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I.—*On the Gāro Hills.* By Major H. H. GODWIN-AUSTEN,
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THE Assam Valley, having the Bhutan Himalaya on the north, is bounded on the south by a broad mountain-system 4000 to 5000 feet high, emanating orographically from the hills north of the Burmese provinces, and connected with the main Himalayan system on the longitude of 96° – 98° E, by the water-parting of the Brahmaputra and the Irrawaddy. For 190 miles it has a direction from east to west, and a mean breadth of 72 miles, and is known successively as the Naga and North Cachar, the Jaintia, the Khāsi, and the Gāro Hills, as it is in this succession inhabited by the people of the above names.

The Gāro Hills, of which I am about to speak, form the extreme western point of the system, extending west for 60 miles, from long. 91° to 90° E. Ascending the Brahmaputra from the delta, the Gāros are the first hills that break the horizon; and although the British Government have been in possession of all the surrounding plain country for many years, since the annexation of Assam, it was only in 1867 that a British officer was appointed to the charge. Previous to that the intercourse with the people was of a very limited and unsatisfactory nature. A few attempts to enter the country had been made, but prematurely brought to an end by the sickness of the European officers and the difficulties of carriage; so that even in 1870 no European officers had penetrated far into the interior and

independent villages, or had ever crossed the hills from Mymensing to Gwalpara.

The area inhabited by Gāro tribes is about 2300 square miles, and the new civil station Túra is on the western side overlooking the south bend of the Brahmaputra. I have given these introductory remarks upon the geographical position of the Gāro Hills, in order that those not familiar with the minor subdivisions of our Indian empire may form a clearer estimate of their position on the map of India.

The line of longitude 91° may be taken as the boundary between the hills inhabited by the Khāsi tribes on the east, and the Gāros on the west; the strip of almost uninhabited forest and jungle that lies roughly on this line separates these two hill peoples, and though only some 18 miles wide, is a complete barrier between tribes differing so widely from each other in appearance, manners, customs and language; and intercourse between the true Khāsis and Gāros is very limited.

Dwelling intermediately between the Khāsis and Gāros, we find a small clan called Migams or Langams (who are not true Khāsis), speaking a dialect of their own. They are under the Seem of Nongstoin, have a knowledge generally of the Khāsi language, and frequent regularly the "hathis" or markets in Nongstoin; they in some respect resemble the Khāsi, but in dress and customs are Gāros, and like them cultivate cotton; yet they never intermarry with the true Gāro, and there is but little intercommunication. They are a quiet civil people, "joom" cultivators, and build their houses raised off the ground 2 or 3 feet. The Khāsi custom of setting up monolithic stones is not practised by these Langams, whose funeral ceremonies are quite different, and resemble those of tribes of Bodo extraction. My first intercourse with the Langams was in the field season of 1866-7, when the survey was carried up to the line of longitude 91° ; the only Gāros met with at that time were those living on the outer southern slopes of the hills, and who turned out and gave very willingly all aid required of them. In the autumn of 1869, having learnt from Capt. W. J. Williamson, the Deputy Commissioner of the Gāro Hills, that he was prepared to give every assistance in his power, should we take up the survey of his hill country, I determined, there being little prospect of our obtaining the same cordial aid on the Cachar frontier, to throw the main strength of the party into the unknown area west of 91° , and to extend the triangulation along the southern face of the hills. The party, therefore, on the 16th December left Chatar, after the usual trouble and annoyance in obtaining boats. The heavy baggage and tents were to proceed by water down the Soormah, and through the many

navigable streams into Shūshang, while Lieutenant Beavan and myself, leaving the boats at Sonamgunj, were to march, viâ Laor, to Puna Tith on the Jādūkatta, to visit Nongkulang, and take up the triangulation there. I also wished to examine the ground near the debouchment of the Um Blay, surveyed in previous seasons.* The hills are well seen from Laor, the fine mass of Maolangten rising abruptly to the east of the Jādūkatta; this wall-like line of mountain, broken by the deep gorge of the Um Ning, is the western extremity of the high Khāsi plateau, the fall in the hills being about 2000 feet, the valley of the Um Blay marking the lowest part in the whole east and west range of these hills. On the 19th we only got the short distance of 2 miles, from the Police Thanna to Ilampur;† for the only way of getting to Puna Tith being by boats, the necessary number could not be procured in one day. So we employed ourselves shooting small birds in the jungle near the village. This was situated on the edge of a fine wooded belt running away from the hills on the right bank for some miles, and covering a higher level of boulder and clay deposit 20 feet or so above the level of the plains.

Stychyris ruficeps was very common in this jungle, and I shot several specimens. Plenty of boats were ready by the next morning, and in them we ascended the river; the entrance to the gorge, and for 4 miles up the river to Puna Tith is one of the most beautiful scenes I have ever passed through. The secondary sandstone, in thick beds, is the first rock seen as the gorge is entered, dipping southward at about 25°, the harder beds running out with the strike of the strata from the river bank. When the gorge is fairly entered, and near the junction of the first large tributary on the left bank, the strata are nearly horizontal, and form high cliffs on the right bank; above this again, trap occurs, and the river has cut a very deep channel through the mass, which rises perpendicularly on both sides for some 200 feet.

The river is here very deep and perfectly still, and the reflections of the richly coloured dark green rocks capped with trees and foliage, as we saw them about sunset, were most

* The bazaar at Puna Tith is a very large and well-known one. We were short of good porters, and I was in great hopes that we might pick up some recruits among the Khāsis coming down from the villages in the hills.

† In Laor and Ilampur, very large quantities of fish are taken in the river and bheels near. These are dried in the sun and packed in bundles for the hill markets; in this state it is called "sūkti," and is a favourite article of food of the Khāsi and Sinteng. Its smell is naturally very strong when stale and old. The village of Ilampur was a very smelly place; near every house was a platform, with posts all round it, on which were drying hundreds of fish, the larger hanging on strings, the smaller placed on bamboo mats. Nets are spread over the whole to keep off the crows and kites.

lovely. During the day I had a long search for fossils in the secondary sandstones, and followed a large tributary up to their junction with the trap; so that the day was nearly spent when we reached the site of the market-place at Puna Tith, situated at the junction of the Rilang with the Um Blay; the place consists only of some half-dozen houses, inhabited by Khāsis, and the bazaar is held on the bank of the river. This presented a very lively appearance the next day; boats were constantly arriving, laden with "sūkti," plantains, rice, &c., from the plains, and generally manned by Bengalis. Long lines of Khāsis, from villages up near Nongstoin—men, women, and children—wound down the zigzag path, running upon the steep spur behind the village. Some few of these people brought lac and india-rubber, but they were generally empty-handed, returning with heavy loads of the sūkti.

My sirdar was busy looking up recruits, and got some 20 men to take service at Rs. 9 a month. They had a curious plan here of keeping the large turtle, tethering them in the water near the landing-place by a strong rope fastened to their hind legs, and thus keeping them until bought by some hill men going in for a feast; one we saw fastened in this way was a remarkably fine specimen of *Trionyx Gangeticus*. We had several things to provide, principally rice for the camp-followers, which was laid in for our onward march; and with the new coolies (porters) in addition to those we had started with, we were now well off for carriage. Failing to get axes, a man was deputed to obtain some at the village of Nong-shing-riang, near Nongstoin. The Khāsi iron is excellent, and the axes made at the above place are in form peculiar to this part of the country; in the hands of an expert woodcutter they do excellent work in jungle clearing; the iron is soft, but admits of being readily ground to a fine sharp edge, which will bend but never chips off.

Another form of axe used by the people of these hills is in shape similar to the stone celts found in Burmah, Manipur, &c., formed generally of jade; this chisel-shaped piece of iron is wedge-shaped at the head, and is fitted into a hole in the root end of a bamboo, where the wood is particularly tough and close grained. By this method it has the advantage of being either set with the edge at right angles to the handle and used as an adze, or in a line with it and used as an axe. With these axes they fell the largest trees very rapidly.

The villagers living on the skirts of the forests, and particularly those who annually clear fresh forests for their cultivation, are most skilful woodsmen; it is quite interesting to see the clever way the trees are selected, then partially cut through,

and a number all brought down together, by one or more trees being made to fall upon them. From Puna Tith we crossed the river Um Blay to the western bank, and a stiff ascent of 500 feet immediately follows, up the very scarped hill-side, in the secondary rocks. A very pretty fern grew in abundance around the stones and large boulders in a ravine bed, and I found it afterwards very common in like situations in this part of the hills, up to the Sumessary Valley. Reaching the edge of the scarp we passed through some undulating ground, covered with a not very dense cope-like growth, and gradually ascending, emerged out of it upon the flat open plateau, extending to Nongkulang hill. The surface is a hard sandstone of the upper cretaceous series, of precisely the same nature as that at Cherra Poonjee; the soil has been washed off the greater portion, and the streams flow over the surface to the south, in very shallow water-courses, the only trees and vegetation growing along their banks. These streams discharge their waters with very fine falls into deep ravines, which have been cut back far into the plateau, through the softer beds below. Into these ravines, bounded by cliffs some 300 to 400 feet deep, it is almost impossible to descend; and the bottom is a mass of the densest forest growth.

We encamped on the open plateau near a stream where we found a sufficient depth of earth to drive the tent-pegs, and our men got very comfortable quarters in the jungle near the water. I was very fortunate to obtain, on this day's march, a very fine specimen of a rather rare eagle, *Aquila hastata*. When the halt was made for breakfast I took the measurements, while Lieutenant Beavan made a sketch of it to be coloured in camp. It was then handed over to one of the Khāsi coolies to carry, but we never saw it again, for on calling for it the next morning, some of them had cooked it the previous evening, not knowing that it was wanted.

The next day, the 23rd, we continued our march westerly along the plateau, which retains the same character with a very gentle fall, with the dip of the strata southward. Near the Langam village of Maomāsi, the nummulitic limestone commences, and fine forest covers the Nongkulang ridge, save in the more level spots, which have been cleared, and form very productive land for cotton and hill rice grown during the rains. The forest scenery is fine over the northern face, giving a dense shade over the ascent to the highest point, where I had placed the station in 1866. The glades were cool, and the limestone rocks damp and covered in places with magnificent ferns.* Of the old platform built by me in the winter, 1866-7,

* Species of *Sugenia* and *Goniopteris*, *Pæcilopteris repanda* and *vittaria*.

very little was to be seen; the wood was quite rotten, and the jungle which I then cut down to within 2 feet of the ground, was now of great height, and shut out everything, so that we had plenty of work to do over again, and this was commenced upon immediately after camp was pitched on the site of the old village. As an instance of how village sites constantly change—in 1866 this was a large one of some 12 houses, and very substantially built. These were now all down and buried in high grass; so that to have a clear camp and pitch the tents we had to burn it, which was soon done in its then dry state. The people had in the interim moved twice, building their first village some 3 miles farther west; this they had to leave after the first year, the site proving so unhealthy, and they were then, 1869–70, living still farther away. Even the most productive clearings they seldom cultivate and live on for more than four years. On the 24th and 25th the work of clearing and building the platform round the trigonometrical station was continued, and men were started off to set up the marks and show heliotropes at Landekar, Kokhlam, Marangthang, &c., so that the observations might be commenced. It was getting more hazy every day, and it was with great difficulty that distant marks could be discerned. On Christmas Day I employed myself drawing some birds I had shot, and broke up a large quantity of the fossiliferous sandstone of the Nongkulang hill, while my fellow-surveyor, Lieutenant Beavan, was engaged in looking over and drawing some new fish which he had collected.

Lieutenant Beavan now knowing what had to be done in the surveying line about here, I left him on the 26th, to meet the head-quarter camp in the Mymensing district. I proceeded to the foot of the hills at Bagholi, viâ Purjonkha; the road lies through forest nearly the whole distance, and from Purjonkha to Bagholi is over a slope of the nummulitic limestone, very rough and tiresome walking. The only good water is to be had at Purjonkha, where I breakfasted by the side of the pretty shallow brook. The Polyplectron pheasant is very numerous about here, and they were heard calling in all directions in the early morning. The beautiful *Irena puella*, or fairy blue-bird, sat in numbers upon a bare tree near the breakfast place: this bird is one of the most lovely of our Indian avi-fauna, but does not extend into the Western Himalayas. Around Nongkulang I collected several good birds; among them, *Trichastoma Abottii*, Bly.; *Turdinus brevicaudatus*, Bly.; *Pomatorhinus hypoleucos*, Bly.; and *Zoothera marginata*, Bly.; the damp limestone rocks, abounding in shells, and the fine forest growth, renders it a capital locality. At Bagholi, the

drainage from the Purjonkha valley, after being lost in the limestone rocks, reappears in a large still stream just within the hills; its volume I am inclined to think is greatly increased by the water of the numerous large streams that descend from Yindkú, Kutabram, &c., which are all lost in the limestone there. The stream that issues at Bagholi, the Gabir, is too large for the drainage area of the little Purjonkha rivulet. From Bagholi, I skirted the base of hills to Gillagora, and encamped there about half a mile from the foot of the last spurs.

The hills here are of the supra-nummulitic series, and dip at a high angle towards the plains, the dip decreasing northwards. Their appearance is identical with some portions of the Siválik hills in the north-west of India, and their age is probably near that of the lower division of the Siválik formation, or the Nahán group of Medlicott. These hills are rather more open than we find the outer slopes further east in the Khāsi country, owing to the clearings that have been made. On the steeper southern slopes, the forest once cut down, and on the cultivation being given up, is succeeded by a rank grass, which hinders the growth for a long time of any trees; this grass is fired every spring, which prevents, more than anything else, the growth of such seedlings as may spring up. Owing to the high angle of dip, the last spurs terminate in very steep slopes upon the plains, and in places the marshes commence at their very base—the alluvial deposits are thus found bedded against the older rock, and there is no slope of talus whatever at the base of the hills. The hill streams, such as the Rongsiang and Mahadeo, are sluggish far up above their debouchments, and are navigable for canoes, showing very clearly that a local depression has been taking place over this area in very recent times, which is marked by the large extent of marsh and open water extending from Nazirpur (in Mymensing) into the Sylhet district, and marked also by the very sudden falls in the Oobdakalee River near Nazirpur, to the west of which there is a marked rise in the whole country towards the Brahmaputra. On the 27th I marched to Bamangaon, situated in Mymensing; the weather was lovely, and the hills very clear, so that I could cut in the position of new points as they came into view, and roughly select those for future stations of trigonometrical extension. Bamangaon is situated on the edge of a vast expanse of very low country covered with high grass in the winter season, intersected with muddy drainage ways, and dotted with a few ponds, but quite under water during the rains. This expanse of grass is the western extension of the marsh and open water above mentioned. The “Kyah” partridge, *Ortygornis Gularis*, Temm., was very numerous along the edge

of this marshy tract, but very difficult to put up without dogs. Their loud peculiar call was heard on both sides when we got up and struck the tents at sunrise on the 28th. The dew that falls in these marshes at this time of the year is very heavy, and a dense damp mist hung over the low country, through which the sun's rays strove to penetrate. Soon after leaving Bamangaon the River Gonassery is crossed, here a shallow, broad stream, with sandy banks about 12 feet high, and we reached Nazirpur, a large "hath" or market-place, by 9 A.M. From this the fine peak of Kylas was well seen, and I looked at it long and anxiously. The highest point in the Gāro Hills, it is looked at with interest, even veneration, by the people of the plains; by the Gāros it is called Chikmüng, and is the last resting-place of the souls of all the race. Various wild stories are in circulation concerning attempts often made by people from the plains to ascend to its summit. The Gāros themselves consider it haunted, and sinful to climb it and so disturb the manes of their ancestors. I stopped to breakfast in the hath of Nazirpur, and while waiting, my Hindustani calashies discovered a fellow-countryman, holding an appointment under the Shūshang Zemindar; this man brought me a present of fruit and some milk, and we opened a conversation. He of course had heard of "compāss walas" and the conversation naturally led up to the peak of Kylas, which we informed him we were soon bound for. He held out very little hope of success; for besides the opposition that he said would be offered by the Gāros, he told a tale of a fakir, or holy man, who had made a vow to pay a pilgrimage to the summit of Kylas, and who for that purpose went as far as the village near, where he put up for some time, and made a number of unsuccessful attempts; but that after getting nearly to the top on every occasion, his legs seemed weighed down, and he was thus prevented at last from making a single step forward, and that all grew dark around him. The Gāros themselves, and the people of the plains below, all said that any man visiting the "Holy Hill" would be sure to fall ill and die soon after. I laughed, I fear, rather ironically at his tale (although I am quite sure many of my men believed there was something in it), and told him that he should soon see our heliotrope flashing from the highest point of it. Seen from the plains near Shūshang, Kylas has a most imposing appearance; it rises abruptly above the mean level of the range, of trapezoid form, its upper surface sloping gently to the east; looking from the west of Shūshang, its shape is that of a truncated cone. The south and west face is almost perpendicular and consequently bare, and its horizontal stratification is apparent, in bright contrast with the

dark forest of the hill slopes below and around; its extreme western and highest part was evidently covered with grass, and this I decided should be the site of our trigonometrical station. The whole line of its flat summit showed that forest grew up to the edge of the southern slope.

After breakfast I parted with my friend, the Zemindar's official; reiterating my promise that he and all the country round should see our heliotrope, and to be on the look-out for it, we parted, he ominously shaking his head and quite convinced that if a fakir failed to get up, we certainly should.

From Nazirpur the march was continued to the left bank of the Sumessary River, and we followed it up towards Shūshang, as we expected to find there some news of the main camp, under Mr. Belletty's charge; we soon met a man of the establishment, who told us the boats were a short way down the river, but detained by a fall where the water was very rapid, and that they would get up as far as they could that evening. Nazirpur was centrally situated, with a fine large market twice a week, from which we could obtain all our supplies, and would also be within my proposed triangulation. I determined at once to form the first head-quarter camp there, under some fine mango-trees, scattered along a piece of ground raised slightly above the surrounding low marshy land, and giving shade and a dry position in wet weather. The 29th saw the whole of our luggage transferred from the boats to this site, and camp pitched; the Khāsi coolies putting up temporary shelter for themselves near.

I did not leave for the hills until the 15th of the following month (January), but much was done in the interval. Men were sent off to clear the hill of Wajong Korong under Mr. Doran, and to set up flags at other points. Mr. Belletty prepared his plane-table for the triangulation of the country west of the Sumessary, and started on the 4th of January to select and clear the hill of Joksangram, north-west of Shūshang, a fine commanding point forming a triangle with Kylas. Mr. Atkinson came in from some work at the base of the Khāsi hills, and was sent off with a fresh plane-table to sketch the ground west of long. 91°. Official correspondence, and the regulation of supplies for those going out and the main body in camp, gave plenty to do. On the 3rd I walked over at 7 A.M. to Shūshang to see the collector of the Mymensing district, to arrange with him about purwanas, or orders for supplies and assistance from the head-men of the villages bordering the hills. The collector had departed with his elephants shooting in the bheels near, so I had my walk to no purpose; he, however, came over on the morning of the 6th, and asked me to accompany him, as he was

going to beat the expanse of open grass country to the east. I was glad of the opportunity of thus reconnoitring that part, which I should otherwise have had to do on horseback and foot, entailing immense labour; for very little or nothing can be seen, save from the back of an elephant. I was thus able during the day to select a good point near the village of Lukhipur, on an artificial mound, which had once been the site of a village. The country was so flat, and the waving sea of grass so high, I was unable to get a ray longer than $4\frac{1}{2}$ miles in this direction. A few wild buffaloes are to be found in these marshes, but not many at this time of the year, and there are a few deer, but it is very difficult to see them in the high grass; pigs seemed numerous.

On the 7th, the building of the station close to camp was commenced upon, and an elevated platform of bamboo had to be erected, in order that the heliotrope might clear the grass on the Lukhipur ray. I could see that Mr. Belletty on one side, and Mr. Doran on the other, were hard at work clearing their respective hills, by the gaps that were being made in the forest that covered them. On the 10th I proceeded to Lukhipur, to observe at the station there; found that the platform on level of ground was not high enough; the flag above Nazirpur mark could just be seen through the theodolite, but not the heliotrope; so a platform had to be run up of bamboo, fine clumps of which grew in the village of Gouripur, and we proceeded at once to cut down sufficient for the purpose, and by evening had very nearly completed our task. I pitched tents in the village of Gouripur in the evening on returning from work, as my men thus got shelter in some of the houses. This village was a good specimen of one in this swampy part of the district, built upon an artificial mound and surrounded on all sides by marsh and rice cultivation. To the north was a large open piece of water, and this swarmed with ducks, geese, and every kind of waterbird, whose cries were heard far into the night as we dropped off to sleep. The next morning we were astir at dawn, and off to the mark again, and had it finished ready for observing at by 10 o'clock. Marangthang mark showed well, and I got all my angles recorded by 4 P.M., in time to return to Nazirpur. The day was most lovely, cool and bright, and the hill range of the Gāros beautifully sharp and clear; it was one of those days and evenings in the cold weather that the European in India looks back upon, when he picks up renewed health and strength, with the happiness the pure temperature (so rarely experienced) imparts. Bagged a brace of teal on the way back; there is good shooting about if one had time to go in for it. My assistant, Lieutenant Beavan, was now brought

into camp very ill with fever and a touch of sunstroke; he had, after I left him at Nongkulang, selected a station on the hill of Pundengroo, and was encamped there clearing it, when the attack came on; he stayed there as long as he could, but at last had to give in, and return to Head-quarter Camp for treatment. Thus was much valuable time lost, and his services—for I had eventually to go and finish his work at Tigasin and Marangthang; but it is impossible in these hills to depend on the health of any man, and plans are constantly upset thereby. Lieutenant Beavan having had a similar attack in the previous field season, when working in the North Cachar hills, and well knowing that such further exposure would probably kill him, I determined, much against my own wishes, but solely for the good of the service, to draft him to some other more healthy part of India, and I eventually sent him forward to Mymensing for Calcutta.

Nazirpur is situated about 5 miles from the base of the hills; the intervening ground immediately north is rather higher than the rest of the country, and is dry and open, so that there is an uninterrupted view of the hills down to their very base, where a dark line marks the site of several large villages nestling amid luxuriant trees and fine bamboo clumps. The hath, or market, is a very considerable one, and frequented largely by the Gāros; these people are extremely timid of strangers, and the first market day after the survey camp had come in, a number of these people seeing my chuprasies about, bolted off at once. They have good cause, no doubt, to fear a "chuprasie" in the plains, for they have very frequently been robbed of their goods, and made prisoners of, by the retainers of the Shūshang Raja; and if not by his orders, certainly winked at by him. I have no doubt that many raids by these Gāros on the people of the plains have been brought about by such acts, which they, like all hill people, are not slow to revenge. Confidence once established, they soon came to the market in their usual way, and eventually supplied the whole camp with firewood during our stay at Nazirpur, for which they received regular payment.

It is only the outer Gāros who come thus far into the plains to market; the interior Gāros very seldom venture out so far, and depend on the former, their neighbours, for all luxuries they require, and transmit their cotton to the plains by the same hands. The 12th and 13th I was employed taking the angles at Nazirpur, trigonometrical station, and on the 15th all was ready for the trip into the hills to ascend and clear Kylas

* Official servant in semi-uniform, wearing a cross-belt and badge of his department.

peak. On the afternoon of that day—bright, sunshiny and clear, but temperature delightful at this season—we marched across the open level country towards the gorge of the Gonassery River; on nearing this the scenery became extremely pretty. The spurs from the hills run out far into the level rice grounds, and terminate in little knolls, the last of which stand quite alone, and must resemble islands in the rainy season. This appearance, and the long narrow dead-level valleys running far into the hills, gives the appearance of submergence, and is unquestionably due to a former depression of the whole mountain mass. These last low spurs and knolls are covered with rich vegetation, and often crowned with a gigantic tree of the fig family; the villages are long and straggling, buried and covered in by tall bamboo clumps, and form a marked and fine contrast with the ochre of the newly-cut rice fields. We penetrated some short distance within the gorge and stopped, when nearly dark, close to the first Gāro village on the right bank of the river, which we had crossed once below, near a deep pool with an overhanging hill above. We were now well within the hills, low spurs shutting in the view on every side; the village and our camp was on a grassy plateau that skirted this side of the river for another half mile. The villagers turned out, brought wood, and promised some fowls next morning. Jackals were very numerous, and all through the night their peculiar disagreeable bark was heard on every side. We were called by the crowing of the jungle cocks early next morning; a few fowls were brought, a very necessary supply when going upon such a trip, where it is often very difficult to get even one a day. Two of the villagers were secured as guides, and we started off at once into the bed of the Gonassery; this we followed the whole day, now wading up a long shallow reach, or crossing and recrossing it to follow the narrow level strip of ground on either side. For the greater part of the way the hills were low narrow ridges, very steep, and covered with forest and dense undergrowth, so that no path existed save the one in the river bed; during the rains, canoes (dug-outs) can be taken up as far as Kūnchūng, the only village in the valley. At points the hills terminate in a cliff of about 200 to 300 feet or so, overhanging a deep still pool, the rock completely covered with a lovely growth of various damp-loving ferns. There were few fish to be seen now, for the traces of indiscriminate poisoning were seen in every decent sized pool. At regular intervals down it, a few yards out from the bank, tripod seats are seen made of three bamboos, first driven into the sand and tied together about two feet from the surface, in which is placed a small truss of grass. On these

they sit and lay hold on the fish, as stupified by the poison they turn up on the surface near. It is a dreadfully exterminating method, and adopted all along the base of the Gāro and Khāsi Hills, when the streams fall after the rainy season, that being the time when the fish ascend from the bheels and large rivers in the plains; in these streams they are principally different species of *Barbus*, commonly known as Mahasir.

Only in one pool, near the village of Kūnchūng, did I see fish of any size, and these were evidently there on sufferance, and taken out as the people wanted them; for the body of water not being great, they could all have been poisoned in an hour.

Kūnchūng was a small place containing about five or six houses; here we changed the guides; while they were getting ready all set to cooking their breakfasts in the bed of the river. When this great meal of a marching day was over, we went forwards up the bed of the river, which wound a good deal round the points of the lateral spurs that descend to it. About 2 miles above Kūnchūng is a brine spring resorted to by elephants, deer, &c.; it was selected at one time as the site of a "kote" (an enclosure or stockade of trees) for catching elephants, and the old stakes are still to be seen in places. The river bed now becomes much contracted and full of large masses of rock, and is no longer passable. The path soon leaves it and ascends several hundred feet, passing over a spur from the left, and descends about a mile farther on to the junction of a stream from the east, quite equal in size to the Gonassery, called the Rūngnū; here my tent was pitched on the 16th, there being only just room for it. The hills rose precipitously on every side, clothed with fine forest; there was little underwood near the streams and slopes, but among the rocks a pretty fern (*Pæcilopteris*) grew in abundance. The sori, when rubbed off on the palm of the hand and held in the sun, are seen to smoke and gradually disappear, bursting with the heat, and scattering the pollen. The natives of course say that the seeds actually do burn.

The Gonassery, flowing from north to south, the Rūngnū from due east, are bounded, the one on the west the other on the north, by the steep escarpment of granite rising quite 400 feet from the river bed. The road from the junction of the two rivers leads up the salient spur formed by the faces of the two scarps, and is very steep. Reaching the top of the ascent we found ourselves on a plateau of about one mile in breadth, extending up to the foot of another and last rise in the hills; it is readily seen that these highest masses, including Kylas, are the last remnants of the stratified rocks, now again in their normal position. These outliers give the plateau a very

irregular surface, but, overgrown with vegetation, appear level when viewed from a distance. Chikmūng, the village we were bound for, is situated on this plateau, close in under the sandstone crags of Daogūrūng, and is inhabited by Atong Gāros. These people are in many points a distinct clan, their language differing materially from the Gāros around them. They form a small isolated colony round about Kylas, occupying some four villages; in personal appearance they differ, but wear much the same dress.

Our reception was not a promising one, and at first they scarcely took any notice of us, remaining in, and about their houses; they seemed a bad lot, expressed in Hindustani by the forcible word "mugra." They were disinclined to give any aid whatever, and would not allow that they had any head-man; and I observed rather uneasily, what is always a bad sign with these people, that their womenkind and children did not show anywhere; while at Kūnchūng they had all turned out to look at us go by.

Our guide from that place was a capital fellow, and by dint of some very loud talk shamed them into producing a fowl, as an offering to the Sahib (myself), and two other men as guides for our onward journey towards the next village, for I said nothing about Kylas then; but when this was arranged they declined stoutly to let the two coolie loads of rice be placed in the large bolbang, or the men's house; this discussion being set on foot, and the objection made, by one ill-looking individual. At one time it seemed as if we should make nothing out of them, but by patient talking the two loads of rice were deposited in the place, and with two loads more served out to all, I was enabled to start four men back to the plains for another supply.

We left immediately the matter was concluded, and halted for the morning meal, in a deep, beautiful forest glen, under the high mass east of Wanrai called Daogūrūng. The head of the Gonassery was passed in the next ravine, and we were soon after on the watershed of the Kylas ridge. A considerable number of canoes (dug-outs) are made in the forest about Chikmūng; trees of proper size and form are selected and felled, and the canoes cut and burnt out on the spot; after which straight round poles, about as thick as the wrist, are laid on the ground, and if these be uneven, are propped up on forked supports—this entails much labour, as two or three hundred yards of rough ground are often passed over in this way—and the canoe is thus launched, in the middle of the forest, as far as the first large stream; it is then taken down from pool to pool, to the navigable part of it, and thence these

dug-outs find their way far into the plains, as indispensable to the people as a carriage or cart in the other drier parts of the country. They are generally seasoned by being kept for some time under water in some pool, and weighted down with large boulders for the purpose; they are generally about 16 feet long, and some on the Brahmaputra are of much larger size.

Passing through some old clearings covered again with young forest growth, we came on the first stream flowing northwards, and as I knew that to go farther in that direction would be leaving the peak altogether, I called a halt in the forest and conferred with our new Gāro guides as to the way to Kylas. They said they knew of no path; there was not one; to the peak they never went. I said a path must be made, and offered Rs. 10 to the first man who would show the nearest way up; but they shook their heads, and said they would not even cut a stick, suiting the action with their daos on a small twig, which was expressive. Finding our guides of no use, I sent Beni, one of my chuprasies, with our Bengali interpreter, on to Rūngshū, the next village on the north, to see what they could effect. In the mean time I took ten men, telling off the same number to the Naik; sent him to make his way up by the ravine, while I took a line straight into the forest, from a point further on along the road. After groping about the forest, and looking here and there through the trees, we tried a likely-looking spur; up, up we went, the ridge mostly clear and open, and leading in the direction I knew could only be the right one; a rocky bit followed, and then the steady ascent again, and looking through the branches of the trees, as small vistas of the distant country showed now and then, and from the height we had got, I felt convinced we had hit the western flank of the peak; and we at length landed on its rather level main ridge, along which I pushed as far as a fine open spot, on the brink of a southern cliff. This commanded a splendid view of all I wished to see—the rivers and bheels in the plains showing bright as silver in the evening light. It was with feelings of the very greatest delight and intense satisfaction that, after picking up on the plane-table all the trigonometrical stations around, I returned to camp, having put an end to all the wild superstitious reports of both plain and hill people, that Kylas was a peak not to be scaled—an absurdity it was quite impossible to talk them out of. My own men were now equally elated at our success; they had listened to many more tales about the mountain than I had. While we had been ascending Kylas, the Naik's party had been working their way up the bed of the ravine, and at last got up under the steep west side

where they found it so precipitous they could get no farther, and so returned to the baggage and pitched camp.

The site of this was very gloomy, the high forest-trees shutting out all light, while a pair of owls made the place still more dreary by their discordant and disagreeable cries when darkness set in. On the 18th we were astir early, and ascended the hill again, leaving the tent and luggage below. I pushed on beyond the open point which we had reached on the previous evening, keeping near to the edge of the cliff, and cutting a path through the patches of a small species of bamboo, reached at last the grassy south-west angle of the Kylas plateau. The site was a splendid one, bringing in and giving me for the first time an uninterrupted view towards the west, along the high range to Túra and the lower sandstone ridges running into the plains; the broad mountain river, the Sumessary, flowing in great bends round lateral spurs, lay almost at our feet, some 3000 feet below. The forest, at this exposed south-west angle of the mountain, was, from its constant fight with the storms of the summer monsoon, of rather smaller growth, and those on the outskirts bore the marks in their gnarled forms, while some were quite dead, and a considerable open space was thus covered with grass alone. The first thing done was to fire it, and not until this was done, and the grass fell before the flames, fanned by the fresh breeze, could we well see what a magnificent prospect we were in sight of. It was the first time fire had ever invaded the sacred hill, and the tall column of smoke was seen all over the low country, and told those in the camp at Nazirpur that we had reached the summit.

After selecting the site for the trigonometrical station, and setting up the plane-table, and getting the rays to other points laid out through the forest, all the men were set hard to work felling trees and clearing the same. The headman and two others of the village of Rūngshū were brought up by my chuprasies, who had gone on there the previous day; but on being asked if they would help cut the jungle, declined, saying that if they did so, the demon of the mountain would turn them mad. They did not seem at all happy in their minds, and went off with great alacrity when told they might go. My Khāsi coolies worked hard, and a good day's work was got through. I was also enabled to take a great number of angles to natural objects for tertiary points, and to observe the vertical angles to two or three of the principal stations. My assistant, Mr. Belletty, I could see had not been idle, as the cleared summits of several hills, and the white pyramidal marks set up on them, showed.

The weather was lovely, and the heliotropes flashed brightly at the principal stations I was connecting with. As there was but little water near the summit, and that not very near, I sent all the men down to the camp at night, and had only bedding brought up for myself and servants; and we slept under a small shelter of boughs, run up between two trees just within the forest. I found it was very much warmer than down in the plains, where the cold, from the excessive damp and fog, is intense in the early morning.

On the 19th, leaving the work of clearing to progress, I started with plane-table to reach the edge of the north-west angle, or extreme northern point of the mountain, taking only Ribai and a young Burmese lad, Mounghé. The forest growth on the summit is neither high nor thick, and no underwood of any consequence.

Fresh tracks of Mithans (*Bosfrontalis*) were seen. The breadth of the plateau, which has a gentle slope to the north, is not more than one-eighth of a mile. It had evidently never been resorted to by the natives; not a mark of a dao was to be seen anywhere. The contrary is invariably the case in frequented forests, for those who have ever travelled with these hill tribes know their habit of cutting a twig now and again as they walk along, in the same way as we swish about a stick. On the edge of the steep fall I found a good spot for a "maichan," where I obtained a fine view over the Gāro Hills on the north and west, and laid the foundation of much future work on the plane-table, and selected the fine isolated mass of Mungrhi, quite within the independent Gāro country, for another trigonometrical station.

The country to the immediate north of Kylas was covered with dense dark forest; it presented a flat appearance, the rivers flowing in deeply-cut narrow valleys bounded by steep regular slopes; the sombre green of all only here and there broken by a bare bit of light-coloured cliff in the horizontal sandstone. On the 20th the felling of trees was going on. My Khāsi coolies had heavy work of it. Commencing at about 7 in the morning they worked, with an hour for a meal in the middle of the day, until quite 5, or about 10 hours. To those who cut down the greatest number of trees I gave "bakshish," the best incentive to zeal in the world; and without these excellent men the survey would have been at a standstill altogether. 21st and 22nd, still clearing the troublesome way to Tigasín, a station due east, which was closed by the forest for some 300 yards. The pyramidal mark, some 25 feet high, was erected over the station, so that should it hereafter be found to be impracticable to retain a heliotrope on the peak, it might be

used for intersection at a considerable distance during hazy weather. By covering in these marks with basket-work made of freshly-split bamboo, which shows beautifully bright and white in the sunshine, this is much assisted, while over the mark itself I set up a long cylindrical basket, like an elongated gabion, covered with white cloth; this, in thick weather, can generally be intersected by the wires of the theodolite telescope. The 22nd was very cloudy, and the observations were very wearying, the heliotropes only showing at long intervals and generally becoming obscured just at the very moment they were wanted to be seen; and Tigin, although now open, never showed at all; and I fear the man received but few blessings, when it was evident occasionally, that with the sun full in his face, he had not got his heliotrope properly aligned. By the 23rd, being the sixth day we had seen the sun rise from Kylas, all observations to the stations cleared were completed, and we returned to the tent in the forest below. While on Kylas I obtained a very pretty form of the genus *Phyllornis*, which was new to me; it turned out to be *P. chlorocephalus* (Walden), a bird hitherto only known from Burmah, and now added to our Indian fauna. I also shot several specimens of the rather rare warbler *Abrornis albogularis* (Hodg.), which appeared here very numerous.

Kylas being now done with, I determined to get round by the northern side of the high main east and west range to Tigin; we retraced our steps to Chikmüng village, where a good hour was spent in obtaining information about the road towards the Nigam village of Nongmen, a place the position of which I was acquainted with, from my former experiences in the west Khāsi Hills, during the field season of 1866-67, and which knowledge now stood me in great stead, for they were surprised to find I had been in that quarter and knew the villages and headmen by name so well. After telling the usual quantity of preparatory lies, with reference to their utter ignorance of the place and the way to it, a very old man was at last produced, who said he had been there once in his life and *might* find the way, and we at last filed out of the place down into the valley to the east.

After crossing the head of the Rúngri, we had a steep ascent up the escarped slope which bounds it thence on the south bank to the junction with the Rúngnú; we emerged out upon a level flat of hard naked sandstone, only covered with scanty grass in the hollows. Crossing this we reached the head of the Mahadeo valley, which has cut back into the sandstone in high cliffs, and is a very striking physical feature of these hills, showing the way in which they have yielded to the effects

of denudation, so rapid here from the heavy rainfall. The Mahadeo valley, seen from this point, reminds one much of that of Cherra Poonjee on a small scale. It was very deep, 2600 feet, the bottom and slopes up to the base of the cliffs covered with magnificent forests. Midway between the northern cliff and the plains, the bounding cliffs, quite 1200 feet, almost meet, and thus form a grand amphitheatre.

Under a small rise on the watershed, camp was pitched early; I had here to put up a mark, and this hill I found was bare, and afforded a fine view of the country both north and south. The former side was seen to great advantage, and broad patches of ochre-coloured grass showed here and there amid the dark green woods which encircled them. Clearings were not numerous, save towards the Gāro side, where fresh patches of newly-felled forest showed that the people had been hard at work.

I obtained here, in the scrubby bamboo jungle that grew near the top of the range, two interesting birds, *Merula castanea* and *Aboricola atrogularis*. I also saw in an open grassy glade, about half a mile off, a fine herd of mithans grazing, but the lateness of the hour and the difficulty of getting to it through a broad belt of forest, rendered their position a very safe one. Beyond the hill of Balpukram, the watershed narrows considerably into a mere ridge, and the path leads on across the head of the Mahadeo valley, now on one side of it, now on the other. The ground is much broken, owing in a great measure to a north and south dislocation in the strata. A short distance further on another plateau is reached, and the road turns off to the northward and descends into the valley of the Bao Tith.

We made several ineffectual attempts to find a road leading direct along the main range to Pundengroo and Tigasín, but failed; the Gāro guides either did not know or would not show any other, save that to Nongmen, so after finishing observations at the stations on the 25th, we made for that village.

The bed of the Bao Tith is crossed at the foot of the northern slope, and was a very lovely glen, buried in magnificent forest; but after ascending the left bank, we came out on open flat glades of grass, with shallow streams flowing through them. Deer (samba) were very numerous here, but there was no time to stop and stalk them. It was dusk when we reached a small stream with good water, and as the guides could not be depended on as to the distance of the village, I pitched camp by the edge of it. Night very cold, with a white frost, the site being low and damp.

Nongmen was still, we found next day, two miles farther up

on the other side of a considerable stream, the Mairam, which, rising near this, flows due west, taking all the northern drainage of the Kylas ridge, and then uniting with the Sumessary. We got into Nongmen early, and I found there some Langams I had previously had with me in 1867. After all the stories told by the Gāros of Chikmūng as to their ignorance of Nongmen and its inhabitants, it was most amusing to witness the guides salute them as old acquaintances; nor did they seem in the least ashamed of their attempt to prevent our march in this direction when reminded of it. Nongmen is a small place of two separate hamlets, each of about ten houses.

We quickly changed the guides and went on towards the base of the main ranges at Pundengroo, the road running the greater part of the way up to the Bao Tith over open narrow flats of grass lately burnt. The Bao Tith flowed in a deep ravine, with precipitous sides, well wooded wherever the trees could get a holding, and ferns growing in great luxuriance. The bed was full of coal in pieces of considerable size, but none occurred *in situ*. While breakfast was being prepared I collected a quantity and made a fine fire, which burnt fairly; the Langams were quite surprised to see that it was combustible.

The Khāsi coolies of course knew of this quality, coal having been quarried and used so long at Cherra Poonjee. After climbing the steep slope of the right bank, we emerged into the open clearing called Panjali. This plateau had originally been covered with forest, but was now under rice cultivation, and the crop just cleared off the ground. Panjali was merely a clearing with two or three huts, occupied on and off by the people when the crops required weeding, &c. The nummulitic limestone was noticed here, occurring in small outliers on the clearing; beyond, on entering the forest, and the path taking the course of a stream, it was largely developed. At the junction of this stream with another from the south, I ordered the tent to be pitched, as I found the road for Tigasın and that to the plains here parted; and taking the theodolite and plane-table and a few men, I went off at once to the former station, to take one or two angles that remained to be observed.

The trigonometrical station of Tigasın was selected by me on my previous visit to this side in 1867. It is situated on the edge of the steep northern slope of the cretaceous sandstone ridge. This has a very gentle fall to the south, and thus I found it impossible, without the expenditure of an enormous sum of money, to clear the forest that intercepted the rays to Kylas and Marangthang. I therefore selected a stout tree on the highest part of the hill, and this, cut off at about 15 feet from the ground, formed the stand for the theodolite; around

this tree, and clear of it, I erected a scaffolding and platform, so that one could walk round (lay the telescope and observe, and read off the angles) without shaking the instrument. By this means it was only necessary to fell the nearest trees, and by sending men up into the tops of those beyond to lop off the boughs, the rays were very soon opened up. The lopping off of the crowns of trees was soon effected, as they fall by their own weight after a very few cuts with the hatchet. I have mentioned the word "maichan," and I may here give some idea of what it is, because a great deal of the topography of this part of the hills, was laid on my plane-table from these "maichans." It is a platform built in the crown of the highest tree on a commanding hill-top. These stations of observation were sometimes as much as 120 feet above the ground; the tree was ascended by a ladder formed of straight saplings, lashed on to the trunk with cane, spars were laid across the forks in the uppermost branches in the crown of the tree, and again laid with bamboo firmly lashed down; this formed a good platform large enough for the surveyor to walk round, his plane-table standing in the centre. Of course, with the slightest breeze, the rolling was considerable; but it was quite possible to cut in one's position, and get rays, and sketch in the country, from such a vantage spot.

The view presented, when on a level with the tops of the forest that stretched sometimes for miles, was very striking, particularly the effect produced on first emerging out of the forest below, where the range of view is confined to a few yards only. It is the most rapid and effectual method of mapping a forest-clad country; clearing such hills to the ground takes many days of hard labour, and can only be resorted to for trigonometrical work. A "maichan" can be built in about six hours by men accustomed to such work as the cutting and splitting of cane and bamboo; and without either one or the other of these useful plants it would be difficult to adopt the method.

Tigasin was much farther than I had imagined, so that after finishing the observations it was late, and before we had got far on our way back, it became very difficult to follow the narrow track. Torches of dry bamboo were made up, and we crept along slowly and down the last rather bad descent into the bed of the Daokikha. It is very disagreeable, fatiguing work, at the end of a long day on foot, thus stumbling over blocks of stone and fallen logs by the uncertain light thrown by a torch: nothing brings out the character sooner, especially a bad one. We waded up the last portion of the way in the bed of the Daokikha, and I was heartily glad when the light of the camp fires

glimmered through the trees, casting their reflections on the water ahead. It was past 9 o'clock when we got in; we had been afoot since daylight, and had got over some 18 miles, and I was not sorry that I had done with Tigin for ever. Many of my men had then to prepare and cook their own dinners, and had not laid down by 12 o'clock. The gloom of these forest camps was quite overpowering; the want of light, the dark sombre green of the foliage, the stillness of the air, and the rank damp smell of decaying vegetation, all intensified the feeling, the only sound that broke the stillness being the murmur of the stream close by and the croaking of frogs. Yet they are not without great beauty; the jagged, denuded surfaces of the grey limestones are set off by the elegant ferns and palms that form the underwood, and by the moss-grown trunks and roots of the trees.

We were now close in under the high scarp of Pundengroo, which rose boldly on the west, the long wall of grey sandstone cliff showing well against the forest at its base, and that which grew up to the edge of its plateau. I had to visit this hill next day, so we took the road to the plains N'a Júgni. Path ascended a short distance over a low hill, where we left the limestone rocks, and descending again into a higher part of the Um Túngkút. Here I noticed coal in fine thick beds, and where the strata at the base of the cliff are very highly inclined. The ascent to Pundengroo is upon the main watershed where it is thrown off from the cliff. This spur, as one nears it, is extremely narrow, and a part, owing to a landslip, is cut right across; it had, however, been bridged with bamboos by the neighbouring villagers, who go up into the forest above for canes; but for this, we should have had great difficulty in getting up. The platform of Pundengroo forms one of the strongest natural positions it is possible to conceive; immediately above the bridge, the path up the scarped side begins, and is very stiff for some 600 feet. I found that the station cleared by Lieutenant Beavan was a very commanding one for plane-tabling, but the tree selected for the theodolite was too high to admit of being observed from, and had in consequence much motion. I had therefore to give up the idea of making it a trigonometrical station, and returned to the valley below, continuing the march over into the valley of the Rongsiang, and encamping at the first water found in the bed of the Sū Hileng tributary. This stream issued from out the limestone, which we soon came upon after crossing the watershed. This formation continued a long way down. The bed of the Rongsiang is broad, and for the greater part of the distance dry, only now and then the water shows itself. The remainder

of the channel, which is seldom less than 50 yards, is exceedingly rough and eaten into curious shaped hollows and holes; during the rains these portions are of course boiling rapids.

The whole valley is forest-clad, and some fine india-rubber trees are to be seen. Just before the junction of the Sen River, the fall of the Rongsiang is considerable, at the same angle as the dip of the limestones, which turn over and disappear far below the upper and newer sandstone series. Close to the junction, the whole body of the water of the Rongsiang issues from a cave in the limestone of the right bank, and thence into a deep pool under the cliff of high-dipping thick-bedded sandstone rock. This pool is noted for the very large number of fish yearly taken out of it by poisoning the water. The fishing was at this time over, but the many old camp fires about, and the remains of temporary sheds and drying frames of bamboo, showed that the fishing employed a large number of people during the month of November. From this pool the river is navigable the whole way to the plains. Cliffs of sandstone occur on the left or western bank, but the spurs on the east are low as they approach it; the scenery is very striking, and it is novel to be thus able to travel by canoe down so small a stream with high hills rising on either hand—a proof of the recent depression the whole range has undergone, and the subsequent silting in the plain and troughs of the lateral valleys.

At the Habiang Gāro village of Mekura, I left the dug-out, and, while waiting for the rest of my men, went in and sat down with the villagers, who soon assembled round me. I made a sketch of an old lady with heavy-laden ears of brass rings, and her likeness being a fair one, I made an impression on them, and had numerous offers from other lookers-on to take their likenesses. As to the old lady, she was so pleased at the notice bestowed upon her, that she said when I rose to depart, on my coolies coming into the place, "What, going so soon? why don't you stay? it is getting late; we can find you a hut." I, however, refused the good lady's offer, and marched on to the open plains, and skirting the base of the hills, encamped in the Bengali village of Pang-gam, lying at the base of spurs thrown off from Marangthang peak (1389 feet), the next station to be visited.

I was on its summit by 8 o'clock the next morning, the 30th, and commenced observing the angles. The haze, however, became so dense, that at last it was very difficult to see the points. Kylas, my most distant ray, could not be seen with the naked eye, and the heliotrope only appeared like a very minute red star in the field of the telescope.

To make matters worse, I was driven nearly distracted by the

heliotrope on Tigasín not showing at all. On the 31st there was no improvement in the state of the peasoup-like atmosphere, and as I had had to send another man off to Tigasín, I determined to go to Head-quarter Camp, to look after matters there, send off the monthly report, and forward supplies of coin to all, to keep the pot boiling.

This office work kept me at Head-quarter Camp until the 5th, when Captain Williamson marched in, and as he wished to see the Mahadeo valley side, and as I had the remaining angles to observe on Marangthang, we decided to go out on that side first, before entering upon our longer trip into the interior of the hills. On the 6th we marched across the plain to the base of the hills, and pitched camp immediately in front of the gorge of the Mahadeo valley, on the right bank of the river, close to the Gāro village of Atashipa.

The Deputy Commissioner was collecting evidence regarding the taxes levied by the Shūshang Zemindar upon the Gāros, which are mostly paid in kind, the amount dependent upon the distance of the village from the base of the hills, and his consequent ability to enforce the payment. Sufficient evidence was produced during these inquiries to show that the so-styled *Raja* was yearly extending his influence, by threats and coercion, farther and farther, and levying tribute from people he could in no way protect or keep in order, while such demands were likely to lead to acts of retaliation on the part of the Gāros, which the British Government might be called on at any time to suppress or punish. It had therefore been proposed by the Commissioner of the district, Colonel Houghton, to take all the hill territory out of the hands of the outlying Zemindars, whose rights over the hill tribes were certainly very questionable, and who had exerted them, there was no doubt, in the name of the East India Company. It was very difficult for the ignorant hill-men to discriminate between the Zemindar and the Company, when he saw the police or sepoy of the latter, march in to burn a village as a retaliation for some raid on the property of the former. And it must not be supposed that the raid upon, or murder of, some Bengali villager originated with the Gāros. Many a tale can be told by them, of detention of their persons or property in the haths, or markets, and against which they had no protection, save revenge. On the 7th I re-ascended Marangthang to finish the observations, and was fortunate in having a lovely clear day, so got through all, with Captain Williamson's assistance recording the angles. This hill is the highest and culminating point on the spur thrown off from the main range at Pundengroo; it rises immediately above the plain 1300 feet, and commands a splendid view over the low

country and the valleys on the north; most of the spurs in its immediate neighbourhood have been cleared for cultivation, and are now regrown with rank high grass, but the steep face on the north is still covered with the primeval forest extending to the main range. This portion of the spur is of Tertiary age, dipping southward, becoming nearly perpendicular at the base of the hills.

On the 8th we rode up the sandy bed of the Mahadeo River, to the village of Emdūng, often proceeding several hundred yards at a time in the bed of the stream; the sand rather treacherous in places. A short distance above Emdūng, which is about 5 miles from the plains, the bed of the river was so obstructed with boulders and rocks, that we had to leave the ponies and proceed on foot, as I was in hopes of reaching the site of the coal-bearing strata, a part of which I had seen at the head of the valley; but from the winding of the river, and the slow rate of progress over slippery rock, and round deep pools of water, there being no other path, it soon became evident we had only time to return to camp, and with other more important work to do, we had to give up further exploration. On the 9th we returned to Nazirpur, taking Lukhipur on the way to observe a few more angles. I had not been able at Marangthang to make out the platform and flagstaff I had set up at this station, and consequently the angle remained unobserved; but as we neared it the cause was very evident—it had been thrown down by cutting it and the supports away at the base. I obtained pretty good proof that it had been done by the Shūshang Raja's herdsmen, who were then at a large buffalo station close by; but it was of little use saying much about the matter. It was one of the many little acts that showed the bad animus of the Bengali of this part, and an example of how a surveyor is impeded. I, however, wrote and requested that a circular might be issued, warning the natives against touching our signal staves, and calling on heads of villages to protect them.

On the 10th, coolies and carts had arrived, and the Head-quarter Camp was moved to the gorge of the Sumessary, above Shūshang, and I selected the beautiful shady tope of trees at Agarkote, on the left bank, as the site of the new encamping ground, which was quiet, with good pure water, on the high dry sandy bank, and away from the bazaar of Shūshang, which I well knew was not likely to make the camp more orderly or more healthy. Williamson had some work to do with the Zemindar. I had to make final arrangements; stores, canoes, and Gāro coolies were collected, and all was ready by the 13th.

On the 14th February we marched away from Agarkote, up the left bank, into the gorge, of the Sumessary, fording it first

near its embouchment into the plains, which landed us under the first terminal spur bounding the river on the right bank. The breadth of the river is here 350 yards, about knee-deep, and flowing with an easy current; but both above and below the ford the depth is greater, and under the banks it is considerable. Fish seemed pretty abundant. The hills on either side for some distance up are low, the highest spur being that thrown off Joksangram, and terminate precipitously just within the gorge. Up to Mutchi Ghat, the Sumessary has a direct course, but it then takes several great bends round a spur from the north-west and south-east; the character of these outer spurs is that of isolated masses rising about 500 to 800 feet above the level of the streams, the connecting ridges being very much lower; the saddles or lower parts, only 50, 100, and 200 feet. The ground, overgrown with dense jungle, is therefore most intricate and difficult to map out. At intervals up the river we passed weirs of stakes and matting, carried quite across the river, with passages left here and there for the fish to pass; these passages were guarded by scoop-nets worked by hand, the fisherman sitting and patiently waiting for the fish as they came up, and raising the lever of his net from time to time; in others basket-work traps are set.

I noticed that the platforms on which the fishermen sit are screened on the lower side, or that from which the fish working up stream would arrive, by matting 4 feet high. The way leads up the bed of the river, as often in the water as over the sandy margin, crossing and recrossing from bank to bank. We stopped about 12 o'clock, to breakfast, at a deep pool called Mutchi Ghat, at the base of a high cliff; the river had here to be crossed, and while breakfast was being cooked, our traps and men were ferried over and the ponies swam across. Some fishermen were here busy at work; in the deep water at the base of the cliffs a series of deep parallel nets were fixed, three to four yards apart; the floats of hollow bamboo, lying flat on the surface, gave notice directly a fish was entangled, and then a man put off in a canoe and took it out; thus we saw several fine specimens caught, and they had made a good bag. The police and men of the survey establishment walked off with fine dinners, Williamson giving the fishermen a present for the whole lot, while we enjoyed a bit of fish broiled for our own breakfast.

At Mutchi Ghat we left the river for a while, ascending and crossing the north-west and south-east spur, striking it again about two miles further up. Scenery very pretty, with striking views of Kylas and the Túra ranges. About 4 o'clock we reached a fine rapid, below Rywuk; this looked so tempting, that

I put up my rod and whipped it for about an hour, taking out about half a dozen nice "mahasir," running from 3 to 5 pounds. The river was low, but at proper seasons the fishing must be splendid. Above this rapid the river assumes a different character, and is for two miles deep and still. The Gāro village of Rywuk is situated about midway, and this short distance we were taken up in a canoe, and it was quite dusk when we reached our tent, which was already pitched on the sands of the left bank. On the 15th a halt was made, for I had to go up to observe at Agal, a point selected by Mr. Belletty. A place was cleared for a depôt camp away out of the bed of the river, among the limestone rocks of the right bank, and a new disposition had to be made. We only took one tent, a small Pāl, and all unnecessary baggage was left behind; thus several coolie loads were saved, and the men carried rice and provisions instead, for we knew that little or nothing was to be obtained when once the Túra range was crossed, until we got into the Gwalpara district of Assam.

The next rapid above Rywuk has a considerable fall, but not sufficient to prevent the passage of canoes (dug-outs); these being dragged up over the boulders close into the bank, or up channels formed by piling boulders taken out of it on either side, and thus allowing the canoe to partially float. Kylas, and the Túra range, here towers above the valley, and forms a splendid background. Got off pretty early for Agal station, the highest, most open point on the sandstone ridge to the west, whence a very fine prospect is to be obtained over the maze of low hills that stretch towards the plains. The spur is thrown off from the high point of Dorengo, and here terminates at the angle formed by the Lookhaee nulla and the Sumessary. On the opposite and eastern side of the valley, at nearly the same level, two broad plateau-topped spurs marked the extension of the horizontal sandstone strata we were standing on; and between the base of the steep slopes of these spurs and the river occurred a considerable belt of level ground with high scrub and grass. These small southern plateaus were isolated from the next sudden rise of 1500 feet in the hills, forming the main high plateau, carrying the elevated mass of stratified rock, Kylas.

Looking westward, a succession of spurs, one beyond the other, given off from the Túra range, met the eye, the strata turning up against it. On several hill-tops, the white pyramidal marks showed the steady advance of the trigonometrical stations, and I was glad to see the trees thinning away on the top of Mimanram, a high point on the main range, which has since been proved to be the highest in the Gāro Hills, viz.

3922 feet. The credit of clearing this is due to Mr. Belletty. Very little cultivation met the eye; some large clearings of forest occurred here and there on the slopes from the Túra range; all the hills southward were covered with jungle, and a few clearings of bamboo marked the whereabouts of man, but no villages were to be made out. Looking up the river north-east, its course was visible far above Rywuk, and both that village and Sejoo were conspicuous on the banks, from the long pented roofs of the houses; such houses are not to be seen in the outer villages. I got a good round of angles in a very short time at Agal. The day was splendid and clear, and the heliotropes flashed brightly. Returning to Rywuk our plans were matured, and we decided to cross the range to Baduri, visiting the new station of Dorengo (also cleared and selected by Mr. Belletty) on our way. The road strikes the ridge of the Agal spur; and on the ascent, Williamson pointed out the site of the first stand made by the Gāros, on an expedition he had accompanied to burn Baduri, some seven years previous, in 1863. The spot was eminently well adapted for a stand; a rugged band of the limestone rocks here crossed the spur, and the only path led through an exceedingly narrow fissure in the rock; the Gāros, however, made a feeble resistance, although the spot was stockaded, and after throwing a few spears, bolted. They again opposed the expeditionary party, on the very steep slope under Dorengo, by rolling large stones down it; but only two or three men and one officer were thus bruised, and they were driven back again. Before we ascended the hill we had breakfast in the last ravine-bed where water is found, none being procurable on the immediate top. On reaching the crest of the range, the baggage was all sent on to an open spot upon the ridge, a short distance further, and near to which on the west side exists a small spring of water. Williamson and myself proceeded to the trigonometrical station of Dorengo, for I had to observe the angles there to Kylas, Wajongkorong, Joksangram, Mimanram, &c. The day was lovely, heliotropes all showing, so this work was soon got over, with Williamson's aid, recording. I worked in my plane-table a reconnaissance of the country, and finished by taking a general sketch of Kylas and the hills to the east.

It was delightfully cool and pleasant at this altitude now, after coming up from the level of the Sumessary valley and Durgapur. On reaching camp, worked until it got dark, inking in the pencil detail on the plane-table, and skinning some birds my collector had brought in. We continued our march the next day to Baduri, descending into one rather deep valley; forest scenery all the way, with some striking views of

Kylas. The charred piles of old Baduri were to be seen still, standing up out of a new growth of rank vegetation. The new village had been erected a few yards off. The headman of the place met us on the road, about a half a mile from it, and no doubt on recognising Williamson remembered the past, and the treatment they had then received; but the fellow, a fine-looking Gāro, was very civil, and the punishment had certainly done no harm.

In the evening, we walked some distance to the westward, through the newly-cleared jooms, where I managed to fix my position and cut in a number of hills to the northward, on rays laid down from Kylas.

The next day's march carried us to Lenksram, and we wound up the day by a rather stiff ascent to the top of a fine cleared hill, whence I could see some fixed points and thus connect my position. The village was situated just above our camp, and is a small outlying hamlet of Darang-Giri.

We had now worked round to the back of the Tūra range; a principal spur, steep on the western face, was here thrown off to the northward; three hills lying upon it marking its very direct direction N.N.E. up to the Sumessary; while another hill and straight line of bluff, on the other and northern bank, marked the continuation of this lateral axis of elevation on that side.

This part of the march lay in the bed of the above small lateral stream, which was very narrow and full of large round blocks, and its steep sides clothed with luxuriant ferns. The Sumessary at this higher part of its course, 25 miles from where we had left it, was a large river nearly waist-deep, in fact with a far greater body of water than is seen at Rywuk, where a large amount no doubt disappears into the many underground channels in the nummulitic limestone. The pools were very deep and very beautiful; in some were large masses of rock, rising out of the water. The stream looked so promising for fishing, that while the loads were passing over on the bamboo raft, and breakfast was preparing, I set up my rod, but without success, although I rose two fine fish.

We pushed on well this day, the 19th, and by sunset got into Dāwā, situated close under the high hill of Mungrhi, which it was desirable to clear for a trigonometrical station.

20th February.—After writing and sending off letters, we made an ascent of Mungrhi, passing up through the fine forest on the western slope. Some 50 men (coolies) were available. I selected the highest and western end of the hill and commenced felling. After we had been there a short time, Judabir, a heliotroper, came in from Shemshang Giri, with 20 men from that village; these were a great addition, and a large

amount of clearing was effected; fine views were presented as the great trees came down, but I could not commence any work, which had to be deferred until the return from another hill I had selected 9 miles to the north-west; but it was very doubtful, situated as it was in the midst of the independent villages, whether we could get there. On the morning of the 21st, just as we had started, in came a small army of men from Shemshang Giri and Negmundal. The Mundal or headman of the former village was among them, and we took him on with us; sending the wood-cutters on with Judabir to the hill-top. Setting aside the importance of getting the hill cleared so soon, it was most satisfactory and encouraging to see that so many of these people will collect and give aid so willingly and readily at the request of our survey chuprasies. It showed that the latter were acting with good address, and that a good feeling existed among the villagers, a people considered so inimical. We proceeded from Dāwā, along the southern face of a ridge running w.n.w., the slopes of which had been a good deal cleared, and large patches of bamboo were then going down before the axe, and terrible stuff it is to pass through when lying on the ground. The path was very uneven, over the many small narrow spurs thrown off to the south. These spread out into a low flat forest-covered country, on the Sumessary; and this expanded above Shemshang Giri into a wide plain backed by the Tūra range. This expanse of open country, with a mean elevation of 1200 feet, is an interesting physical feature, and does not find a counterpart in the adjacent hill country. Thanks to the numerous clearings, I obtained a great number of plane-table fixings, and did a good day's work. In the evening, on a hill near Norek, I put up the theodolite, and took angles to Mungrhi, the flag of which was up, and peak B (Mimanram), but it was so hazy, few natural objects could be intersected. Camp was formed on the bank of the stream, flowing through the village of Norek, a largish village of 25 houses.

22nd February.—Off early at 6 o'clock back to the station of the previous evening, but could do nothing owing to the haze, and returned very disappointed. The headman of this place had to pay up his arrears of revenue, he was very reluctant over it, made feeble excuses, just short of refusal, and after causing great delay, complied. Williamson (who had shown most praiseworthy patience with the fellow, who was negatively impertinent, and whom a good smack in the face would have done much good, and brought him to his senses) then asked him to accompany us and show the way on to the next village. The fellow said he must go and get some rice for the journey,

and went off to his house across the stream, to comply as we supposed, but immediately bolted; this was the sign to the whole village, who followed his example in a general stampede into the dense jungle around, with the exception of one man who happened at the time to be standing amongst our retainers, and he was instantly secured, to point out the road to Rangap Giri.

Now was shown the first signs of discontent and unwillingness on the part of the mundals of the different villages, who up to the previous day had been most communicative. They began to say that they did not know the road, they could not go on; and while Williamson and I trudged on in front, they lagged behind the laden Khāsis, and we had at last to stop to let them come up. A long talk ensued, every kind of excuse was made, defeated by Williamson's arguments; they then stated that their independent Gāros were up, and even tried to frighten us by suddenly remembering that small-pox was raging in the next villages. While this waste of words was going on, the only guide, the man of Norek, watching his opportunity, dashed off into the scrubby jungle, and was immediately out of view. This was rather awkward, for no one knew the way; the path we were on being a mere track, which might only lead to some distant and freshly-cleared ground.

It being past 10 o'clock, we made the usual halt for breakfast; Williamson and I, discussing the turn of events, during the meal, determined to push on and find the way in the best manner we could. Such delays were very serious, and were greatly against our doing much exploration; our supplies of food could only last a certain number of days, and our base was daily farther off.

Very fortunately, when the meal was over, and loads repacked, two men came along the road from the side of Rangap; they did not bolt as we expected, but turned back with us, showing the way as far as a hill above the village, on to which I went to observe from. The laden coolies rested below. Huri Sing, a head constable, who spoke Gāro well, was sent with a villager into Rangap, to see if he could get a guide or two, to show the way to the hill Shokadūm: he returned, saying he could only see 7 or 8 men in the place, all the women and children having left it.

On rejoining the coolies at the foot of the hill, the mundals actually proposed that we should return to Norek, although they in the first instance had recommended the route viâ Rangap, declaring the independent men would oppose our advance. Williamson told them that if they would not show the southern road to Shemshang Giri we would find it ourselves, and failing, could find our way (the one we had come by)

ourselves without their aid, and that therefore they might go off at once, so disgusted was he with their conduct. This shamed most of them, and the Bong-kong Giri and Dāwā mundals went down the hill-side towards Rangap Giri, and we followed behind them. The mundal of Shemshang, who had been the worst and greatest liar of the lot, hung back to the last.

About half-way down the descent into the little valley we met 3 or 4 men with spears, and they turned back with us. Arriving in view of the open space near the village, a small stream separating us, we found all the men were out, armed with spears and swords to the number of about 40, who called out and made signs for us to stop. We walked on up to the stream, when the headman, to our surprise, came forward with 3 rupees in his hand to present as a nuzzurana, and his men I observed all laid down their spears on the ground for a second or two, then raised them and came crowding round us as soon as Williamson had accepted the present.

On being told that we wanted the road shown to the next village, they waved their swords and shouted; eight of the younger men ran to the front, and started on before us into the jungle path. The whole matter now seemed simple enough; they were very naturally suspicious of *our* movements and visit, and believed *we* were quite ready to commit mischief, as all armed parties visiting them from afar would do, according to their past experience; a return on our part they would have construed into fear, and could not be thought of. Such meetings are always very ticklish affairs, and an *émeute* may occur in a moment, and like a spark swell into great proportions; while every village around would be up in a few hours, and easily cut off and render the retirement of a small party very hazardous work, especially when night set in.

We reached the second village situated on the Rangap river, from which these hamlets take their name, and here the brutes of mundals from the outer villages again gave trouble, and wanted to push on out of the place. Their apparent anxiety and forebodings were of course very unpleasant, and had a tendency to frighten the porters, on whom we depended for everything. We decided that whatever designs the independent Gāros might have, it was the best course to remain in the village than go on late and pitch in the open. So we chose a spot in the village street, close to the large house of the men, or bolbang, and thus ended my first introduction to an independent Gāro village. The night passed off perfectly quiet, the people not making themselves even troublesome by curiosity. We took all precautions against any surprise, and kept half the guard with the arms, while the other moiety

cooked by the river-side below. We were off pretty early the next morning, and at this hour the cold was very great, from the low situation of the village in the damp, wooded ravine. Williamson presented the old lukmah with a pugri and a cloth; and the dirty old ruffian looked quite respectable after they were put on. Some of the men then wanted to see the breech-loaders fired, and Williamson smashed a bottle and fired at a tree for their amusement, each successful shot being received with a yell of delight. We then marched off for Bong-kong Giri, whose lukmah, as well as Rangap, desired to pay a nuzzurana; these village communities are closely connected, and they look to each other for example; and thus Rangap having owned allegiance, Bong-kong and Rong-reng followed suit. Here two or three of the obstructive lukmahs (headmen) were sent to the right about, and told to go to their homes, which proved the greatest blessing. The Baduri man, however, begged to be taken on, and seemed to be ashamed of the part he had been lately playing. With the lukmah of Negmundal all was plain sailing, and but little prevarication went on.

In Bong-kong Giri I saw the first Gāro wearing a kind of crown ornamented with tinsel, the honourable distinction of a man who has taken a life in a fight or otherwise; one only finds them worn in the independent villages.

From Bong-kong Giri we marched through a very level tract of grass and forest trees, to the banks of the Sumessary, or Shemshang, as it is called in this upper part of its course. Some very fine "sal" timber is to be seen here, and it is the principal forest tree.

The Shemshang is at this place a quiet stream about 30 yards wide and knee-deep, with low banks of sandstone. The forest is thinner in parts here, with open glades of high grass.

After fording the river, in which we had a delicious bathe before breakfast, we passed over the flat ground on the south, which soon gradually ascended and crossed a low spur, and our path dropped into the gorge of the Chibok, up which a short distance is the village of Negmundal, two miles distant on the right bank and about 150 feet above the river; this had now very little water, but its broad, bouldery bed showed that it was one of the large feeders of the Shemshang that rise in the main Túra range.

The spurs on either side were here steep, and covered with primeval forest, extending thence to the summit of the range, six miles direct distance to the south. The day was very hot, and we were glad to sit awhile in one of the larger houses of the place. Williamson's turn for work had now arrived, and

he was busily taking down the deposition of the headman and others, relative to the Raja of Shūshang's people, who has been gradually extending his influence farther and farther into the hills, and requiring annual payment from these Gāros, varying in amount and kind; failing which, threats of punishment had been undoubtedly held out, such as the *assessment* of their cultivated lands, and persecution in the markets of the plains. The lukmah here agreed to take us on to Surramphang Hath, a place where a large annual market is held, but only attended by Gāros. No Bengalis from the plains are ever allowed to attend it, either as buyers or sellers; produce and commodities from the plains are brought up by the outer Gāros; cotton being exchanged on the part of the interior villagers. Among other things taken by the latter are large numbers of dogs, which are fattened and eaten. We saw a great number of these at Rywuk when on our return, the people were then getting the supply ready. Colonel Houghton, the Commissioner, had been very desirous that this market-place should be discovered and its position fixed, and it was a most satisfactory victory over the scruples of these Gāros, and the lying stories they had told of its position, with the difficulties that would attend our getting there; this victory was solely gained at the expense of long and continued talking. Leaving the bed of the Chibok, we followed a low ridge overlooking the flat ground in the Shemshang, passing through large clearings of "sal" forest where splendid timber had been felled and burnt; at three miles we reached the river, where, on the opposite high bank, was situated the village of Rong-reng Giri, the nearest to the hath, on the east. The river was here still navigable for small canoes during the rains, but at this season the rapids, which occur at intervals between the large deep pools, are shallow, and it would be too laborious work to drag them over such places.

Fording the river here, we pitched the tent in the village; raised clear above the forest on the high bank, the peaks on the Tūra range could be seen, and enabled me to cut in its position with accuracy.

At 7 o'clock the next morning, the 24th, we left for the hath, leaving all the coolies in the village, and four constables in charge. The largest and most powerful independent village, viz. Dilmagiri, is close to Surramphang, and it was very necessary to be guarded, in how we entered it; it can never be contemplated what wild tribes like these may do to oppose a party. Our total number of police, armed with muskets, was only 17, two head constables and an inspector, leaving very little margin as guard in camp for a "dour" of this kind, and the

worst to fear is a panic among the porters. Recrossing the river we marched through the forest on the south bank of the Shemshang in a westerly direction, taking a short detour round by a mere forest track. The forest was here principally of "sal," with scarcely any underwood; grass growing about two feet high. An hour and a quarter's walking brought us at last to Surramphang, close to the right bank of the Shemshang.

There was nothing very remarkable about the place; no market had been held, it was evident, for a long time, and but for the few low huts, no one would have supposed it to be a market-place. The Shemshang murmured over its bouldery bed, and the forest trees towering up around shut out the view to the southward. On the opposite bank was Samandal, and one or two men were seen, who shouting out a warning, vanished.

The place is named from a tree called the Surram, compounded with the preposition "phang," below. After I had marked off our route by bearing and distance on the plane-table, and got the bearing from the guides, of several independent villages lying near, we retraced our steps to Rong-reng Giri, our party not being strong enough to bear the rise of the numerous independent villages we had now got among, and of whom nothing was known. Fixing the position of the hath was more than we had ever expected to do.

The Government policy is to keep quiet with these people, and not to bring on a row if it can be avoided; to this policy Williamson has to act up, much against his own wish and feelings, for sooner or later the pressure has to be brought to bear, owing to some unprovoked murder case, or attack on some neighbouring village by one of its independent neighbours.

On returning to Rong-reng Giri, we had a fine swim in the pool, then breakfasted, and started back eastward, following the regular hath road the whole day—sal forests, more or less open, with glades of grass—and crossing a few bouldery ravine beds from the Túra hills.

At Shemshang the river is very sluggish, with bouldery bottom, and numerous "dug-outs" were seen, which are much used during the rains. The place consists of three separate hamlets on the right bank, the middle one situated just east of the junction of the Chibok. Close beyond this we had to cross the river to the other bank to avoid the rather long southerly bend of the river. At the crossing, the river was deep, and men and baggage had to be ferried over in canoes. The banks were here of sandstone, about 30 feet to 50 feet high. Pea-fowl were very plentiful; and several were bagged. In going after one I had a very narrow escape from being spiked in a pitfall made

for deer, in a run leading to a patch of cultivation; very fortunately I slipped in near the edge, and fell between the side and the sharpened bamboo stakes. These pitfalls are very dangerous, and the following season a Gāro woman met her death from one, under the following unfortunate circumstances: The survey party coming suddenly into a patch of cultivation, the Gāros weeding it, bolted, as they usually do; this woman, in her fright taking the line of the pitfall, received a spike right through the femoral artery of the leg, and bled to death in a few minutes.

25th February.—Before leaving Shemshang, I had to pay up the wood-cutters who had cleared the hill of Mungrhi; the payments I always made with my own hand to the men themselves, never allowing the money to pass through the hands of any native of the establishment—a rule that should always be followed with a new people such as the Gāros. Getting a shot every now and then at pea-fowl, we got back into Dāwā about 11 o'clock, meeting the men with letters half-way. After breakfasting, I went on up to the station at Mungrhi to observe the angles; the day was fortunately clear, and this was very soon got over.

26th February.—Marched at 8 o'clock over Mungrhi, and then along its northern spur to Doboo, through virgin forest. Crossed the Lenkra stream close to the village; this receives a number of small rivulets taking their rise some six miles north. We followed the Lenkra for about 3 miles, and then turned up into the lately cleared ridges, between that and the Rūngüt, another tributary of the Sumessary. Several low conical hills were seen from here to the northward, and marked the main watershed of the hills; while the summits of others, far down on the north base of the range, were also visible. In this respect the country here much resembled that to the north of Jaintia, but the vegetation is very different here; sal replaces the oak and fir of the eastern hills. The low, narrow ridges we were on ramified in every direction, trending to the south, having steep sides and sluggish boggy watercourses between them, where bamboo grew in great luxuriance, mixed with tree growth. The larger streams, like the Rūngüt, flow in broad flat valleys, and on the slopes on either side, the sal forest comes in, extending here and there into the open grassy belt. Looking towards the east or Khāsi side, the line of horizon was very flat, a bluff marking the fall into the Sumessary drainage.

On the 27th we got into the valley of the Rūngüt, and passed through the two hamlets of Daroo Giri, following the stream for 5 miles, our path often through high grass, which must be

a swamp in the rainy season. Then reaching another small collection of houses, forming part of Daroo Giri, we left the Rūngūt on our left, and ascended the low ridge, where I obtained a fine point of view and survey station on one of the low conical points we had seen the previous evening. These higher masses are bosses of gneiss, harder than the rest of the circumjacent rock, and have thus withstood the effects of denudation, like the fine mass of Kollong in the North Khāsi Hills. The ridges we were now on had a strike E.N.E. and fell abruptly on the north, throwing off innumerable parallel narrow spurs to the south only. Immediately below, on the north, was a flat grassy expanse, triangular in shape, and in which I found was both the source of the Rūngūt and the Chichira, a large stream flowing into the Gwalpara district and the Brahmaputra. This flat valley was bounded on the west by a steep hill of gneiss, and this continuing W.S.W. was connected with Shokadum, and marked the western extension of the main watershed; the continuity of which eastward, as a mountain feature, is here broken.

We encamped in the large village of Rong-reng. The people were civil. Jungle fowl were numerous around the village. The next day we followed down the valley of the Chichira; fine sal timber seen here, hills rising abruptly from the valley on either hand. Nearing Gabul, about five miles down, we left the river, crossed a low spur, and pitched tent in that village. Williamson and I, after some breakfast, marched on to Mejpgiri,* a village some thirteen miles from the plains on the north, in order that we might lay down the road the whole way across the hills.

From the top of the ridge we obtained a fine view to the northward and to a great distance westward, for this point lies upon the edge of the northern slope, and overlooks the valley of the Brahmaputra, and the valleys below us on the north could be followed from their source into the plain. The little and new swift (*Cypselus infumatus*, Sclater; *tectorum* of Jerdon) was here extremely numerous, and exceedingly fearless; their nests were built in the palm thatch of the houses, about the eaves and on the gable ends, no higher than the head of a person sitting about the entrance. I took them off the nest with my hand, and kept a couple as specimens, which I could see the Gāros did not quite like. By the time we got back to our tent in the village of Gabul, we had done a good 18 miles.

1st March.—The supplies not having arrived from Gwalpara,

* Mejpgiri is a large village, and the residence of a mundal, who was rather astonished to see us arrive.

a halt was made; but at two o'clock I started down the little valley in which Gabul is situated, and ascended the hill on the east, to fix its position and cut in some of the points around. I was rewarded by another fine view of the surrounding hills.

On returning to camp, I found our fresh supplies had come in. Williamson, who had been ailing the last day or two, was here rather unwell, and I was uneasy lest he should get fever, which takes such a serious form in these jungles.

All being ready for our return journey to Shūshang, we got off about 8 A.M. on the 2nd March. Our road lay for a short distance up the Chichira, when we turned off to the east, through some rather dense jungle, to the village of Dambo, situated on a good-sized stream from the north-west, called the Mandu, and which is the principal feeder of the Chichira. While Williamson remained in the village of Dambo, taking depositions, and receiving the annual payments, &c., I crossed the river and ascended the steep scarp opposite; and to the south-east, in a clearing on the top, I got a fine and extensive view up the Mandu valley, bounded on both sides with very steep forest-clad slopes. On returning to the village we followed the northern base of the porphyritic granite ridge, and by 5 P.M. reached the village of Rong-reng, which we had previously encamped in. From here we determined to follow a new line of country, and visit and take over the independent village of Nongsram, where a market is occasionally held. The road out of Rong-reng lay due south, up a ravine draining to the north, jungle much mixed with bamboos, and showing in places that it had been cleared many years back; some of it was now undergoing a second cutting. Crossed the main watershed by a low gully, and the path then lay down a wooded ravine, thence into an open valley of grass interspersed with sal.

Path excellent all the way to Nongsram, a finely built Gāro village, situated at the junction of the small stream, called the Rongra, that we had been following down, and the larger, the Rungdi, from the north-west. We had heard that Nongsram, hitherto independent, would, if visited by the Deputy Commissioner of the Gāro Hills, own allegiance like all those in their neighbourhood.

The headman in due time produced his nuzir, his déposition about different matters, and a certain murder case was taken down; and after breakfasting, we proceeded due south down a small valley, the Rongdu, running parallel to and east of the Rungdi, about half-way to Swang-giri; we ascended by some very steep paths into the large clearing, and got in a good deal of country.

Swang-giri turned out to be a very large village, paying revenue to the "seem" or chief of Nongstoin. It is situated close above the junction of a large stream from the north-east, which rises in the Khāsi country, and is called the Dat river. Steep bluffs rise very suddenly here on the east, and tower above the village. Crossing this, the path became bad, and after passing some old clearing, we descended, following the bouldery beds of watercourses until we got into a more open valley; it was dusk the latter part of our journey, and the deep ravines, shaded by high trees and ferns, soon became very dark, so that some of the things got into Sudu-giri very late. This was a very small place of some half-dozen houses, another small part lying about a mile off to the north-east.

We had now got to the confines of a thoroughly forest country. On all sides, dense high forest that had never been touched by axe met the view. Through this we marched the whole of the next day, the 4th of March, crossing one high flat plateau descending into the level of the Rengchi, flowing south-west to join the Sumessary. Our path ran with the course, oftener in it than out of it; the fall very gradual, long still shallow reaches, with sandy bottoms, separated by gravelly bouldery falls. Just before reaching the junction with the Sumessary, the roar of whose waters we could hear, we struck up over a ridge, and descended again upon that river at a place called Kūrchú (now deserted). The scenery was here very grand, and during the height of the rains must be truly so; the whole body of the water is thrown over a steep and sudden ridge of gneiss, which strikes east and west across the bed, into a large deep pool below. At this time of the year, the reduced amount of water finds its way through a deep cut or groove by several small falls on the right bank. The bed of the Shemshang in this gorge is choked with enormous sub-angular blocks of gneiss and sandstone; the former from the right or west, the latter from the left, or east, bank. In this deep north and south gorge, it makes its great fall to the very low level at Sèju, some 700 or 800 feet, in 10 miles. We here left the river and ascended the hill-side, and encamped in the jungle close to a small ravine with water, on a plateau to the north of the Rong-kai valley. Owing to the forest and the low grounds we had passed through, surveying was hopeless work, save by compass-bearing and timing the distance.

Descended into the Rong-kai, a fine gorge in the hills, bounded by precipitous cliffs on both sides; higher up towards its source, near the Nongmen, it is known as the Mairam, and is densely wooded for its whole course. The river was crossed by bamboo rafts, in deep still water. Both above and below this

point, precipitous rocks closed in the bed of the Rong-kai, so that it was impossible to follow it in either direction. The ascent from here was very steep, until we gained the top of a spur thrown off from Kylas, which we now saw again before us. I obtained a splendid point for sketching in the country, in a clearing at the end of this spur overlooking the valleys of the Sumessary and the Rong-kai, and squared up a large area. Rūngshū, where we breakfasted, was a short way along the same spur, and was a rather large place, with one or two well-built "bolbangs." That evening we got to the base of Kylas, to the site of my old camp, and pitched tent in the same spot in the dark sombre forest.

Started very early for Kylas, but on reaching the trigonometrical station, found the atmosphere frightfully thick from combined haze and the smoke of jungle fires; for all the clearings made during the cold season, and now well dried, are fired at this time. Many and many an hour of precious time have I lost waiting for a fall of rain to clear the air, and triangulation was in consequence terribly impeded after February. There was nothing to be done but to leave the remaining supplementary angles unobserved, and we returned, struck camp, and went back to Rūngshū. My fellow-traveller had, however, seen and enjoyed the magnificent view from Kylas; for haze, although against instrumental work, adds not a little beauty to mountain scenery, especially in the early part of the day.

On the 7th, descended through fine wooded slopes to Sèju on the Sumessary, a fine large village on the right bank; made a sketch of it while breakfast was preparing and the coolies and baggage were being ferried over. Capt. Williamson had now to see into a murder case; information regarding it had been accumulating, and we heard that the murderers were in the upper village of Sèju, and we were paddled up the deep reach in a "dug-out," with some police in another, and landing, the headman was called on to produce them; we had a great deal of talk, and the men not being produced or found, the headman was made a prisoner. I rather pitied the poor old man, for his own son was one of the murderers; and still more did I do so when I afterwards saw the son, a fine athletic young fellow and one of the best types of Gāro I had seen. Limestone slopes are not to be passed without a search for shells, and I made an examination in the shady side above the pool; their plenty is quite astonishing, and I collected in about a quarter of an hour some twelve different species, though none new, as I had previously obtained them in like ground elsewhere. After thus testing the molluscan wealth of the limestone rocks, the minuteness of some of the shells appearing to give

great amusement to my companion, whom I enlisted in my service as collector, we turned our attention to the rapid below the pool. I put up my rod and got good sport, taking one mahseer and nine basa, the last a siluroid fish, running about $1\frac{1}{2}$ lb., which I had never yet seen rise to fly. They came at it most ravenously and afforded much sport, fighting most actively and vigorously. This would be a splendid fishing river later on after the first freshets. About 2 P.M. we dropped down the Sumessary in canoes to Rywuk, reaching our old camp just about sundown, thus completing the circuit of our most interesting and pleasant tour; and who would not envy the life of a surveyor or district officer in a mountain district of India? However hard the work, or however detrimental it may be to the constitution, it has charms and excitement no other kind of life can produce.

The 8th was our last day in the hills. Kundahs (dug-outs) fastened together into rafts took the whole party down the river to Shūshang; at the pool below Rywuk I took some parting casts, and landed some nice mahseer, one of which was rapidly transferred to the pot.

Williamson's work was completed by the police bringing in the two men concerned in the murder case, who had given themselves up, owing to the pressure brought to bear on them by the rest of their own community, and being now secured, the old headman was released.

The son was, at Shūshang, handed over to a party of the Khāsi police, who had some time previously come round to apprehend the men; for the murder having taken place in the Khāsi district at a village called Nongsopha, the murderers were well known, and had been seen.

It was the old story—revenge for some former wrong. I left India soon after, and so never learnt the fate of the well-made young fellow, who, unmindful of the terrible position he was in, poled our raft the greater part of the way down the river. One could not blame him; the part he had played was a part and parcel of a Gāro's duty, probably instilled into him by his own mother, and considered a right and honourable act by the men of his race. Is it right in us to carry out the full penalty of the law upon these wild tribes? and is it not best to attempt their improvement in the Andamans? where, if not improved, they can at least be made useful, until their natural death. Never tired of the ever-changing and lovely views as we dropped down the winding Sumessary—Kylas and the Tūra ever towering in the background—we got into Agarkote just after dark, and thus passed away the last hours of the reconnaissance we had made.

GEOLOGICAL APPENDIX.

THE geological formations of the country are the same as seen in the Khāsi Hills, and have been described by Mr. H. B. Medlicott in a report entitled "On the Prospects of Useful Coal being obtained in the Garrow Hills, Bengal," and in his "Geological Sketch of the Shillong Plateau." We have a considerable thickness of cretaceous rocks resting on gneiss, capped by nummulitic limestone and later tertiary sandstones. These last, forming a very narrow belt at the base of the Khāsi Hills, here further west, form a broad belt of low ridges between the high metamorphic ridges and the plains. The section in the Um Blay, near Puna Tith, has been fully described by Mr. Medlicott, and I would refer the reader to his account of it. I followed up the first large tributary from the north-east after entering the hills, for about a quarter of a mile, to where the secondary sandstone forming the spur on the left bank ended, and is clearly seen abutting against a steep surface of the amygdaloid trap (the Sylhet trap of Medlicott). The massive distinctly-marked flows of this rock dipped 20° northerly, and rose from here on both sides of the ravine precipitously and high above the sedimentary rocks. These last have a very slight inclination south, and appear to be here quite cut off by the trap. This point is the most westerly known extension of the Sylhet trap, for I have never come across it in the Gāro Hills in any part I have visited, and I do not think it will be met with there; it occurs, too, where a decided change in the physical aspect of the whole mountain mass westward takes place, where the sedimentary rocks are less disturbed, and less elevated above the sea-level.

I found fossils in the same relative position as those mentioned by Mr. Medlicott, viz. in the lowest beds; these differ much in composition from the lowest beds we find a short distance north and west, where they rest immediately on the gneiss. The fossils were by no means numerous, but scattered through the rock here and there, so that it would take many days of hard stone-breaking to make anything of a collection. The secondary sandstone rises in a precipitous bluff to the west of Puna Tith, overhanging the Um Kanchiang River, and a broad plateau of hard sandstone beds, covered with scanty grass and but few trees, extends all the way to Nongkulang. Only in one place was a thin outline of nummulitic limestone seen; but at Mac-ma Si, about 2 miles north-east of, and with the rise in, the Nongkulang Hill, it is seen in considerable thickness, 420 feet, the lowest bed at base of the hill being 1340 feet above the sea. At 1760 feet fossiliferous sandstones succeed, and of these 150 to 200 feet cap the ridge, and are richer in the higher beds. There is a decided thickening of these sandstones south of the ridge, within a very short distance, for massive bedded, coarser, and non-fossiliferous beds come in, resting on limestone, the upper level of which is reduced to 1480 feet, and this difference of 280 feet is greater than the low dip of about 5° will allow for, and marks an unconformity in the two deposits. The above section is seen in the first large ravine on path to Purjonkha. A ridge of secondary sandstone bounds this on the west, and crossing it, the nummulitic limestone is seen again dipping 18° west, marking a low north and south roll in the beds.

A very interesting section is presented under Pundengroo; the steep scarp of this hill bears north and south, rising some 1700 feet from the bed of the Um Túngkút, a tributary of the Um Blay. In the bed of this river rolled pebbles of gneiss occur, and 200 yards from its junction with the Daokikha the limestone beds are seen, and turn up at 15° N.N.E.: it is here of no great thickness, perhaps 200 feet, and rests apparently conformable on secondary sandstone, as one ascends the ravine; the section is then lost, but a quarter

of a mile further on in the bed of the same ravine, where the path strikes it, the sandstones, now close under the scarp, are as much as 70° , and 200 yards further are perpendicular, strike N.N.W. Coal-beds here occur, and an excellent section is exposed in the bed of the stream and on the steep left bank. The section measured here from E.N.E. to W.S.W. :—

	Feet. In.
Sandstone	unknown.
Coal	4 0
Sandstone	6 6
Coal	6 0
Sandstone	10 0
Coal	8 0
Sandstone	18 0
Thin carbonic shale	0 9
Sandstone	7 0
Coal	3 0
Sandstone	unknown.

Or about 20 feet of coal, for the beds are not very regular in thickness.

This north and south uniclinal bend of the whole mass of sedimentary rocks has consequently produced the Pundengroo scarp, such a marked physical feature of the country, and carried the secondary rocks to a much higher level than they are found on the east towards Pūna Tith. Following the ravine up above the coal section, the massive sandstones are reduced in dip to 30° E.N.E., and rest on gneiss, and a short distance further, at the base of the scarp, are almost level. Near the top of the scarp some inferior shaly coal was seen lying about on the surface occurring in the highest beds, but the nummulitic limestone does not occur, and is nowhere seen on the ridge all the way to Kylas, and not until we reach the valley of the Sumessary, denudation having removed it and the highest beds of the cretaceous rocks.

East of Pundengroo is the deep valley of the Mahadeo River. The limestone was seen in its usual position above Emdūng, 5 miles from its embouchment into the plains, dipping 25° south. I was unable to follow the valley higher, and to observe the section near the junction with the secondary formation. In the fine cliff sections exposed at the extreme head of the valley, coal was seen in extensive beds, and ten well-marked ones were counted. The cliffs cannot be less than 1000 feet high. The thickest bed, certainly not less than 10 feet, lay about half-way up, with two well-defined beds of less thickness just above and within 30 or 40 feet of it. Time did not admit of a closer inspection; it would have been a long and difficult matter selecting and opening a path into the deep gorge where this section is to be seen. Here is the finest and most extensive development of the cretaceous coal in this part of the hills; and from the appearance of the beds and the long distance they can be traced along the face of the cliff, I am inclined to think they may at some future time be turned to profitable account. That in this area they have a considerable horizontal extension is proved by their presence along the line of ridge to Pundengroo, in the Bao Tith or Um Tith just north of that hill, where the bed of the stream is full of large blocks of coal brought down from above. 10 miles east, near Nongkerasi, north of Nongkulang, the section mentioned in a former paper,* finds an equally thick coal series which thins out on the east. It is certainly the most extensive cretaceous coal deposit in the Khāsi-Gāro Range; unfortunately the beds lie in a part of the hills almost uninhabited, and are at a somewhat considerable distance from the plains; the distance is, however, less than from the beds of nummulitic coal at Cherra

* In the 'Journ. Asiat. Soc. of Bengal,' 1870.

Poonjee to the base of the hills at Teria, to where coal is taken in small quantities, and the descent is much less. The beds in the Mahadeo valley are greater in extent than the Cherra coal-beds, and are the most accessible, if a road were made to Emding, water communication with the plains existing here for several months in the year.

In the Gonassery the sections exposed along the outer line of the hills, showed the tertiary rocks to dip about 60° south, the dip increasing towards the plains. These sandstones continue the whole way to above Kūnchūng, thick-bedded and soft, mostly of a pale grey colour, with but few strings of pebbles. The high dip seen in the outermost section sinks to 10° s. and s.s.w., here and there almost horizontal, and I did not observe a northerly dip; a series the whole way of low unclinal waves. At Kūnchūng a dip of 20° was succeeded by nearly horizontal strata; two miles above Kūnchūng more shaly and finer beds are seen, and a salt-spring occurs. Just beyond this, the nummulitic limestone is separated from the thick-bedded tertiary sandstone, by a considerable thickness of hard, blue, nodular clays, dipping 65° to 70° south-westward. The limestone that succeeds is of great thickness, and the bed of the stream, which has cut its way through it, becomes quite impassable. The limestone beds, at first dipping 50° , bend sharply over for 200 yards, with a low northerly underlie, and again resume the original high south and westerly inclination.

The steep spur that has to be ascended to avoid the rocky bed of the river, is of secondary rock, and the path descends to the junction of the Rūngnú, a large stream; this and the Gonassery mark the junction with the metamorphic rocks. The salient angle between the two rivers is a steep slope of gneiss, the edge of a considerable plateau, on which rises the imposing mass of Kylas, secondary sandstone, nearly horizontal and 500 feet thick. Immediately north of the village of Chikmūng is another but smaller mass of the same formation, called Daogūrūng, and between that and Kylas is a road to Rūngshū and the valley of the Sumessary. No coal is seen in the Gonassery section of the secondary series. Between the edge of the metamorphic plateau and the base of the sandstone mass, the lowest beds are seen in outliers near Chikmūng; they consist of coarse blue and purple sandstone with quartz pebbles of small size, very hard and compact where it rests immediately on the gneiss, and might be taken for it on a casual glance. It is quite similar to some beds at base of secondary series seen on the high plateau of the Khāsi Hills to the east and north-east. Crossing the watershed at the head of the Gonassery, the secondary sandstones are found dipping towards the east, still resting on the gneiss; this upthrow carries them to a higher level than at Daogūrūng, and finally they overtop all at Kylas, the uppermost beds being as high as the highest part of the Western Tūra range of the metamorphic rocks. The upper beds are fine and contain very few pebbles. Near the eastern summit of Kylas, at 2341 feet, very thin carbonaceous shales are met with on the path, showing that the coal fines out westward. North of Kylas, near Rūngshū, the cretaceous rocks occur in two outliers upon the metamorphic spur, gradually falling with a low northerly dip. On the west they bend over in that direction sharply, and disappear under the horizontal nummulitic and newer sandstone in the valley of the Sumessary near Rywuk, *vide* section sketched in Mr. H. B. Medicott's paper. To the west of the Sumessary, north of Rywuk, cretaceous sandstone again composes some outlying masses at a high level near Baduri, and on descending into the valley of the Rūngnú, north of the metamorphic axis of elevation, they are met with again at a far lower level considerably disturbed with a high s.s.w. dip; following this valley up to Lenksram, it thinly caps the hills on the north, and continues to Chibong Giri, occurring upon a N.N.E.-S.S.W. minor lateral axis of elevation in three conspicuous thick outliers. West of this, at Chibong

Giri, thin beds cap the metamorphic, and have a westerly roll. All these lowest beds north of the main Túra axis are much changed in composition, are much finer, and show a considerable thickness of a pure, white, soapy, kaolin-like rock. North of Chibong Giri the sandstone terminates abruptly with the Shemshang River, which has cut down into the gneiss. North of Kütchú, on the Sumessary, the secondary sandstones have the same relative low position, and are horizontal, the steep extremely straight lines of bluff in which the plateau terminates, giving a very characteristic appearance to this part of the river. Still higher up the Shemshang, horizontal sections are seen in the low banks of that river up to Rong-reng Giri; but closer into the main range of the Túra they dip south, and such a section can be seen near the junction of the Rungrhi with the Sumessary on the path to Surrampang, where it is 20°. The general horizontality of the sandstones has given the country on the Upper Shemshang the character of a flat, wide, open valley of considerable extent—a good example of how physical features are affected by geological structure. On the north bank, the plain is a good deal cut up by small ravines concealed by the forest that covers the country. The extreme northern boundary of the sedimentary rocks is, however, reached with the ridge of gneiss running from the conspicuous and isolated hill of Mungrhi to Shokadam; a section at the junction was not obtained, but such a sudden termination of horizontal beds would probably be against a rather steep face of the metamorphics. Mungrhi is gneiss of the kind seen in the Khāsi Hills, of which Kollong rock is a good example (porphyritic).

The Mungrhi mass extends thence in a direct north-easterly direction, and forms the northern steep scarp bounding the Mandu River, carrying it directly into the same relative position this rock holds in the northern face of the Khāsi Hills. From this ridge (the main watershed) the whole extent of hill-country is of the metamorphic rocks. It differs in one respect from the Khāsi side—no intrusive rocks were seen. I traversed the whole line to Mejpgiri along the valley of the Chichira, where, if trap occurs at all, it could not fail to show in the débris on either side of the valley or in the bed of the river.

The beds seen above the nummulitic limestone near Rywuk, and which compose the Agal ridge to the west of the Sumessary, are the same as the supra-nummulitic first noticed by me at Nongkulang, and I propose to designate them the Nongkulang series; the fossils are identical. It is here quite conformable, no local unconformability being seen, as occurs in one or two spots on the east. Also over a large area, no marked line of separation can be found between the nummulitic limestone and the cretaceous sandstones; they appear quite conformable.

There is evidence, I think, in all the sections, that the cretaceous rocks were deposited on an originally sloping surface of the metamorphics; that the isolated masses of stratified rocks now seen dotted about the country owe their origin and permanence to very local elevations on the upheaval of the whole mountain system, and, being more yielding, were carried up, falling over into more or less sudden uniaxial bends. The steady dip of the strata away from Kylas, seen east and west of it, particularly on the south, is an instance of a very local dome-like upheaval of that mass. The unequal elevation of the whole range has produced the north and south dislocations marked by the great and repeated changes of level in the base of the sedimentary rocks so well displayed at Pundengroo, at the head of the Mahadeo, and between Kylas and Daogürung, these marked also by the lateral valleys. The Sumessary marks the greatest line of rupture, all the sedimentary deposits being greatly lower on the west than on the east; and this line is continuous, taken up by the courses of Rungdi and Chichira to Damra, at the base of the hill system on the north. Medlicott's conjecture of a bend in the crystalline rocks at Sèju to form the base of Kylas, and thus bringing in the cretaceous, is proved correct.

In this section of the hills, we have, looking at their general physical construction, two main lines of elevation,—the northern and principal from Laubersat, on the main watershed of the range on the south-east, continuing north-west to Damra and Gwalpara; the southern, the Túra, from Nongkulang, Kylas, Mimanram, with a direction from E.S.E. to W.N.W. Intermediately, a third and subsidiary, with a more north-westerly trend than the last, extending from Kokhlam, Lumdekor, to Mungrhi, well marked by the northernmost extension of the cretaceous rocks. West of Mungrhi it forms again a portion of the main watershed of the hills, and this line, extended north-west, falls on Doobri, the last western outlier of the crystalline rocks. The south-east, north-west, lines of main watershed are connected by portions nearly at right angles, or with north-east, south-west directions. The main drainage lines, from a certain regular arrangement and their intimate connection with undoubted dislocations, appear to mark a system of great joints, with former displacements of sections of the surface, which have occurred in the crystalline rocks. Everywhere are to be seen interesting examples of how subsequent denudation has affected the general aspect of these hills as they are traversed from west to east into the Khāsi and Jaintia districts.

Orographically there is a similarity which connects this area with the Himalayas on the north, as shown in the great longitudinal feature marked by the bend of the Brahmaputra, and successively by the Guddadhur, in the Dooars, and deep valley of the Mochu to Punakha in Bhūtan, of which the Wangchu is a supplementary feature or ramification. Again, the deep breaks through the Gāro range, of the Sumessary and Um Blay, which together throw the watershed of the range to within 10 miles of its northern base, have corresponding great gorges in the Bhūtan Himalaya, viz. the Champanotee or Matteesum and the Manāss. While proceeding east to long. 93°, we have the next great geographical depression, with corresponding geological changes, marked by the Kōpili, having as its *vis-à-vis*, on the northern side of the Assam valley, the river Bhorolee. Such features cannot, I think, be accidental, but must be connected with past orographical movements on the contraction of the earth's crust.

II.—On a Projected Railway Route over the Andes, from the Argentine Republic. By R. CRAWFORD, M.A., C.E.

[Read, December 9th, 1872.]

IN compliance with a request that I should endeavour, while engaged upon the surveys for the proposed "Transandine Railway" from Buenos Ayres to Chile, by the "Planchon" Pass, to collect all such information as would be of interest to the Royal Geographical Society, I beg now to forward the results of our explorations and observations.

I have had a map of a portion of Chile and the Argentine territory carefully compiled to a scale of $\frac{1}{800000}$, and the results of our surveys and explorations marked upon it. On examination it will be found that some important geographical knowledge has been added to previously existing maps. For instance, the Rio Grande, which takes its rise in the Andes and,