates, and reduced the imperial army to great distress for provisions. The Suyuds in Bukur pitying their condition, sent the emperor a present of sixteen hundred Khurwar† of grain, which relieved the wants of his army for a time, but the garrison still held out, and he was obliged eventually to raise the siege, and marched to Jeyzulmeer. Afterwards he withdrew to the fortress of Umurkot in the desert, where the empress gave birth to the infant Akbar, A. H. 949. Humayoon subsequently returned to Bukur, and leaving his Wuzeers Moojirhid Khan and Moohibb Ali Khan with the army to besiege it, set out for

* *Tunab.* A Tunab according to the measurement then in use was derived from Arabia, and equal to fifteen yards. The following are the dimensions of the Arabian tunab and jureb.

6 Barley grains placed lengthwise one above the other,		1 finger.
32 fingers,		1 ziru,
60 Ziru,		1 tunab.
4 Tunab,		1 jureb.

Thus a jureb comprised an area of 3600 yards.

This measure is still used in Kabool, except that only twenty-four fingers go to the ziru.

† A Khurwar is equal to about 1050 lbs. avoirdupois.

Kandahar. They failed in obliging Muhmood Khan to capitulate, and he died during the siege, and was succeeded by an officer of the same name. After this the Wuzeers marched to Thutta. Moohmud or Moohumud Khan, acquired independent sovereignty and historians distinguish him by the title of Sooltan. He died 980, while Meer Eesa of the Turkman tribe from Thutta was besieging the fort.* In the same year Sadood-son of Meran, of the lineage of Moohummud Mukae Kuguree, was chief of the Suyuds of Bukur, amounting to seventeen hundred families. They had suffered great inconvenience and privations during the siege, and determined with the consent of their superior to abandon the fort† They accordingly settled on the east bank of the river on the Lohuree hills, a little to the south of Bukur, and founded the city called after the hills Lohur improperly Roree.

The fortifications were rebuilt and restored the last time by the governor Nuwab Ghoolam Sudeeg Khan, about fifty or sixty years ago, in the reign of Timour Shah, to whom Bukur then belonged. To obtain bricks he broke down the tombs of Puthans which covered the heights of Sukkur and reduced them to a complete ruin. The open space between the walls is of irregular breadth, being in some places thirty feet, in others less than twelve. The Alum Punah to the NW. is now about eight feet high, and more than double the height to the south, and looped for matchlocks, but without embrasures: It does not extend to the east and south-east faces where the Indus almost washes the base of the wall, and leaves no path over the rocks. About half the Alum Punah on the faces not mentioned is fallen, and was in course of repair when our troops arrived in 1858. The rampart is twelve feet wide. The natives consider the fort impregnable, but a few rounds from heavy artillery would throw down any part. The lofty embattled pinnacles are imposing to the eye even in ruin, as the fort is admirably situated on the Indus between the towns of Roree and Sukkur, but the superior elevation of the hills on both banks make it of little value as a stronghold. The British have converted a hill near Sukkur into a battery for seven cannon, and a few hundred native infantry and a small detail of artillery formed the garrison of Bukur in the autumn of 1839. A few ceriss and peepul† trees take root in the walls, and hasten their ruin. A large bastion to the NE. has already fallen, and other

* The tomb of this enlightened prince still exists in good preservation among the Kalhora sepulchres at Thutta, and is remarkable for the beauty of its carvings.

† Captain Macmurdo states that the Arghoons were jealous of the great power possessed by the Suyuds, and compelled them to leave the town, and occupy Lohur. This was probably true, and the fact of their sending grain to Humayoon's army proves their bad feeling to the governor.

‡ *Mimosa cerissa* and *Ficus indica*.

totter. The fortifications are brick hardened in the sun, and faced with large square bricks and tiles laid in mud instead of cement. Part was formerly encrusted with porcelain glazed, coloured, and ornamented with Persian inscriptions.

The once flourishing city of Bukur contains now only twenty-five houses, and exhibits a deplorable picture of desolation. The British have converted the governor's palace on the east wall into a powder magazine, and the entire area is covered with mounds fifteen or twenty feet high of bricks, the debris of buildings and ordure that have accumulated for ages.*

The Indus sweeps round Bukur in a rocky channel, half a mile wide, in form of a horse-shoe, of which the fort occupies about the middle, and can be traced in clear weather through a perfectly level country for fifty or sixty miles. The stream directs its force at present against the west bank, a little above Sukhur, and were it to give way, there are no obstacles to oppose the course of the river over the flat plains. In event of this contingency, and the Indus deserting Bukur, it would be valueless as a military position; and it will probably happen at no distant period, unless checked by a strong embankment: the current turns now about eight miles from its natural direction.

In 1839 the Indus began to subside the last week of August, leaving extensive shoals opposite the fort, which arrested reeds and timber. It rose a little the three last days of the month, but six weeks afterwards shoals filled above a third of the bed, and decayed vegetable matter and slime, exposed to a burning sun, produced exhalations that generated remittent fevers. In the end of October the river had fallen about sixteen feet, and entirely deserted the NE. and SW. angles of Bukur, leaving a bank on the north face, a quarter of a mile in circuit, and a shallow ford alone divided the fort from the island of *Khwaju-ka-ghan*. The bank to the SW. was three feet above water level, and more than a furlong in circuit. The Indus appears to be forsaking its western channel, which had in the beginning of November only four and a half feet water in the deepest part, but the strong current could not be forded. The eastern channel has a width of nearly five hundred yards.†

* Quantities of gunpowder, amounting to a hundred pounds together, were found buried in three places, and are supposed to have been introduced by the Talpoorees to blow up our troops. In July 1839 a Sipahi while cooking was thrown violently on his back by an explosion, but escaped without injury, though his food was projected into the air. People had lighted fires on the spot for months, and that an explosion did not take place before is ascribed to the dampness of the earth, which is filled with salt-petre. Had the great Magazine ignited, it would have destroyed every soul in the fort, and rent the fortifications to atoms.

† Captain Thompson, the Principal Engineer of the Bengal Column of the Army of the Indus, threw a flying bridge over this channel, which was swept away shortly after

In July and August the river pours down floods of water over the rocks at short intervals with angry violence, and casts up waves a mile and a half below Bukur with a noise that can be heard a distance of several miles. It frequently dashes boats in pieces, and drowns people bathing. In 1839 it thrice carried away the *pont volant* connecting the fort with Sukhur, and sacrificed the lives of two men employed to replace it; as the ferry boat that left Sukhur every morning for Roree lost about a mile and a half in the transit, which it accomplishes in the cold months in about seven minutes.

Bukur is the only pretty spot on the Indus in its course through Sindh. The growth of timber is less luxuriant than at Gouahatee, the principal town of Assam, but the broad and rapid stream with rocks frowning over it, and the picturesque groves and islands, remind the traveller forcibly of that beautiful and unhealthy spot. The view of the town of Bukur from the rampart is a fine subject for the pencil of an artist, and embraces on the north a small island, which the Moslem and Hindoo have endowed with a sacred character. A shrine and tombs, terminating in numerous gay spires of coloured porcelain, cover another island below the fort, and a third lower down the stream forms the abode of a solitary anchorite, who has lived there many years on the donations of pilgrims. Fruitful date trees mixed with the mango, plantain, and pomegranate, line the shores of the stream for miles, and flocks of pelicans, remarkable for the whiteness of their plumes, are seen in the summer months sailing majestically on the current.

Note on the rivers Nara and Arrul in North Sind.

The Nara ranks first among the streams of North Sind that receive their waters from the Indus, and spreads fertility over a district inferior in wealth and importance to none in the Ameer's dominions. I ascended the stream in June 1839 in a vessel of seven hundred muns burthen, and as the country it runs through has only been visited by two or three European travellers, I have thrown together a few notes on my voyage, which occupied a fortnight.

Nara signifies a snake in the Sind dialect; and the river richly deserves the title, from the extraordinary sinuosity of its course, equalling, if it does not surpass, that of the Goomtee in Oude. From the point where it leaves the Indus, about thirty-five miles below Bukur, to its junction with the Munchar, is about fifty miles in a direct line, but nearly one hundred miles by the course of the stream. The distance across a belt of land

the army crossed in the middle of February. Another bridge over the western channel, connecting Sukhur with Bukur, stood till the end of March, when it was destroyed by the flood.

one of the turnings which the boatmen took an hour to circle was found to be only twelve paces. From the sharpness of the turns it is often impossible to carry sail more than fifteen minutes together, and even when the wind is favourable for boats ascending the stream, they are dragged great part of the way by the track rope.

The Nara is navigated throughout its course four or five months of the year by vessels of eight hundred muns burthen. Boats proceeding northward always take this route in the inundations, to escape the current of the Indus, which it is impossible to breast without a strong favourable breeze. Those bound to Bukur re-enter the great stream about thirty-five miles below the fortress, and always return by it to the ocean.

The only part of the river where an obstacle occurred, was at the hamlet of Gahé, where the men, to save time, went up a channel which the farmers had lately opened by cutting an embankment to let off the floods which had risen suddenly, and threatened to destroy the crops. Here the stream, which has a westerly course above the village, turns abruptly south, sweeping round a sharp angle with immense force, and it was only after a dozen attempts that the men succeeded in dragging and pushing the boat up the rapids.

The stream rolls along a rapid volume of water from thirty to fifty yards wide, but sometimes diminishes to twenty, and has an average depth of about four. There are a good many ferries in the upper part of its course, traversed where the current is strong, by a *pont volant* worked by a man, who receives half a pye for conveying over a foot passenger, and double the amount for a horse or bullock.

The Nara is surrounded, where it leaves the Indus, with shoals and shifting sands, which make it difficult for boatmen to find the entrance. It is skirted in places by a wide expanse of fields unbroken by forest, and clusters of cottages at intervals of two or three furlongs. The grain cultivated is chiefly wheat, joowaree, and rice, and a good deal of cotton and a little tobacco. I saw ten or twelve Persian wheels working together, and in the gardens apple and nut trees, mangoes, grapes, and limes, luxuriant rose bushes, and a profusion of white and scarlet oleander. None of the fruits are remarkable for size or flavour. The soil is sand or stiff clay, and canals from six to ten feet wide, cut from the Nara, receive the floods and convey them through plains divided by low ridges and embankments: the crops are most luxuriant, but the mode of tillage slovenly, and the manure of a worthless description.

Fifteen miles from lake Munchar are extensive low lands bare of trees, and little elevated above the level of the Nara, so that banks are required to prevent the river overflowing. Part is cultivated with rice and wheat, and

part pastures sheep, herds of horned cattle, and a small breed of horses. Before the British arrived in Sind, grain was so plentiful that the people measured at a guess the quantity demanded by purchasers, and even now about forty seers of wheat are sold on the farms for a rupee.

The shores untouched by the plough are without paths, and the dense jungle of acacia and tamarisk of large growth that overhang the water is never cut, and is a serious impediment to boatmen in tracking. It would be a great benefit to commerce, if the peasants were obliged to remove the trees. Their villages are usually at a short distance, and they obtain wood for fuel, building, and agricultural implements from the jungle. It might without much additional trouble cut it on the river banks.

The country towards lake Munchar is lower and more intersected by streams than the tract to the northward, and extensive lakes and sheets of water covered with lotos and rushes harbour multitudes of geese and other water-fowl. Neither the domestic goose nor the duck is an article of this region, and though the river swarms with fish there is not sufficient demand for it to induce people to make fish-catching a profession. The common fowl is plentiful, and the people hardly know what price to ask for it. They are glad to exchange their poultry for earthen plates and pipes, and glass bottles of British manufacture, and our boats were seldom without a chicken for supper. There are no alligators in the Nara, but it is infested by a small leech, which is troublesome to those who bathe in it.

Shortly before the river joins lake Munchar, it flows through a channel which had lately been deepened, and the earth thrown up on the banks gave it the appearance of a canal, but the resemblance soon disappears. The thick groves of tamarisk exclude the air, and make the atmosphere in summer oppressively close, and when the floods subside in September and October the soil engenders miasma. No dew fell during the time we were on the river, and our party slept in the air surrounded by sand and jungle without suffering injury.

The people on the shores of the Nara are nearly all Moosals. Their hamlets consist usually of small groups of cottages at short intervals along the banks, and a sequestered spot in the vicinity, sheltered by trees, is set apart for the dead, and held sacred from intrusion. The houses are generally on rising ground, and built of mud with terraced roofs, under which the farmers raise a chamber of reeds, where they pass the night in summer to escape the suffocating heat and stings of musquitos and vermin that swarm the river. When the peasant is too poor to incur the expence, he removes his mat, or bedstead, to the roof of his house, and in situations liable to inundation, resides in a shed covered and

with tamarisk boughs. Sometimes he relinquishes part of this humble dwelling to his cattle.

The only town on this route besides Sehwan, is Khyrgaon, situated on the west bank of the Koodun, a branch of the Nara, and has not yet found a place in the maps; it is about thirty miles from lake Munchar, and has seven mosques and between 2,000 and 3,000 inhabitants, about a fifth of whom are Hindoos. The bazar was last year totally destroyed by fire, and the people were rebuilding it in a very superior style to that of the Sehwan and Thutta markets, which it promises to surpass in width and loftiness. The chief articles exposed for sale are striped and coloured cottons.

The lake Munchar bears E. 10 N. from the town of Sehwan, and about sixteen miles distant. In the season of inundation it spreads far beyond its limits, and overflows the groves of tamarisk and rushes on its shores. The figure is a long oval, between forty and fifty miles in circuit, and the greatest length is east and west. The shores are fringed with lotos, and rushes six feet high, except on the south-west side, where there is a waste of sand. Barren hills are seen at a distance rising in altitude as they recede from the lake, and form the modern boundary between Sind and Beloochistan. A hot dazzling vapour floats in summer over these desolate heights, which are as unpromising to the eye as the mountains on the coast of Yemen, and afford no shelter for travellers. The solitary village of Jungar, with the domed sepulchre of Peer Bubber, is to the south, and the only inhabited spot distinguishable; near it are extensive meadows where sheep and buffaloes pasture. Among the varieties of fish that inhabit the lake I recognized the Rohoo, the Silun, and the Saolee, which are speared with bamboos barbed with iron, a common mode of fishing where water is sufficiently clear to distinguish objects below the surface, which is never the case in the Indus.

Lake Munchar presents a beautiful sight in the season when the lotos is in blossom; the plants occupy a circle of more than twenty miles, covering the surface of the water with a thick carpet of leaves and flowers far beyond the range of vision. A channel fifty or sixty feet wide, winds with many sinuosities through the midst of the lotos beds, and a current sets to the eastward at about two miles an hour. The water is clear, but has rather an unpleasant taste of vegetable matter, and a pole, three fathoms long, was dropped into it frequently without touching the bottom. To reach the Nara in the western limit of the lake, boats force a passage through reeds and lotos, and no one unacquainted with the navigation could discover the mouth, it is so completely hidden from view by these plants.

The river Arrul may be considered almost a continuation of the Nara, and after emerging from the east side of lake Munchar has a course of

about twenty miles to the Indus. The banks are fringed thickly with tamarisks and acacias, and an undergrowth of camel-thorn and turf. There are a few hamlets on the banks, and a good deal of land under tillage. The river expands nearly a hundred yards at Sehwan, and the depth in the middle is never less than twelve feet. Below the town its course is circuitous. Sehwan stands on an eminence on the west bank of the river, about four miles from its mouth, and close to the Lukkee hills, part of the great chain of Hala, that forms the west boundary of Beloochistan. The hills approach the Indus a little below the mouth of the Arrul, and consist of lime, in which a great variety of petrified shells, wood, and coral, are embedded, well worth the attention of geologists. I had not leisure to visit them, but Major Smee of the 5th Bombay Infantry, an indefatigable collector of shells, found the following specimens during two days he passed at Lukkee :—

Several species of Trochi,
 A species of Helix,
 _____ Bulimus,
 _____ Turritella,
 _____ Cypæa,
 _____ Conus,
 _____ Terebellum,
 _____ Oliva,
 _____ Voluta,
 _____ Cryptostoma (genus of Voluta),
 _____ Ostrea,
 _____ Pecten,

and a large species of Nautilus, measuring eighteen inches across. I believe the cowrie and core are rarely found in a petrified state. There are likewise hot springs in the neighbourhood, impregnated with sulphur and alum, and the last is an article of export.

Ruined houses, mosques, and sepulchres cover an enormous space at Sehwan, and are a melancholy record of the prosperity of the town under the Summa Jams, the Urghoons, and the Moghuls, before the Kalhoras deprived it of its independence. The modern town is said to contain 2000 families, of which a fifth are Hindoos, and there are forty grain sellers' shops. The houses are mud, and rise to several floors, the uppermost being often built on arches, and surpass in style and accommodation those of Hyderabad and Thutta. The bazar is narrow and crooked, but of considerable length, and covered with mats to exclude the sun. Belooch caps, shoes, silk strings for drawers, and a few other silk articles for the lower orders, are fabricated and exposed for sale. There is scarcely any trade, and an

entire absence of bustle and activity. At the time of our visit there were forty boats at the town, including one of 300 muns in progress of construction. Twelve were small craft belonging chiefly to Sehwan, and the rest to towns on the Indus. More than half were without cargoes.

The shrine of Lal Shah Baz, a holy man of Khorasan, is the great object of attraction to Moosulmans and Hindoos, who flock hither from the Dukhun, Northern India, and the Punjab. The tomb is a quadrangular edifice covered with a dome and lanthorn; round it are small domes and blue enamelled spires and coloured porcelain tiles, and inscriptions in the Arabic letter decorate the walls. A gothic arch admits the visitor to a paved court with arcades, where a number of mendicants lodge, and solicit alms in a tone of command rather than entreaty. A door on the side opposite the entrance, closed by handsome shutters of hammered silver, leads to a lofty domed chamber with Arabic inscriptions, niches, and a canopy. It contains the tomb of the saint covered by rich cloths, and the balusters with silver plates, much corroded by time. The numbers of pigeons that have sanctuary in the building give it a musty, disagreeable smell. The sepulchre is reputed to be rich in money and endowments, and enjoys the revenues of the Sehwan gardens, and many villages in the district. The Ameers of Hyderabad make pilgrimages to the shrine, and went there in 1828 to return thanks to Allah for restoring health to the late Morad Ali, the principal Ameer.

The fort of Sehwan stands on a scarped rock, about a hundred feet above the Arrul, and divided from the town to the south by a deep channel, which is dry nine months of the year. The interior is completely ruined, but the corner towers and shell of two noble gateways are tolerably perfect.

The temperature of the air on the Nara, in June, was considerably higher than on the Indus, as shown in the following table:—

Average range of the Thermometer on the Nara from 4th to 18th June 1839.	Average of Thermometer on the Indus during six days of June 1839.
Sunrise, 85°	85°
12 A.M. 103°	96°
3 P.M. 106°	98°
6 P.M. 102°	96°
8 P.M. 96°	91°

The mercury on the Nara rose several days at 3 P.M. to 111° and 112°, and once to 113° of Fahrenheit.

Note on Khyrpoor in North Sind.

Land owners who hold Sunnuds (title deeds) of rent free tenures of the Emperors of Dilhee and their successors, pay no revenue to the state.

Suyuds pay one-fourth of the crop; and the *ang*, or expense entailed by Government in collecting the revenue, is remitted.

Some noble families of Moghuls, Puthans, and Sindee Zumeendars pay one-fourth like the Suyuds.

A second class of cultivators pay one-third, a third class two-fifths, and a fourth class one-half the crop. The cess varies in different districts, and is regulated by the prince or his lieutenant.

Proprietors of gardens pay revenue in cash. I have stated in my account of Khyrpoor that government leaves only one-sixteenth of the produce to the owner. I find on reference to my notes that in some places it exacts sixty, and in others seventy-five per cent. Indigo is taxed a fourth, and is not cultivated in the districts of Roree and Sukkur.

Buhawul Khan, the Nuwab of Daoodpotra, collects in kind, nominally a third and fourth of the crop, but fines and exactions leave the farmer only half the produce of land near towns and villages possessing facilities for irrigation. Land distant from inhabited spots, and watered from wells, is taxed a fourth and sometimes a fifth for a term of years, according to agreement with the Zumeendar, who clears the land and digs wells, to irrigate it. The people complain universally of the high assessment, and the prince obliges Zumeendars to grind in their mills a certain quantity of grain produced on the royal farms without remuneration. His oppressive measures have depopulated a large extent of country, and numbers of the inhabitants have settled on the west bank of the Sutluj, where the assessment though nearly as heavy as in Daoodpotra, is levied fairly. The land on the west bank is of better quality, and yields a large return, which enables the peasant to support his burthen, and he enjoys complete security of life and property under the police system introduced by the late Runjeet Singh. The inhabitants have put aside their arms, and in the large district of Mooltan, bordering on the Sutluj, I am informed that it is rare to find a sword or matchlock in a family.

The people of the Sikh states west of the Sutluj pay a fourth and fifth of the crop either in cash or kind, and the former is sometimes obliged to purchase the government share at a price greatly in excess of the market rate. There are also profit and loss settlements adopted, apparently from the system in operation in the British provinces, which are unfavourable for the farmer.

The ruler of the Punjab takes half the produce of "Silab," or land inundated by rivers, and a fourth or fifth, and sometimes as little as a seventh, of land irrigated from wells, according to situation and fitness for agriculture. The ryecuts are on the whole better off than in Daoodpotra and Mumdot, where they save nothing, and make a bare subsistence.

The cess in the Puthan Chiefship of Mundot in the Sikh states east of the Sutluj under British protection, amounts to a third and fourth of the crop, and in 1839 the people were in a state approaching starvation from the total failure of the periodical rains.

G. E. WESTMACOTT, *Captain,*
37th Regiment Native Infantry.

Three new Species of Monkey ; with Remarks on the genera Semnopithecus et Macacus. By B. H. HODGSON, Esq.

Whoever has occasion to refer to the family of the Simiadæ in works of Zoology, will, I think, be struck with the fugitive and doubtful manner in which several proximate forms are generically separated from each other ; and this impression is peculiarly likely to arise, if the reference be made with a view to classifying the ordinary Indian species. Are the larger ones (Langoors) *Semnopithecus* or *Cercopithecus* ? Are the smaller ones (Bander) *Macacus* and alium quid ? It is universally laid down that the *Semnopithecus* and *Cercopithecus* both have cheek pouches ; yet is there not really any trace whatever of these pouches in their prototypes, the Langoors of India, not at least in those of Nepal : and whilst Cuvier's type of the former genus has andromorphous canines, Horsfield's has these teeth as formidably developed as in the true Carnivora ; the difference in *this* case being consequent only on nonage or femininity, though insisted on by authors as essentially diagnostic of separate types or genera.

Again, what animal exhibits the typical characters of *Macacus* ? If *Rhesus*, then are our Indian Banders not *Macaci*, as generally alleged, for they have neither the elongated snout, nor the very short tail of that species : nor are their canines longer than in the Langoors, to which they bear a strict likeness in the outline of the profile, and in the facial angle ; the only differences in these respects being caused by the greater dip between the brows at the base of the nose, owing to the superior saliency of the orbital bones, and by the shortness of the round terminal nares.

Without further preface, I shall now proceed to give a summary description of our Nipalese species of Langoor and of Bander, prefixing to each an amended indication of the generic character, for the reasons above assigned.

SIMIADÆ.

GENUS. SEMNOPITHECUS.

Generic character. Facial angle 45 to 50 ; face flat ; nose short, with long narrow lateral nares ; head *depressed* ; limbs long ; thumbs small, remote ; callosities large ; *no* cheek pouches ; 5th tubercle on last molar

present or absent (a trivial idle mark); canines variable, large only in grown males, for the most part; stomach sacculated and banded as well as intestine; tail very long, commonly tufted, and usually exceeding the length of the animal. Very agile; grave deportment; gregarious; not docile.

Species new. *Schistaceus hodie* (Nipalensis of Catalogue). Habitat Maurus. Dark slaty above; below and the entire head, pale yellow; ears, hands and feet somewhat darkened or concolorous with the body above. A pencil of black hairs radiating upwards from the brows; concolorous tail longer than the body, and more or less tufted; skin black; nude on face, and on last phalanges of anterior digits; hair on the crown short and radiated, on the cheeks long, directed back, and hiding the ears. Pile or fur of one sort, nor harsh, nor soft, more or less wavy, three to five and a half inches long on the body, closer and shorter on the tapering tail: thirty inches long: tail without the hair, thirty-six: hand six and a half; foot eight and a half. Females smaller, with shorter canines. Habitat. Tarai forest and lower hills, rarely the Kachâr also.

GENUS MACACUS.

Pithex (Πιθηξ, antiq.) nobis.

Generic character. Facial angle 50. Muzzle not elongated; canines large; buttocks often nude; structure compacter, but generally resembling that of *Semnopithecus*, only that the thumbs are larger; orbits more salient; the head rounder; cheek pouches distinct and large; the canines similarly variable, being large and grooved in grown males only; the nares short, round, and terminal; the stomach simple, though the cœcum and rectum be sacculated; and, lastly, the tail short though usually equal to half the length of the animals. Agile; lively; gregarious; familiar; intelligent; and very docile in confinement.

1st. *Species, new.* *Oinops* (οἰνωψ) nob. (Nipalensis* of Catalogue). Tail, without the hair, half the length of the entire animal; ears partly exposed; buttocks postœally nude, and like the face, carmine; the colour of fur a full brownish yellow-red or deep rusty, passing into grey on the anterior quarters, and purpurescent slaty internally. Two to two inches long. Tail, without the hair, ten; hand four and a half; foot six; pile or fur of one sort, as in the last, and of like quality as

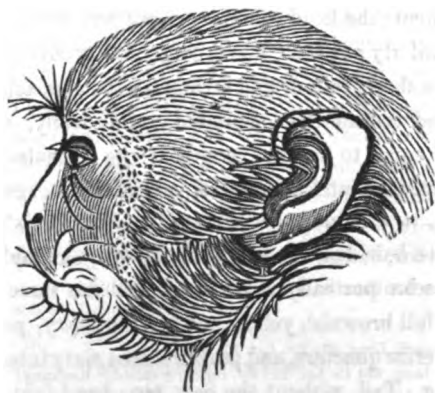
* Topical names dropt, as seldom appropriate.

generally : two to three and a half inches long on body, shorter on the tapered, untufted tail, and not radiating on the crown of the head. Females smaller, with less canines. Habitatt. Tarai and lower hills.

2d. *Species, new.* Pelops (πηλος et ωψ) nob. Structure and aspect similar to the last. Colours more sordid or purpurescent, slaty partially merged in rusty ; buttocks posteaally (except the callosities) clad : face nude and dusky, flatter than in the last. Twenty inches long. Tail, less hair, nine and a half ; hand four and a quarter ; foot five and seven-eighths. Habitatt. Northern region of hills exclusively. Fur fuller and more wavy than in Oinops.

N. B.—In all the above three species, the digits are basally connected by membrane, which in the posterior extremities reaches forward beyond the first phalanges. In the first, the thumb scarcely reaches the base of the metacarpus : in the second and third species, it extends only half way down the first phalanx of the index. In the posterior extrimities the same digit has a size and strength, especially in the Macaci, more analogous to those of the thumb in our hand. In *Semnopithecus* this digit extends a little beyond the base of the metacarpus. In the Macaci to the end of first phalanx of proximate digit.

NEPAL,
March, 1841.



HEAD OF MACACUS OINOPS.

*General notice of the tribe of Kujjukzyes (Upper Sinde). By Capt. N. HART, 3d
Regt. Grenadiers (Bombay Army.)*

The Kujjukzyes are the descendants of a Kakur chief named Kujjuk, who resided with nine other Kakur chiefs in the village of Mejhtur,* ten kos from Borjaba in Kakuristan. In consequence of a feud in which Kujjuk was overpowered, he fled with his family and dependants to Seewee,† a northern Kuchee (to which town he had been in the habit of emigrating during the winter) and settled there. At that time the Governor of the country was Jeeymed Khan, the son of Baroo, the founder of the Baroozyes. They granted one cubit's breadth of the waters of the river Naree‡ to Kujjuk to enable him to raise grain for his people. One evening on bringing in the flocks from the jungle a he-goat was missing. The tracks being followed up the next morning, the animal was seen baited by a wolf, which had been able to destroy it. They secured the goat, and carried it home in triumph. This occurrence was considered so propitious by Kujjuk and his followers, that they determined on building a town on the spot. Six years afterwards, when their numbers had much increased, they obtained the grant of a larger portion of the waters of the Naree from Mirza Khan, the son and successor of Jeeymed Khan, and to evince their gratitude were ever foremost in the service of the Baroozyes. In process of time the grant was increased to eight cubits. From Mirza Khan Baroozye, Mahmood Khan, the father of Habeeb Khan, the power of the family declined, while that of the Kujjuks increased; and on Mahmood Khan attempting to enforce the payment of the tribute claimed by the Dooranee monarch, they slew him. His son Habeeb Khan being unable to control them, and being obliged to abandon Seewee, from which city they had cut off the water for their own use, the Candahar Sirdars sent Hajee Khan Kakur, with an army to demand the arrears, due since the dismemberment of the Dooranee monarchy. At this period, the tribe had eight hundred descendants of the sons of Kujjuk. They agreed to bribe Hajee Khan to destroy their enemy Habeeb Khan Baroozye, who was then living in the village of Kooruk, four miles from Seewee. The Hajee accordingly seized him one day in durbar, and gave him over to the Kujjuks, by whom he was put to death. His brother Sadoola Khan fled with his three nephews,§

* In Tassin's map E. Long. 69° 20'. Lat. 30° 30'.

† By Tassin E. Long. 69° 45' Lat. 29° 40', formerly called "Koohung." The fort still exists, though the town has long since been in ruins.

‡ This river has a bund across it, and cuts measured by the cubit are made from the supply of the different villages.

§ Founder of Mirzapoor near Mittree, at present in ruins.

Khan, Misree Khan,* and (name unknown) to Candahar, but their complaints were not attended to for a long time. At length Sadoola Khan was ordered to return to Kuchee and collect the revenue as his forefathers had done. The Kujjuks persuaded him that the Hajee alone had been the cause of his brother's death, and for some years they gave him a small portion of the tribute, but having quarrelled with him for demanding the whole amount, they killed him. His nephews fled to Lehree, and sought the protection of the Doomkees, where they remained some years. But reduced to extreme poverty, they were necessitated to throw themselves on the mercy of their enemies for subsistence, and the Kujjuks saw with pride the descendants of the Bazoozyes, once the governors of Kuchee and their masters, now begging at their gates for relief. For a year or two they were permitted to reside in the town, but then sent to Kooruk, where they have since remained.

To such a degree of power had the Kujjuks risen, and so great was their influence, that in A. H. 1228-9 (A. D. 1813), when Ahmed Yar Khan (the son of Bairam Khan), Surfuraz Khan (son of Moostapha), and Mall Zeinub, Nusseer Khan's daughter, fled from the protection of Mahmood Khan, the reigning prince of Kelat, they took refuge in the town belonging to that tribe, and Meer Khan, the head chief, agreed to assist them in obtaining a settlement of their claims. Mahmood followed them with an army, and for four days was encamped in front of the place, but doubtful of taking it, he granted two shares of the revenue of Dadur to the Mall, two to Ahmed Yar Khan, agreed to treat Surfuraz Khan as his own son, and then withdrew. In Mehrab Khan's time also, they succoured some fugitives, and that prince appeared before their walls with a large force, but eventually retreated without coming to blows.

On the occasion of destroying the village of their neighbours, the Murukzanees, about thirty years ago, Meer Khan was slain by a matchlock ball. The surviving Murukzanees sought refuge in the village of Duhpall, where they now reside.

The names of the Kujjuk chiefs, the descendants of the sons of Kujjuk, are :—

1. Ismael Khan, son of Punjoo, Punjoozye. (The head chief Punjoo being the eldest son.)

2. Eesan Khan son of Alea Khan Baranzye.

3. Syud Khan „ Door Khan Dowlutzye.

4. Kurim Khan „ Taj Mahomed Kashee.

5. Hassun „ Meer Khan Kashee

* Lately serving in the Beeloche levy.

6. Meeran son of Jan Mahomed Kuryazye.

7. Door Khan „ Nusseer Kuryazye.

8. Keemool Khan „ Tutebar Sagzye.

The tribe is said to have numbered from seven hundred to one thousand fighting men this year.

The waters of the Naree, though latterly almost entirely kept by the Kujjuks for their own use, was formerly divided as follows:—

To the city of Seewee eight shares and one “Ghanga,”* for the use of its gardens.

The village of Kujjuk,	8 shares	
„ Kooruk,	8	„
„ Gooloo,	6	„
„ Lohnee,	4	„
„ Murukzanee,	3	„ Taken by Kujjuks
„ Sapee,	6	„
„ Abdoola Khuer,	3	„
„ Mahmood,	2	„
„ Bukhera,	2	„

Extracts from Capt. Hart's letter transmitting the above.

“A few miles from our camp is a large mound of earth, evidently remains of an ancient city. The people call it “Dumb-i-Dulora”^{Shah} who they say was a Kaffer king, who once reigned in Sinde, but owing his manifold crimes, particularly that of marrying his sister, showed ashes were rained on his cities by the Almighty. May not this king Dahir-ben-Chuch, sovereign of Sinde, when first invaded by the Mahadans?

“Should any thing turn up I will not fail to send it. I am told of other similar mounds, where caves are said to have been found, but verily is not a Sindian virtue, so until I can send people to search, I must do it. There are so few persons who do know any thing of the country, that at times I almost despair of acquiring any information; what I do get purchased, for no one will open their mouths without being paid for. Books (where so few can read aught but the Koran) are not to be had. Moolla in Dadur says he had one containing an account of the “Dumb” but it was burnt when his house was destroyed last November. That

* Ghanga, a water course *always* running—differing from that measured by the cubit, which is only allowed to each cultivator one day and night in his turn. It was called a “Poo” again subdivided into “Hitts,” or finger breadths.

may judge how ignorant they are, even of their own annals, I send a copy of an inscription cut on the side of a hill at the entrance of the Chota Bolan pass. There are some tombs not far from it, but the villages in the immediate vicinity being deserted, no one can tell me any thing about it. I have sent copies to Shikarpoor and other places, without success. I was at first told it was done by the Kaffirs, and led on a wild goose chase, thinking I had at length got something worth communicating, but the letters that are legible are so plainly Persian, that it is not worth troubling oneself further about it, except perhaps to fix a date, could it be read. Even at Bagh, the capital of the district, where I offered any sum for an account of the town even, no one would write it. The only way would be to employ persons for the purpose, send them to the principal places, and then glean from their accounts and the Chuch Nama. I will, if you wish, send you all I have picked up, but I fear it will not repay you the trouble of reading."

NOTE.—The translation of the inscription, which is modern Sindee, was given me by a native merchant in Calcutta, who understands the language tolerably well. It is nothing more than a receipt for one hundred rupees, with the names of witnesses to the payment,(!) and in another style of character a query, as to what had become of a certain *Oula Mirza*, with a reply, that nothing was known of him. Some cyphers (probably a date) are illegible to my translator. I have written to Captain Hart, urging him to pursue his researches in Sinde, and he has since obliged me with an interesting notice of the Brehoees.



Second Notice of some forged Coins of the Bactrians and Indo-Scythians.—By Lieut. ALEXANDER CUNNINGHAM, Engineers.

When I first drew attention to the subject of counterfeit coins, my remarks were chiefly directed towards those which had been cast in moulds formed from genuine ancient coins: I had then seen none of any other kind; but I was aware of the existence of one piece which could not have been cast; namely, the gold piece of Amyntas in the possession of Lady Sale, "which is in all respects similar to the copper coin of the same king, except that the figures are reversed." Not having seen the coin, I was induced to say, that "the fact of the type having been reversed, showed an advance in the art of forgery;" for I did not suppose that a spurious coin which had deceived any one, could be so ludicrously barbarous in execution as that of the forgeries

in the accompanying plate: for all of which, as well as for several cast forgeries, I am indebted to the disinterested kindness of Dr. Chapman of the 16th Lancers, who sent me all the suspected specimens in his own cabinet, and impressions of other suspected coins which he had seen accompanied also with several genuine coins, that I might have, by a personal examination and comparison of them, the very best possible means of drawing correct conclusions regarding the genuineness of the suspected coins.

The forgeries which I am now about to notice are of two distinct kinds, of which the most likely to deceive, consists of pieces formed in moulds from genuine ancient coins. These are generally reproductions in gold of ancient silver coins; though some few specimens are known of silver, formed from genuine copper coins, and even silver gilt pieces have been offered for sale. This kind of forgery is however not likely to do much injury to the cause of numismatic science, for the cast pieces only repeat the very types and legends of genuine coins. Now the very fact of a gold piece being of the same size, type, and make as a known true silver coin, should at once lead a collector to suspect its genuineness, and to examine carefully whether the gold piece has not been cast. Of the genuine gold Bactrian coinage only one specimen of Euthydemus is at present known; and this scarcity alone should make collectors cautious how they purchase a gold Bactrian piece, unless it should be of a round form, and of a type unknown either in the silver or copper money of the same prince.

From what I have said, it will be evident that our best safeguard against cast forgeries, lies in the cupidity of the forgers, who reproduce the ancient silver coins in gold, that their profit upon each piece may be greater; and by this very change of metal we have an almost certain proof, furnished by the short-sighted forger himself, that the piece cannot be genuine. Were the forgers of cast coins however to confine themselves to the multiplication of *silver* casts of genuine silver coins, the only means of detection would be in the want of sharpness and distinctness both in the figures and in the letters, as more especially where they join the field or ground of the piece; as in an excess of sharpness about the edges, instead of the smooth rounded edge of a genuine coin; as well as in a kind of dull frosty appearance, which cast coins usually have.

I will now describe the three gold pieces that Dr. Chapman has brought to my notice, all of which have evidently been cast in moulds formed from genuine silver coins.

The first is of Menander, and is a cast of a well known type, having a bare diademed head to the right, and on the reverse Minerva Promachus : this was purchased at Kabul for 30 rupees ; some ducats also which were bought from the same person by another gentleman, have since turned out to be forgeries.

The second is likewise of Menander, but of a different type ; the bare diademed head of the king being to the left, and his right hand being raised in the act of hurling a javelin forward. This was also procured at Kabul.

The third is of Antimachus, being a gold cast of the commonest type of the silver drachmas of that prince ; with a figure of Victory on one side, and on the reverse a horseman at speed. This piece was likewise purchased in Kabul, and I have no doubt that all three of them are the manufacture of the same hand.

The first of these pieces is in the possession of Major Fitzgerald, and the others belong to Dr. Chapman, who when they were presented to him by a friend, at once suspected them to be forgeries ; and my examination of them only confirms his suspicion.

The gold piece of Menander belonging to Dr. Chapman, weighs 74 grains, whereas the gold piece of Antimachus weighs only 56 grains ; the difference between them being 18 grains. From an examination of seven genuine drachmas of Menander, and of five of Antimachus, I find that the heaviest of them weighs 40 grains, and the lightest one 32 grains ; the difference between them being only 8 grains, or less than one-half of the difference between the two gold pieces. But as gold is less liable to injury and corrosion than silver, the extreme difference of weight between ancient gold coins should not *be so great*, as that between ancient silver coins ; yet here we find that the difference between these two gold pieces is more than double the greatest difference to be found between any two silver coins. Now as this excess of difference between the gold coins is too much to have arisen from the effects of time, we must look for some other cause ; and that this cause can only be that the two gold pieces have been cast in moulds formed from genuine silver coins, is proved by the following facts.

1. The heaviest of the genuine silver coins weighs 40 grains; and as the relative specific gravity of silver to gold is about 11 to 20, we have; as 11 is to 20, so are 40 grains to $72\frac{8}{11}$ grains; the weight which a gold piece would be if cast in a mould formed from a silver coin weighing 40 grains, and within $1\frac{3}{11}$ grain of the actual weight of the cast gold piece of Menander.

2. The lightest of the genuine silver coins weighs 32 grains; and therefore as 11 : 20 :: 32 : $58\frac{2}{11}$ grains; which would be the weight of a gold piece if cast in a mould formed from one of the lightest genuine silver coins; and which is within $2\frac{2}{11}$ grains of the actual weight of the cast gold piece of Antimachus.

3. The difference between two pieces thus formed is $72\frac{8}{11} - 58\frac{2}{11} = 14\frac{6}{11}$, or nearly double the difference between the heaviest and lightest genuine silver coins; and also very nearly the actual difference between the two gold pieces under examination. The metal of the Antimachus is of a paler colour than that of the Menander; and therefore as it must contain more silver, its relative specific gravity must be less: if however the metal of the two pieces had been the same, the difference between their weights would have been a grain or two nearer the difference which I have calculated.

From these facts, then, I come to the conclusion that, as the weights of these two pieces are the same as the weights of gold casts made in moulds formed from the heaviest and lightest genuine silver coins: and as the difference in weight between the two pieces is more than double what it should be if they were genuine coins, and very nearly the same that it would be if they were cast as before said; these pieces of Menander and Antimachus must be forgeries taken from genuine silver coins: a conclusion which is fully borne out by all the suspicious circumstances observable in their appearance.

There is a faintness and an indistinctness in the outlines of the figures on these pieces, that stamps them at once as cast coins; and where the relief in the figures on the original coins is small, it is seldom reproduced in the casts; as in the instance of the gold piece of Antimachus, on which the horseman has no neck, and the horse has scarcely any visible pasterns; and where the letters are at all crowded on the original coin, the spaces between them become filled up in the cast piece, and render the legend almost illegible; as in the

gold forgery of Menander, where the letters ANΔ are joined together by several flaws; and this place I suppose to have been the mouth of the mould, and that the letters have become confused together by the more rapid cooling of the molten metal towards the neck of the mould, which prevented it from entering perfectly into the hollows of the letters at that part. From the same cause the letters ΒΑΣΙΑ on the gold piece of Antimachus are totally obliterated. I may add also as a further proof of the spuriousness of these pieces, that, when I showed them in the midst of several genuine silver coins to a native goldsmith, and asked him if he could make me some casts from them, he replied, that the figures and letters of the casts would not be so clear and distinct as on the original coins; and then added, as he picked up one of the gold pieces, "This was made in a mould."

Of the second kind of forgeries, the specimens which have come to my notice, are chiefly of silver, with the exception of Lady Sale's gold piece of Amyntas, and the gold piece of Kadphises engraved at the foot of the accompanying plate.

No. 1. A round silver piece of the size of a tetradrachm, weighing 243 grains. It is evidently imitated from a coin similar to Dr. Swiney's tetradrachm, published by Mr. James Prinsep in the *Jour. As. Soc. of Bengal*, for November 1836; if not indeed from that very coin; which I had frequent opportunities of seeing, when it was in Dr. Swiney's possession. Its relief was exceedingly bold, as I have shown in the left hand section of the plate, and this boldness is what will always be wanting in forgeries made by natives of India, whether from modelled moulds, or by engraved dies. The section to the right is of the spurious piece of Euthydemus; and a single glance at the two sections will be sufficient to show the great difference in the relief of the head of the two coins.

It is true that there are ancient tetradrachms of Euthydemus of great rudeness of execution; (vide, *Jour. As. Soc. of Bengal*, June 1833; plate 11; Fig. 6.) but even they are distinguished by a boldness in the relief of the head, which is not to be found in any of the modern forgeries, which I am about to describe. These ancient rude tetradrachms are discovered chiefly in the neighbourhood of Bokhara, from whence many have passed into Russia, and have been published by the celebrated Russian antiquary M. Köhler. I have one now before

me which likewise came from Bokhara ; it weighs only 140 grms and is therefore properly only a heavy didrachma : it is in high relief and of extremely barbarous make ; but as coins of this description are found in great numbers about Bokhara, there can be no doubt of its genuineness. This specimen must therefore have belonged to a local coinage of Euthydemus, which was confined to Bokhara alone as a tributary state ; for if Bokhara had been under the immediate government of Euthydemus, there would either have been a royal mint established, or none at all ; but if Bokhara was, as I suppose, a state tributary to Euthydemus ; then it is easy to believe that one of the stipulations of the tribute was, that the money of the Bokhara state should be coined with the head, and in the name of the paramount sovereign.

Another point which distinguishes the engraved tetrachma from a spurious one is its utter barbarousness as a work of art ; the sketch on the plate gives a faithful outline of the head, preserving all its peculiarities ; of which the most remarkable is a full eye in a side view to the face. This singularity at once stamps this piece as a forgery, and proclaims it to be the work of a native of India, whose artists invariably represent a full eye, even in a side face.

A third peculiarity is the fringe observable around the eye, on the forehead, before the ear, beneath the chin, and on the shoulder ; what almost tempts me to believe that the forger had copied his die from Mr. Jas. Prinsep's engraving ; for these fringed parts in the spurious coin are the very portions that are shaded darkly in Mr. Prinsep's etching. This supposition is still further borne out by the want of the central portion of the upright stroke of the monogrammatic letter Φ on the reverse of the spurious piece ; this part in Mr. Prinsep's etching being so much fainter than the other strokes of the letter that it might easily have escaped the eye of a forger, who was ignorant of the Greek characters.

The last peculiarity which I need notice is, that the standing figure of Hercules on the reverse is without a club : for the forger ignorant of the figure represented on the true coin, has overlooked the fact that the lower part of the left arm is concealed beneath the lion's skin : he has accordingly transformed the club, which reposes in the hollow of the arm on the original coin, into that half of the arm which should

hidden by the lion's skin, which it carries, and he has omitted the club altogether. This omission alone is sufficient to prove that the engraved tetradrachm is a forgery; but when taken in conjunction with the lowness of relief in the figures, the ludicrous barbarism of its workmanship, the full eye in a side face, the two feet of Hercules turned to one side after the fashion of Indian art, and with the incomplete monogrammatic letter Φ , there can be no doubt whatever that it is a forged coin.

I observe that both the legs of Hercules exhibit a double outline to the right, which can have happened only from double striking; proving clearly that this piece must have been struck from dies engraved by the forger. When dies are once engraved they may be used either for striking, or, with the addition of some clay round the edges to separate the two dies to a distance requisite for the thickness of the coin, they may be used as a mould for casting forged pieces; and indeed Dr. Chapman, to whom this piece belongs, mentions that there is a cast of it in existence. The piece was procured at Bajáwur; and it has been subjected to the fumes of sulphur to give it a dark appearance.

No. 2. A small round silver piece of the size of a drachma, weighing 61 grains; it is one of two pieces in the cabinet of Dr. Chapman; and there is a third specimen also weighing 61 grains in the possession of another gentleman, of which an impression is now lying before me.

The execution of this piece is considerably more barbarous than that of the spurious tetradrachm of Euthydemus just described. The head faces to the left, instead of to the right, as on all the genuine coins of Eucratides: one of the three spurious pieces however has the head to the right. The change in the direction of the head, from right to left, may possibly be owing to the inadvertence, and not to the cunning of the forger; for if he engraved his die from a genuine coin, and not from an impression, the die would have the head in the same direction as the coin, and the stamps made from it would be reversed. I doubt however whether the forger had a genuine silver coin in his possession; if he had one, he would surely have made several casts from it, instead of putting himself to the expence and trouble of cutting dies. I am therefore inclined to believe that the forger had nothing more than a sketch to guide him in engraving the dies of this

grotesque piece of Eucratides. The eye is scarcely visible, and the nose, mouth, and chin are worthy only of a ludicrous mask. The ears and palms of the Dioscuri are also strangely disfigured; and the name is corrupted to $\square\chi\lambda\alpha\alpha\Delta\tau\iota\alpha\alpha$ on the first specimen, and on the third to $\text{BA}\epsilon\text{I}\alpha\epsilon\Omega\Sigma\ \square\chi\kappa\text{PATI}\rho$; all which suspicious circumstances prove most incontestably, that these pieces are forgeries.

No. 3. A square silver piece of large size, weighing 118 grains procured by Dr. Chapman at Peshawur. The execution of this piece is very much superior to that of any of the others in the accompanying plate; but there are several suspicious appearances about it, which induce me to believe it to be a forgery. Of these the principal are its square form; its identity in size and type with a copper coin already known, having an owl on the reverse; and the total omission of the Bactrian Pali letter प , at the end of the word *Maharaja* although there is plenty of room for it on the piece. It is curious to observe that the same omission occurs on the genuine copper coin published by Mr. Prinsep, from the corner of the coin having been worn off (vide Jour. As. Soc. of Bengal; November 1836. Fig. 6.) and on this account alone I am inclined to suspect that this forged piece must have been stamped by a die copied either from that identical one or from a sketch or impression of it. I have no doubt whatever that the piece is a forgery.

No. 4, is likewise a square silver piece of large size, and is of extremely barbarous workmanship; the title of $\text{BA}\Sigma\text{I}\alpha\epsilon\Omega\Sigma$ is given as $\text{BA}\Sigma\text{AI}\epsilon\Omega\Sigma$, and the name is written $\text{ME}\epsilon\text{N}\alpha\text{H}$. . . ; some of my objections to the genuineness of the last coin, apply equally to this; namely, its square form, and its identity in size and type with a known copper coin, having Minerva's Gorgon-headed shield on its reverse. These facts alone are sufficient to raise suspicion; but when coupled with the barbarously rude execution of the piece, and with the jumbling of the letters of the legend, I have no hesitation in declaring it to be a most pitiful forgery.

No. 5, is another square silver piece of large size, and of the roughest possible workmanship. The king's head and the figure on the reverse are both in directions contrary to what they are upon the original coin, and this reversal of the figure of Minerva, betrays that the piece is a forgery; for it brings the buckler upon the *right* arm, and leaves the

left arm to wield the spear; thus making the goddess of Wisdom left-handed. The legend also is much corrupted, and reads ΒΛΕΝΕΩΣ ΝΙΚΔΟΤΟΡΟΣ ΑΜΥΝ . . ; the missing letters of the name being the very same that are wanting upon the coin that was stolen from Colonel Stacy.

In the legend of the reverse, I observe that the initial letter of the name in the corrupted Bactrian Pali characters has a foot-stroke to the left, the same as in Mr. Jas. Prinsep's engraving; but this stroke does not appear on the plaster cast of that coin, which I have now before me; nor on a genuine round silver drachma of Amyntas, which through the kindness of Dr. Chapman I have been able to examine. On both of these, the initial letter of the name is the same as is found initial in all the names beginning with the letter A.

All the circumstances observable about this piece, stamp it at once as a forgery; its extreme rudeness of workmanship, its corrupted legends, and its having the buckler of Minerva placed in her right hand, all prove it to be a spurious piece; which its square form, and its identity in size and type with a known copper coin, only serve to confirm beyond the possibility of a doubt. It was procured at Peshawur from a man who had also a similar piece in gold; and the latter may very likely be the very piece which is now in the cabinet of Lady Sale. Here then, in addition to the spurious piece already made known by Mr. Raoul-Rochette, we have two more in gold and silver agreeing in all respects, save that of metal, with the copper coin of Amyntas, which was stolen from Colonel Stacy. The same sloping cut which is attributable to accident in the original coin, is here found repeated in all these spurious pieces; and I have therefore little doubt that they have all been copied from sketches or impressions of that very coin.

In No. 6, I have given the Bactrian Pali characters of the name of Menander, as I find them upon a beautiful square coin of that prince of middle size. The first letter is *m*, inflected with the vowel *e*; the second is *n*, with a dot to the left below, which invariably represents the long *a*; the third character is a compound, the curve at the top thus *c*, being one-half of the Bactrian character *ε n*; the middle portion is *d*; and the foot stroke to the right is *r*, which occurs exactly in the same way in the name of Eucratides, and in the word *putrasa*; and the last letter is *s*. Thus the four characters read simply according to the

Greek, *Ménándrasa*. I may add however that this is the only coin on which I have seen the name written in this way.

In No. 7 I have copied the Bactrian Pali characters of the name of Amyntas, as they appear upon the beautiful drachma belonging to Dr. Chapman. The first letter is the initial *a*; the second is *m*, inflected with the vowel *i*; the third is compounded of the half of the letter *s* (as above) and *t*; and the last is *s*; the whole four letters reading together in perfect accordance with the Greek, *Amintasa*.

It is a curious fact that the engraved originals of all the five forged coins, now published, are to be found in the same plate in the Journal of the Asiatic Society of Bengal, (Pl. 46. Nov. 1836); and as I have shown that the foot stroke to the initial letter of the Bactrian Pali name of Amyntas, which is found in the engraving in that plate, does not exist on the actual coin, and that the wanting portion of the stroke of the monogrammatic letter Φ on the spurious tetradrachm of Euthydemus is the very portion that is faintly sketched in Mr. Prinsep's engraving; I am almost tempted to believe that the forger of these spurious coins is in possession of a copy of that plate; and that all these forged pieces have been imitated from the engravings contained in it. It is scarcely possible that a native of the East, resident in Afghanistan, should have one of these plates in his possession; and as all the information which I have received from Dr. Chapman and from others, tends to prove that a *white* man is the superintendent forger of many false coins, I have little doubt that he (the white gentleman) is in possession of a copy of that plate, and of others; and that he has pointed out to his native assistants the particular coins which he wished to be forged. Of the common coins, such as drachmas of Menander and Antimachus, the forger has made casts, because he was easily able to procure original specimens; but of the rarer coins, such as those of the types imitated in the forgeries which I have just described, the fabricator, unable to obtain original specimens from which to form his moulds for casting, has taken advantage of Mr. Prinsep's etchings, and has imitated them as well as he was able. Such at least is the conclusion that I have come to from the facts before me; and I have hopes that before long, I shall be able to expose the white gentleman, who superintends the forging of these coins, to the merited contempt of the public.

No. 8. A small round silver piece, weighing 33 grains, in the cabinet of Dr. Chapman ; a duplicate of this piece is in the possession of Captain Hay, who has kindly favoured me with an impression of it ; and I am thus, by a careful comparison of Dr. Chapman's coin with the impression of Capt. Hay's piece, able to say that they have both been struck by the same dies ; and also that Capt. Hay's coin must have been struck before Dr. Chapman's piece, for on the reverse of his coin there is no visible flaw, whereas on the reverse of Dr. Chapman's coin there is a great flaw passing across the male figure, and a lesser flaw across the female figure : proving that the reverse die must have become cracked from repeated hammering, and that there are most probably many more similar counterfeits in existence. The original of this piece will be found engraved as No. 7, of plate 28, vol. iv. Jour. As. Soc. of Bengal.

The chief objections to the genuineness of this piece are ; 1st. its metal, none of the Indo-Scythian coins yet discovered being of silver ; 2nd. its size and type, which are identical with those of a gold coin already known ; 3rd. the jumbling of the letters on the obverse, where I observe that the letter *A* is the only legible character of the words PAO NANO PAO ; 4th. the want of a halo round the head of NANA, which is never omitted upon the genuine coins in gold and copper ; and to these I may add, the filling in of the arms and body of the half length figure on the obverse with small strokes, apparently copied from the shaded lines in Mr. Prinsep's engraving.

The Indo-Scythic coins of Kadphises, Oerki, and Kanerki are always of superior execution ; the relief of the figures is bold and rounded ; and not low and flat as on this silver piece ; besides which, the limbs and bodies of the figures on the genuine coins are never formed of outline strokes, as on this silver piece, but are boldly and creditably engraved. I have no doubt, from all these circumstances, that this silver piece is a forgery.

No. 9. A round gold piece in the possession of Mr. Conolly, C. S. It is of very inferior execution, and is evidently copied from the coin published by Mr. Jaa. Prinsep as No. 1 of the same plate in which the original of the spurious piece just described is given. Dr. Chapman, who suspected this coin to be spurious, kindly procured me an impression of it, from which I have made the accompanying sketch. A cast

of the original genuine coin is now before me, and I can therefore vouch for the correctness of Mr. Prinsep's engraving.

On the obverse of this rude piece it is observable that the little charioteer of the original is replaced by two unmeaning strokes; and that the principal figure, as well as the body of the chariot, is ornamented with a row of small lines, which I believe to have been copied from the shading of Mr. Prinsep's engraving. The Greek legend is besides faulty: there being but a mere stroke for the Λ of *Basileus*, and the final ζ of *Kadphises* being altogether omitted; and these two letters are the only faulty ones in Mr. Prinsep's engraving. On the reverse the standing figure with a trident exhibits a double outline from double striking; and the body has three sloping lines drawn across it, which are the very number of shaded strokes in Mr. Prinsep's sketch. The Bactrian legend is particularly faulty; as I suppose from the incompleteness of the original engraving, from which the dies of this piece appear to have been copied.

We have λ $\cup$, *Maha* distinct enough, but then follows $\square$ Δ for which the two upright strokes of the r and j , which are alone visible in the etching, might easily be mistaken.

From all these coincidences between this spurious gold piece and the engraving published by Mr. Prinsep, and from its extremely barbarous workmanship, I have no doubt whatever that it is a forgery; and I suspect that it must have been copied from Mr. Prinsep's engraving. It is certainly very curious that the same fact, which we have observed regarding the engraved originals of the Bactrian forgeries being found all in the same plate, is to be noticed of the engraved originals of these two Indo-Scythian forgeries, which are likewise found together in another plate of Mr. Prinsep's Journal. I shall therefore not only be not surprised, but I shall expect to see other forgeries of the rarer original coins engraved in those two plates; and I cannot help suspecting that the person who has forged all the coins is in possession of copies of those two plates.

From the long remarks which I have made upon the coins of a second class of forgeries, it will be evident that the best test for distinguishing a genuine coin is its excellence as a work of art; and this test will hold good with the earlier coins of the Indo-Scythians as well as with the whole series of the Bactrian coins, which have passed

Greek names. The forged specimens which I have described are, with the exception of the Owl Menander, of such grotesquely barbarous workmanship, that a single glance is sufficient to detect their spuriousness. A collector therefore in examining a coin of this class has only to pay particular attention to two points; namely, whether its workmanship be worthy of Grecian art; and whether the double legends are perfect; in carefully attending to which he will escape the purchase

Of many medals, "which if neither rare
Nor ancient, will be so, preserved with care."

Since writing the above notice, several other glaring forgeries have become known to me through the kindness of zealous friends. From Captain Hay I have received sketches of two square silver pieces of Menander, the exact counterparts of Nos. 3 and 4 of the accompanying plate. In the Bactrian Pali legend of No. 3, I observe the same remarkable omission of the final *ṣa*, of *Maharajasa*, although there is abundance of room for it on the forged piece. Captain Hay suspected them to be forgeries when he first saw them; but as they formed part of a large collection which was offered for sale, he was constrained to purchase the whole.

From Lady Sale I have received impressions of her gold Amyntas, which is of square form, and is in all respects, save that of metal, identical with the barbarous silver piece engraved as No. 5: it is therefore, as I supposed in my former notice, an undoubted forgery. Lady Sale also purchased two other gold pieces at the same time from the same dealer; one of them a Kadphises in his chariot, similar to No. 9 of the accompanying plate, and the other a Kadphises with a common bull, reverse, both of which I cannot help suspecting to be worthless, from the bad company in which they were found.

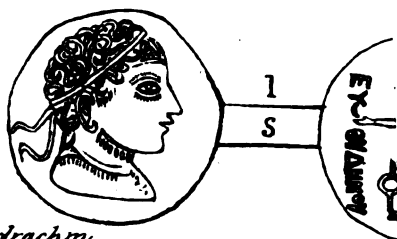
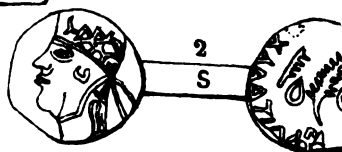
I have likewise received no less than nineteen forged silver pieces from my brother Lieut. J. D. Cunningham, at Peshawur, who knowing them to be forgeries, kindly purchased them for me with the hope that their early publication might put collectors upon their guard. Of these nineteen pieces, three are forgeries of a Roman drachma, and the remaining sixteen are forgeries of the drachmas of Menander; six being of the helmeted type, and ten of the bare-headed type, of which

five have the face looking to the right, and five have it to the left: the reverse of all of them being Minerva Promachus. It is needless to describe them more particularly, as they are equally barbarous in execution with those which have already been noticed; but there is one peculiarity observable about them, which alone is sufficient to stamp them as bungling forgeries; namely, that the legends on all the pieces of Menander are reversed both in Greek and in Bactrian Pal, the former reading from right to left, and the latter from left to right. The average weight of these pieces agrees with that of the genuine coins, being $36\frac{1}{4}$ grains.

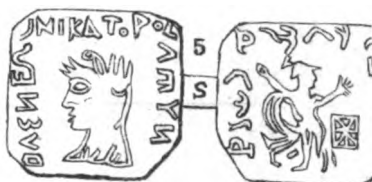
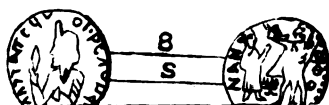
ALEXANDER CUNNINGHAM.

Counterfeit Coins.

Section
of the
genuine Tetradrachm



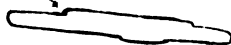
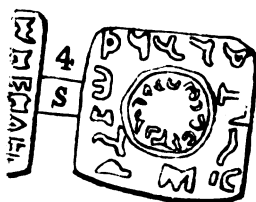
6
P. 2. 8. w
Me-
na-
ndra-
P. sa



five have the reverse of all describe them execution with one peculiarity stamp them as pieces of Men the former real The average coins, being 34



*Section
of the
Saurian Tetrads.*



Z
P947

7 A-
4 mi-
5 nla-
P sa

12

fiv
re
de
ex
or
st
pi
th
T
α

