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No. II.

FEBRUARY, 1913.

VOL. XLI.

THE ABOR EXPEDITION: GEOGRAPHICAL RESULTS.*

By A. BENTINCK.

I PROPOSE to deal with the exploration of the valley and course of the river Dihong and its main tributaries, so far as it was effected by the Abor Expeditionary Force to which I was attached as a Political Officer. I am under certain disabilities, as having enjoyed the usual public school and university education I am in no way a scientific observer, and the duties of an executive officer in the Eastern Provinces of India allow him no leisure for new acquirements. On the other hand, I had been able during the three and a half years before the expedition started, and more especially in the six months which elapsed before it was possible to undertake the punishment of the murderers of Mr. Williamson and Dr. Gregorson, to obtain some knowledge of the language and manners of the tribes on the North-East Frontier of India. The expedition had many objects in view besides exploration; I am not at liberty to detail all these, but may mention the exaction of reparation from a most elusive enemy, the construction of a mule-road over heart-breaking country, the opening up of friendly relations with tribes and villages whose very names were either unknown or matters of vague and generally incorrect conjecture, and the necessity of appearing always in sufficient force to ensure against accidents. All these still further curtailed the time strictly limited by the climate during which exploration was possible. More surveying might have been done had it not been made a *sine quâ non* that the work should be linked up with the Indian triangulation, but this is a matter in which quantity may yield to quality, and the nature and extent of the work done is in itself a tribute to the indomitable spirit of the survey officers in the face of exasperating obstacles. I have nothing to say on the two missions

* Royal Geographical Society, December 2, 1912. Map, p. 200.

which were working simultaneously with us ; the Mishmi mission along the upper Lohit covered little ground that had not been previously visited by Mr. Needham and by Mr. Williamson and described by them ; the Subansiri mission, as I prefer to call what was officially known as the Miri mission, because the tribes it visited are not and have never been connected with the Miris, broke a good deal of new ground, but I have no firsthand knowledge of its results.

The Dihong, even for the 25 miles or so of its course from where it leaves the hills to its junction with the Brahmaputra, has hardly been visited by Europeans, and until Mr. Williamson took over charge at Sadiya in 1906, the claim of the Abors to turn back even fishing parties that wished to go more than a few miles above the mouth had been admitted by default. A lamentably unsuccessful expedition in 1858, which penetrated nearly as far as Kebang, returned without making much addition to our knowledge of the country, and between that date and 1894 no expedition or traveller got further than the villages facing the plains on the outer slopes of the hills. In 1894 a punitive expedition directed against the Padam Abors nearly succeeded in reaching Damro, the principal village of that section, and gained some knowledge of the valley of the Yamne, one of the largest tributaries of the Dihong. They had, however, no surveyor with them, and the margin of error in their work was rather large. The first survey work in this area was done in 1901 by two Gurkha surveyors from the Survey of India, who succeeded in getting up the right bank as far as Kebang. Perhaps deservedly satisfied with the accuracy of their work up to that point, they seem to have let themselves go on the subject of the country beyond ; they describe it as open and undulating and as absurdly easy compared with that as far as Kebang. It is certainly more open, in fact it could hardly be less ; we may also admit the undulations, but as these are continuous, seldom less than 1200 feet high, and often two or three times as much, and seldom have as mild a slope as one in three, it must be conceded that as undulations they are somewhat bold. As to the ease of the country, our impression on returning from it was that the country between Kebang and the plains was mild and harmless, and in saying so I do not wish to withdraw the epithet I have already given that country of heart-breaking. The most amazing statement of these surveyors was that Gyala Sindong was only ten stages from Kebang and visible on a clear day. Mr. Sam Weller on a well-known occasion protested that his eyes were not patent double-million magnifying gas microscopes, but the surveyors seem to have laboured under no such disabilities. As a matter of fact, twenty-four marches took us less than halfway to where Gyala probably stands, and with an immense snowy range in between, while from Kebang, which is not more than 3000 feet high, the view up the Dihong extends not for ten stages, but for rather less than 10 miles, the valley then bending eastwards at right angles and a 5000-foot ridge shutting out everything behind.

Mr. Williamson's journey of 1909 to Kebang covered much the same ground, but he then made the acquaintance of a remarkable man in the person of Madu, Gam or headman of the important village Riu, and received from him the invitation upon which he undertook his last journey in March, 1911. This is not the place to discuss the murders; their actual occurrence was brought about by the folly of a messenger and the hot-headedness of the younger men of Kebang and Rotung, who cut short the career of one who had in five years created our influence over the tribes of the frontier without force or show of force, but by the unaided strength of his own personality.

In speaking of previous explorers I should not omit the well-known name of Kinthup, who alone claims to have entered the country from the north. I shall return to him later on.

It may be as well to mention that all travelling by Abor paths has to be done on foot and in single file; obstacles such as fallen trees, steep places where hands are needed as well as feet, and ravines where the track is along steps cut in a succession of slippery logs are common incidents, and at such places each man causes an additional delay. British officers had to limit their personal effects to the 60 lbs. carried by one coolie and sepoy to 10 lbs. only, and thus no tents could be taken, and it was necessary to end each march by 3 p.m. at latest to enable a camping-ground to be cleared and shelters and a defensible perimeter to be run up before dark.

We left the headquarters camp below Kebang on December 27, with rations for a month, which meant that at first we had many more loads than carriers unless we could induce the villages we visited to help us. As, however, it was necessary to leave friendly feelings behind us, we were not likely in any case to go very fast at first. On that day we reached Pangin, a village which, though it borders on Kebang, whence the plains are reached in two days by an Abor, had never been down and had never seen a white man. I had previously got into touch with the Gam, and we were received here as elsewhere with the utmost confidence, friendliness, and no little curiosity, especially on the part of the women and children, who regularly came out to meet us and would press on the British officers a doubtful egg or a damaged banana for the privilege of examining all that they had on. The Abors weave themselves a rough cotton cloth, and obtain by trade, generally through the Mishmis, a good deal of coarse Tibetan stuff, but the ordinary cotton materials in use in India are practically unknown in these further villages, and provided they are white or scarlet or bright blue are highly prized. The amount of dress worn by an Abor is regulated entirely by the heat of the weather, and though the women wash with fair regularity, the men decline throughout the winter months to part with the warmth given by a coating of steadily accumulated grime.

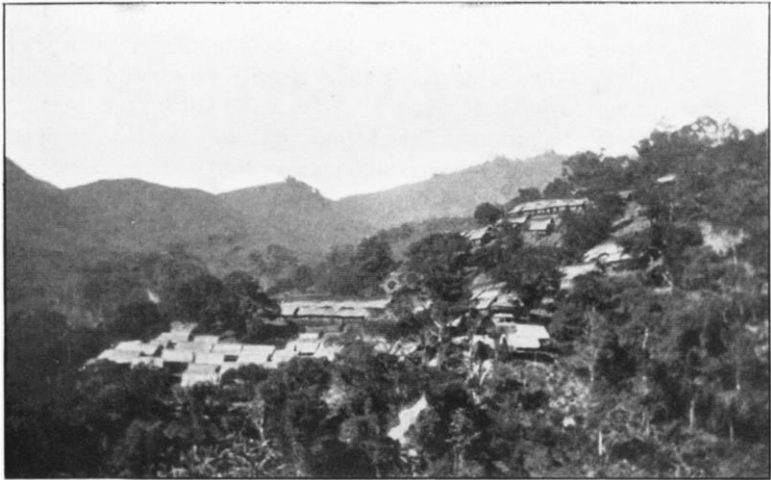
From Pangin we crossed the Dihong to Komsing, but while

preparations were going on we paid a visit to Yekshing village across the Siyom and had an interesting day. After making our way along the rocks at the river-side we came to the great cane bridge which crosses the Dihong rather below Komsing. This has been described in the *Journal* for August last, and I need not therefore delay upon it. The Komsing bridge when we saw it was getting old, and, except for its size, was not as well made as several other such bridges that we crossed. I have no doubt, however, that it is a good deal stronger than has been stated. I have seen thirty or more Abors running across such a bridge over the Shimang where it is some 80 yards wide, though that bridge was in worse repair than that below Komsing. A similar bridge a good deal smaller and much newer at Yugong was so rigid that it was unnecessary to hold on while crossing, and it supported the weight of most of the villagers who gathered on it to watch Captain Hore, the Intelligence officer, and myself bathing underneath it. One cane that I happened to notice was nearly 90 yards long, and few are less than 50; the whole structure is put together without a particle of iron and underfoot is close enough for dogs to cross over readily. Such bridges are common on all the larger streams, but numbers of other types are found, from the primitive tree-trunks, split and hauled into position, to cantilever bridges of bamboos weighted with piles of boulders, suspension bridges with rigid bamboo footways, trestle bridges and combinations of these types. There is nothing so rudimentary as the cable and sliding ring which contents the Mishmis.

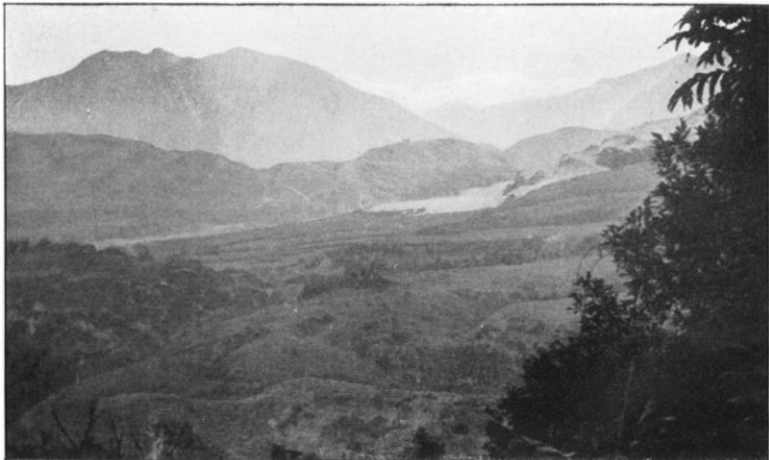
On the same day we crossed the Siyom river to Yekshing village, which stands on the steep ridge at its junction with the Dihong. The Siyom probably rises about lat. $28^{\circ} 45'$, and collects most of the drainage of the area east of a well-marked range averaging some 11,000 feet which runs north and south and divides the Subansiri system from that of the Dihong. Where we crossed the Siyom it is some 90 yards wide, with an average depth of about 30 feet, and a current of about $\frac{1}{2}$ miles an hour, but just below it dashes down for some 2 miles in continuous rapids which carry its dark clear waters far out into the green stream of the Dihong. Its existence had hitherto been based on rumour only, and its size was unsuspected. While we were visiting Yekshing, a poor village full of goitre, deformities, and eye-diseases, rafts had been got ready, and on these we crossed the Dihong next day and marched to Komsing. Here we were able to recover some of the remains of Mr. Williamson and those who were murdered at the same time, a task which was completed by those who came after us. Pushing on with the help of 120 Abor carriers, we next arrived at Riu and halted there for two or three days. At Riu the Abor system of local self-government is seen at its best, and a few words on it may be apposite. Though I have used the term Abor, it is a name of which the Abors themselves are ignorant and for which they have no equivalent. It covers a number of tribes, each of which is loosely coherent,



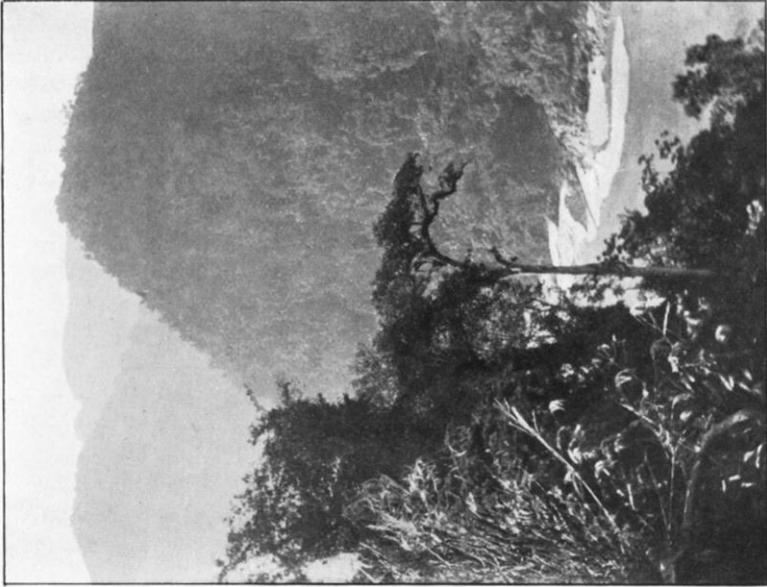
ABORS AT RIGA CAMP.



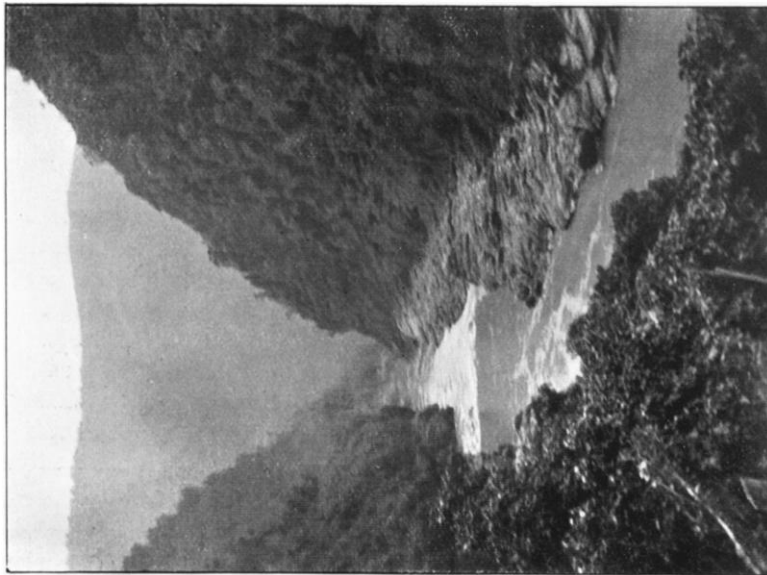
KOMSING.



DIHONG VALLEY NEAR GETTE.



COUNTRY NEAR PALING.



GORGE BELOW KITGOR HILL.

generally by its connection with some parent village, but not otherwise recognizing any community of interests or policy. The real unit, as the nature of the country requires, is the village, and each village acts independently. All questions of policy are debated at the village assembly, which all may attend, including the women. I am not aware, however, that the latter have obtained or desire the right of recording their opinions. Of these assemblies the Gams or headmen are the mouthpieces, but a Gam of standing will have a large share in forming the opinion which he transmits; it is, in fact, on the success of his policy that the influence of a Gam rests. He must at the same time be a man of superior intelligence and foresight, a ready, fluent, and persuasive speaker, and have a backing of personal adherents of his own family and clan, for each tribe is subdivided into clans which differ from one another in glory. As the Gam cannot risk a failure, the line he takes is always one of caution, and he has, where his influence is tolerably secure, a sound modifying effect on the more hot-headed young men. A village which has been doing badly may have no recognized Gam, but this is generally regarded as a discreditable state of things, and in the stronger villages Gams are many. None is more remarkable than Madu, Gam of Riu, who is a born politician, diplomat, and statesman. He has always seen that his people had everything to gain by friendly relations with us; it was on his invitation that Williamson made his last journey, and after the murders, which he strongly disapproved but could not foresee nor prevent, he went out of his way to send down messages protesting his innocence and friendship, kept the villages near him from joining against us, and came to meet us on the first opportunity. The esteem which he enjoys is a strong testimony to the generally peaceable and orderly nature of the Abors, and to their power of recognizing a good thing when they have got one. He helped us on to the next village, Geku, the headquarters of the Panggi tribe, between whom and Riu there had been for some years past an intermittent hostility, which we were able to compose to the satisfaction of both. Geku had already been visited by a party under Colonel McIntyre, which, starting from Rotung at the same time as we from the camp below Kebang, had worked up the comparatively easy valley of the Yamne through the Panggi villages. The southernmost Panggi village of Pongging had picked up a fugitive from Williamson's party, who reached them badly wounded, had tended and kept him at some danger to themselves from their neighbours, and had sent him back to us on our arrival; they could not do so before, as the villages below them rigidly excluded them from all intercourse with the plains. The Panggis are a weak and poor tribe shut in between the powerful Padams and Minyongs, and only saved from absorption by the mutual jealousy of these two and by their own friendship with the strong Simong community further north.

There is not much to be said of the geography of the country traversed up to this point; the path runs at some distance from the Dihong, up and

down and in and out of continual spurs at right angles to the ever-changing course of the river. The lower slopes of these ridges where they face south are cleared or only moderately overgrown, but the upper parts are covered with dense jungle which completely shuts out all view ahead, and only occasionally allowed us glimpses of the huge bends which the river indulges in about here. These, however, were enough to make us already cautious about prophesying on the course of the river further on. The Yamne valley party had not had these advantages, and on this account, coupled with an ignorance of local nomenclature, arrived at hasty conclusions which at the time obtained some publicity. While we were at Geku the fine weather came to an end, and the cloudless days we had enjoyed hitherto were replaced by rain on three days out of five, while on the rest the sun shone only fitfully, and the high hills hardly ever emerged. It was important to get in touch with the village of Riga, the parent village of the Minyongs, and we therefore, largely by the good offices of Madu Gam, made rafts and crossed to the right bank. The Abor raft is built up of bamboos of a special kind, very large and light; it is some 20 feet long and 5 wide, carries a small platform for passengers and baggage, and is worked by three or four men with sticks, of whom the man in the bows does such steering as is possible. The only crossing-places are where the river widens out, and the current in shore is therefore very slack. The raft is towed up the bank as far as the steepness of the rocks allows, and is cast off with the head well upstream. Then follows an exciting period of furious paddling, during which the raft goes slowly across the stream and rapidly down it until if successful it strikes the slack water on the far side. Bad steering results in its being carried far down, and there is no saying where it may stop. We tried without success to improvise apparatus to take soundings at this point; our geologist reckoned that from the set of the rocks the average depth would not be less than 80 feet, and close under the bank there was no bottom at 60 feet. The river narrows here to about 120 yards, and the current was approximately $5\frac{1}{2}$ miles an hour, the river being then at its lowest; the rocks for some distance above this and right down to the plains are volcanic and generally lava. From the river-side our Survey officer, Captain Trenchard, made his way to the top of Arte hill, some 8700 feet, on the lofty ridge behind Riga, but apart from the fact that the weather was hopelessly thick, he found the top not only covered with dense tropical jungle, which we expected, but also under 3 feet of snow, in which our bare-legged Nagas who were to have made a clearing were helpless. At this time we received orders to push on up the Dihong, therefore recrossed and marched next day to Komkar, the only village of a small tribe akin to but distinct from the Padams, and maintaining itself by alliances with both Damro and Riga, and a reputation for sorcery and witchcraft of a dangerous kind. On the next day we camped just short of Simong, which now became our advanced base. Komkar is the first village of any size on this bank

which faces the Dihong, and a few miles beyond it the volcanic rocks end in a fine bluff of some 3000 feet, from which there is a view up the river as far as Puing. The valley here opens out, and, in place of jungle-covered cliffs descending almost sheer to the water's edge, the land falls away in innumerable small plateaus with very steep sides to a gently sloping strip often a mile wide between 100 and 200 feet above the river, intersected everywhere with deep precipitous ravines. On the opposite bank the slope is steeper, but the fields run unbroken from 4000 feet down to the river. Simong dominates the remaining Abor villages on the left bank, and is on friendly terms with the small Karko group of four villages which face it on the other side, and are at war with Riga; it is also on good terms with the Bomo-Janbo group beyond. These last villages we were not able to visit, but we saw something of their inhabitants; they differ slightly from the other Abors of the Dihong valley in that they generally wear very dark-coloured clothes, and instead of both sexes wearing their hair cropped all round they allow it to grow long behind and hang down. Simong itself is a large village of nearly three hundred houses, compact but not crowded, built on a broad steep-sided spur, and when we first visited it with all its peach and plum trees in blossom it was far from unattractive; most Abor villages are at their best from a distance. It would have been well if we could have waited here for a few days before pushing on in order to make ourselves better known; the Abors generally think of us as a tribe not more numerous than one of their own and inhabiting the villages of Dibrugarh and Sadiya, but here we were entirely unknown. Moreover, the most influential Gam, who is known alternatively as Mi Okko, or Bapor, is in spite of the current reputation of the Abors the only one whom I have found habitually surly and unresponsive. Time however pressed, and when we set out we found, partly from the wish of the village not to lose its good name for hospitality and partly from a desire to make it appear that we passed through with their permission and consent, an opposition which threatened to make our further progress slow and difficult and did in fact delay us a day. We had more of this at Gette, which we reached on January 24, but circumvented it by taking a side-path, crossing the ridge on which the village stands at its narrowest part, and camping on the further side. At Puing, two days later, the villagers at Okko's direction denied that the path went any further, but as we had to wait here until a convoy with supplies for our final advance overtook us, we were able to make friends by an exchange of presents and to give examples of the effect of rifle-fire. At Gette we met two interesting strangers in the persons of two Tibetans, refugees from the Kongbo district in Tibet and settled in Shirang village on this side of the high snowy range. From them we tried to get information about the course of the river, but partly from the want of an efficient interpreter and partly from the fear of the Abors that we might interfere with the trade with Tibet which Simong largely controls, the results were small. They certainly regarded the

Dihong as the same river which passed their homes, and knew nothing of any falls on it; but of its course we were able to get no clear idea.

At Puding a cane bridge crosses the Dihong to Bomdo, or Bomo, and is largely used by the Janbo villages and the Boris behind them, as the path down the right bank is very bad and difficult at this point. On the left bank also the valley closes in above Puding, and our path took us high up along the Puding fields, on which, as on all the very steep hillsides, the tree-trunks, after felling and trimming, are allowed to lie supported by the stumps to hold up the exposed soil from slipping into the river. Turning our backs on the river, we climbed to the narrow top of a high precipitous ridge, which we followed until a very abrupt and laborious descent of 3000 feet down a rocky difficult path brought us out on the Dihong again. The river here runs from the north-west, bends sharply to the south-west through a narrow gorge, the hillsides running up nearly 4000 feet from either bank, covered with jungle, and very steep indeed. Our 3000-foot descent took us less than half a mile forward, and the hills in the gorge are steeper. Where we again met the Dihong it was running south-east; it then, after running south-west in an almost continuous rapid for about half a mile, again turns right angled to the north-west, swings round a long projecting spur, and passes Puding running slightly east of south. Above our camp there is a succession of rapids as far as Rikor village, which we passed through on the following day. Here the rain, which had held off the last few days, though snow had been falling heavily down to some 6000 feet, set in, and continued almost without intermission for the next nine days and nights; even when it was not raining the mist was so thick that no plane-tabling could be done. Immediately above Rikor the hills close right in on the river, and after a steep and slippery climb of 1700 feet we could catch through the mist glimpses of deep narrow valleys running in all directions with nothing to indicate the course of the Dihong. We had long been waiting for the Dihong valley to make a more decided trend to the north-west, and when we got down again to the river a very well-marked valley straight ahead, though several others were available, seemed to fulfil the requirements. This turned out, however, to be occupied by the Anbo, quite a small stream, while the Dihong disappeared through a quite inconspicuous opening in the opposite direction. Another stiff climb brought us up to Paling, a small poor village high up on a bleak ridge, and obtaining its water through about half a mile of bamboo piping from a mere trickle on the hillside. From the village we could see that the Dihong cut right across our front; that the high hills, especially that behind Panggo village, which the Survey were hankering after, were all across the river; and that we might go on for some days on the left bank without getting appreciably nearer the main range. For the last two days we had gone on three-quarter rations, and therefore had a small margin, and as the march to Singging promised to be fairly easy, and the large tributary, the Sigon, came in somewhere near it,

we decided to push on to see what we could. The march turned out to be the worst we had had; first a steep drop of 1800 feet to the river-bank from Paling, then a steep pull up of about 3200 feet on to the narrow top of a long ridge, and then a long descent, at first fairly easy, but for the last few hundred feet with a slope, if it can be so called, of 3 in 1. On all these steep places the path is merely a series of well-worn footholds of rocks or tree-roots, for no hillside seems to be too steep for a thick growth of jungle, and it was long before we got rid of the habit of walking with short steps and eyes fixed on the ground. A few more hundred feet up the opposite hill brought us to fairly level ground close to Singging village shortly before dark, and we were very grateful to the villagers who turned out and helped to clear a camp and collect firewood. In nearly seven hours' actual marching we had covered $6\frac{1}{2}$ miles. It was plain that we were getting near the end of the inhabited country on the left bank; the villages had shrunk to little hamlets of between 30 and 40 small houses, and the widespreading fields to little patches of cultivation wherever the hillside is not sunless or too steep. Pigs and fowls are scarce, and the scanty supply of grain, generally millet, is supplemented with rats and squirrels, snared in the jungle. The latter are regarded as something of a dainty, and whenever a small gift of salt or tobacco produced a long search in the capacious satchel which every Abor carries, it usually ended in the production of a smoke-dried squirrel extended on a wooden skewer. These are largely used in trade with the Mimat, a tribe living far back in the hills whose reputation as cannibals extends right down to the plains. We did not see a Mimat, but they visit Singging with salt, which they exchange for anything edible, including, as we were once more assured, human dead bodies. They live close to the snow-line, dress in skins, and are spoken of by the Abors with disgust and contempt. Beyond Singging on the left bank is the small village of Angging, at two days' journey for an Abor, which means three for any one else; another two Abor days on is Namyng, and a little further Jido, beyond which the country on the left bank is said to be impassable, and the path crosses by a cane bridge to the Menba village of Kopu. The three Menba villages of Kopu, Jeling, and Shirang are inhabited partly by Abors and partly by another tribe probably nearer akin to Tibetans proper than the Abors are. The Dihong valley is said to run for some distance beyond the last village in a north-easterly direction, but the country is so steep that not even an Abor can go there.

Rain and dense mist continued all the while we were at Singging, and though a further reduction of rations gave us an extra day in the hope that the weather would improve, it was useless, and on February 3 we turned back, having with us rations up to the following evening. We were now moving down the same path that Kintgup claims to have used twenty-eight years before; he has given a description of his route, and I do not propose to detail points in which he is wrong, as that would be unduly

tedious and lengthy ; it is possible to give his correct statements in very few words. The first identifiable Abor village reached by him is Angging ; going southwards he gets four village names correct out of eleven, two of them being misplaced, and three others more or less correct. In his descriptions he is right twice only ; he says that at one point he crossed two or three streams, and ascended a hill covered with jungle ; the traveller in Aborland is seldom doing anything else : he says that from Mobuk village the Dihong is not visible ; this is right, but I believe by a mere fluke, as every other statement is irreconcilable with anything that is or ever has been in that part of the world. I do not think it possible that he can have penetrated further than a prominent hill near Jido, from which there is an extensive view, and was there told the names of the villages on that bank. This is probable, as he calls his furthest point Damro by the impossible name of Miri Padam, an obvious confusion with Miri Pamdi, which means the Snowy Mountain of the Wizard, and is a very prominent peak which from Jido would exactly indicate the direction of Damro. Where he got his other information I cannot say, but when his journey into Aborland is described, as has recently been done as "one of the romances of the Survey of India," I am prepared to let it go at that.

We were back at the Simong camp on February 8. The transport line, when stretched to its furthest, could only get us one day further up the left bank than we had been already ; our carriers were pretty well worn out with four months' incessant work, and to replace them and engage others in sufficient numbers would have required nearly two months, by which time the season would have been at its unhealthiest, and storms and floods always threatening. While, therefore, we awaited orders the Survey started observations from the highest point above Simong. Here, at 6000 feet, the jungle was so thick that it required 150 men for ten days to clear it, while on the very few favourable days the distant hills were free of cloud only for an hour at sunrise. Below in the camp we made friends with the Simong Gams, and learnt from them about as much about the river as they could tell us. One of them, called Asan, had in his earlier days been carried off as a prisoner across the snowy range. He crossed the Dihong at Jido, and was then carried over four ranges of hills to a country much like that of the Abors, where people lived in wooden houses and used neither ponies nor yaks. The path through the hills does not follow the river, but joins it again at Bapung. The river among the snows is said to be deep, narrow, and very rapid, and the banks precipitous ; again, nothing was known of any falls, and it may be remembered that, while on the Dihong the river in a course of not less than 85 miles from Singging to Gyala has to drop some 10,000 feet, the Teesta, not so very far west, descends 16,000 feet in a course of 70 miles without any falls at all. Moreover, if there are falls on the Dihong at the place where Kinthup saw rainbows, this must be before the river pierces the main range. It may be said in a word that the nearer we got

to where the falls ought to be the less was there to be known of them. We questioned the Simong Gams about the floods on the Dihong, especially the great flood of 1900, which brought down a number of bodies then supposed to be of Tibetans and a quantity of coniferous trees, none of which grow in the Abor country. These floods, they said, are caused not by the Dihong, but by a large tributary called the Yigrung, which comes in from the east; both the bodies and the timber in 1900 came from the country of the people known to the Abors as Pobas, and considered by them quite distinct from the Tibetans. It seems, therefore, likely that the Yigrung is identical with the Ngong Chu, and from the fact of it having an Abor name, it may be inferred that it joins the Dihong on the south side of the main range, probably near a great 25,000-foot peak in long. 90°, lat. 90° 45' approximately. The Gams were quite willing to guide a small party as far beyond the hills as they themselves could go, so long as we ourselves whom they knew composed it; it was impossible, however, to go at that season, which was no doubt true, and they would not care to take only one of us; two would be better, and three best of all. The reason given for this is most characteristic of the Abors. "One of you," they said, "will probably die because the country is so bad, and then you will blame us, whereas if three go two may die, but there will still be one to come back and say that it was not our fault." We left Simong on February 24 with kindly feelings on both sides; here, as elsewhere, the Gams met us as friends and equals, with an absence alike of insolence and servility which a long sojourn in the eastern provinces of India made all the more refreshing. At Komkar I held a conference, which was attended by all the principal Gams of the tribes we had met, to discuss our future relations and settle minor disputes, and we then had a short halt at Geku, where survey work, under the same difficulties from thick jungles on the hilltops and bad weather, was proceeding. Here, during our absence, much highly-appreciated medical work had been done, but the centre of attraction was the two trained dogs brought up by Major Wilson of the 8th Gurkhas. It is not in my province to speak of their war services, but in peace they were a valuable asset, as the Abors are noticeably fond of animals. It is customary, when meeting a *mithan* (the domesticated bison, *Bos frontalis*, of the hills) in the jungle, to speak to it and give it a lick of salt; and I have seen an Abor carrying a dog under each arm across a stream to save them from getting their feet wet.

From Geku we crossed again to Riga to enable survey work to be done from Arte hill. A survey camp was made at about 8000 feet, and a detachment of sappers sent up to make a clearing, and here Captain Trenchard had to wait for three weeks before a thunderstorm, more severe than usual, cleared the air sufficiently for a few hours to enable him to get a few observations. At the same time another party moved up the Shimang valley, and by great exertions struggled to the top of Moling, a 10,000-foot hill west of Arte, only to find the jungle at the top as thick as ever, 10 feet

of snow on the ground, and all round dense cloud which refused to lift before it was time to return. While this was going on I was able, with Captain Hore, to make a journey westwards from Riga to visit the villages in that direction. The country is exceedingly broken, and the hillsides so steep that not even an Abor thinks of tackling them; the path, therefore, climbs up the crest of narrow ridges to the point whence they diverge, and so down again. A fourteen-hour march from Riga, involving a climb of 6000 feet up over Arte and another 6000 down, brought us to Shupsing, in the Shimang valley, and at the end of three days we had done rather more than 20,000 feet up and down, and had advanced 27 miles; two days later another climb of 3250 feet over the Yillo ridge took us into the Siyom valley at Rangku village. The Siyom here is some 80 yards across, with an average depth of about 20 feet, but lower down it widens out sufficiently to contain wooded islands, a very unusual feature. We crossed the Siyom on rafts in the hope of reaching one of the partly Gallong, partly Bori, villages on the other side, but this we were unable to do in the time available, to the disappointment of the Gams, who invited us cordially to return next year. We followed a different path on our journey back, mainly along the very devious valley of the Yubung, crossed the Shimang at Pareng, and after doing the 5600 feet to the crest of the ridge, were once more in the Dihong valley. The trip was more successful politically than geographically, as though we were constantly reaching excellent points for survey work, and enjoyed fine weather throughout, the haze which marks the approach of the hot weather was over everything, and was much thickened by the smoke of burning trees and undergrowth wherever the fields were being cleared for sowing. There is no wind to carry it off and, in consequence, we could never see beyond the hill we happened to be on. Few sights were more impressive than the expanse of the Riga fields, seen from above; those now in use cover three great valleys, and the ridges between, once under thick forest, but now with some 15 square miles cleared of all that, and at sowing time without a weed anywhere to be seen. The system of Abor cultivation is the same as that practised by many hill tribes. The crops are mainly rice and millet, and as much is cleared as is required for one year's supply, this heavy work being all done by the men; the land is cropped for three or four years, and the jungle is then allowed to grow up again on it while more is cleared. In most villages each set of fields gets a rest of nine to twelve years, but where the population is pressing on the soil, as is markedly the case with an old village like Riga, not only is the land harder worked, but there is a strong tendency for tree jungle to be replaced by grass and reeds which still further impoverish the soil, and will, until better methods are learnt, increase the overflow from the hills down into the plains, where the Abor deteriorates both in physique and in character. The matter is in many places one of some urgency, but can everywhere be met by improved methods, improved implements, and new kinds of crops.

Three of the Riga Gams had gone with us on the last trip, and they accompanied us on our return, which began on March 25; they were joined by others from the villages on the right bank which we passed through, all eager to see the world, and more particularly to look for possible locations for new colonies which were to keep open their communications with the plains, and prevent the re-establishment of the trade barrier formed by Kebang and the villages under its influence. Little need be said of the return journey; from Kebang downwards it ran along a wide, evenly graded, and finely bridged mule-road. The Abors with us frankly admitted that they thought it superhuman, and it is not hard to understand and even to share their enthusiasm. By the middle of April frequent and heavy rain is to be expected in the hills, and in their outskirts fever, mosquitoes, and leeches abound. The expeditionary force was, therefore, withdrawn with all speed, and on April 1 we were once more in the plains.

It would, I think, have been generally admitted that much had been done if more had not been hoped for. It would be fairer, perhaps, to say that if the information and conjecture upon which those hopes were founded had been correct they would have been fulfilled. In any case, the way has been made incomparably easier for the survey party now at work; there should be no risk whatever of friction with the tribes, but whether in that country further exploration can be carried on with large parties is a point about which I am less sanguine.

I have purposely avoided discussing the habits, characters, and beliefs of the Abors; others with less opportunities have rushed in to print, but I prefer for myself to be on the side of the angels until wider experience has been gained. This, I trust, may be possible in the near future. One who has the welfare of the tribes at heart may be excused a feeling of relief that their country shows no sign whatever of mineral wealth, and that they, therefore, have a better chance of working out their own salvation along their own lines. In this they will need guidance, and they are willing and anxious to learn; their methods of warfare have been shown to be useless, and their methods of agriculture have, as I have already said, brought many villages to a point at which the rising generation must emigrate or starve. Difficulties are not altogether wanting, slavery is one of them, but I believe that the time is now, and that the opportunity has been made.

The PRESIDENT (before the paper): I am glad to see so large an audience present to listen to what I have no doubt will be a most instructive paper. The subject of the address is the geographical results of the recent Abor Expedition on the north-east frontier of India. In those parts of the world is a remote mountain tract, almost unknown to Europeans, inhabited by inhospitable and semi-barbarous tribes, lying partly inside and partly outside the administrative frontier of India. This region, which has excited the interest of geographers and travellers for years, but has been visited by few, was suddenly brought under our notice less than two years ago by the news of the murder of a distinguished young British

N. E. FRONTIER OF INDIA

Map to illustrate the GEOGRAPHICAL RESULTS of the ABOR EXPEDITION

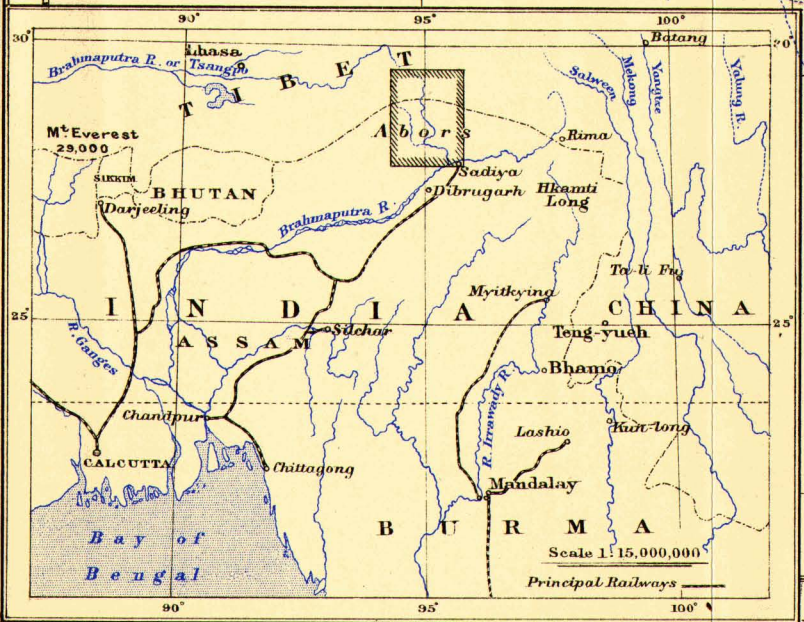
by A. BENTINCK 1911 - 12.

Scale 1: 500,000 or 1 inch = 7.89 Stat. Miles.



Route of the Expedition
" " M. Bentinck's party - - - - -
" " other parties

Note: This map is a reduction of the provisional map of country surveyed during the Abor Expedition 1911-12, on the scale of 1 inch to 4 miles by Capt. G. H. B. Trenchard, R.E. and produced by the Survey of India.



94° 15'

30'

45'

95°



M I M A T

J A N B O

S I Y O M

S I B A N G

Panggo Hill

Pomu

Panggo

Moshingo

Pating

Rikor

Anbo

Miging

Janbo

Bondo (Bomo)

Pating

Gette

Ransing

Gosango

Yugeng

Karko

Sirayuk

Moling 1011

Mersing

Yihuk

Medi

Robuk

Sine

Juhun

Yugong

Rangku

Yehung

Sine

Sine

Sine

Sine

Sine

Shapsting

Artz Hill 40781

Parong

Parong

Parong

Parong

Parong

Parong

Parong

Parong

Parong

Parong

Mopit (Moshing)

Bomsing

Yokshina

Hang in

CANE BR.

17512

17208

15453

15212

14055

12603

10600

12231

12123

29°

45°

30°

15°

95°

15'

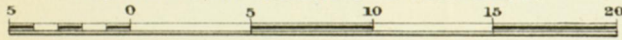
30'

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Shirang
Jido (or Kido)
Namying (or Namdo)

Rikor
Bondo
Paging

12231 12075
12125 Lengging
Miri Pamdi 13780
3414
13640
13280
Kallang 10072
Ariz Hill 8781
Rigo
Sibbung
Dakka
Kumdam 8570
Dirap 10860
Nankam 7157



29°

45'

30'

15'



Published by the Royal Geograph



Published by the Royal Geographical Society.

ABOR EXPEDITION
BENTINCK.

officer, Mr. Williamson, who had advanced beyond the frontier to conduct certain investigations in the tribal area in those parts. An expedition was sent out by the Government of India to avenge the murder of Mr. Williamson and to pursue geographical and scientific inquiries, and Mr. Bentinck is better qualified than almost any man to acquaint us with its results. He himself was Deputy Commissioner of that portion of British territory to which I refer. As such he was also Political Officer for the tribes in question, and poor Mr. Williamson was his subordinate. When the expedition took place it was not unnatural that Mr. Bentinck's knowledge should be utilized for the assistance of the force, and he went as Political Officer to General Bower, who commanded it and who is with us this evening. There were many results of that expedition, political and otherwise, about which we should like to hear a good deal. But we are a Geographical Society and are not admitted into the secrets of Government, and we are therefore not at liberty to-night to discuss more than the geographical results.

General Sir HAMILTON BOWER: Mr. Bentinck has given us a very clear idea of the geographical work that was done on the Abor Expedition, but there is one point he has very much minimized, and that is his own difficulties as Political Officer, and the tact required to enable the work to be carried on. At the time that Mr. Bentinck left us a certain amount of punishment had been inflicted upon the culpable villages, but they had not yet made submission. Mr. Bentinck and his party proceeded up the river. Now, we had no quarrel with the people above, but savages in their ignorance are often like a nervous horse that does not mean any harm, but in its nervousness may become dangerous. It required very careful handling to avoid a collision which we did not want, and go beyond that and get the assistance and confidence of the tribes; their assistance was very valuable in the exploration work we hoped to carry out, and it is due to Mr. Bentinck's great tact and patience that this was successfully accomplished. Mr. Bentinck has mentioned the absence of any mineral wealth in the country as a matter of congratulation—well, that is so, and it rather directs attention to the geological formation of the country. We find first of all, from the Brahmaputra running right along the hills, a flat alluvial soil covered with jungle known generally as the Terai—a general feature all along the foot of the Himalayas. Inside that we come to hills known in the western part of the Himalayas as the Siwaliks; this lower range of hills, formed from river deposit, presents at the mouth of the Dihong exactly the same characteristic as it does further west.

In the country beyond that we come to Carboniferous strata, and in that there are signs of coal, but very poor coal it is. We passed through that and came to the volcanic system to which Mr. Bentinck has alluded, and behind that there is the crystalline core of the Himalayas; this forms the core of the main range. There we find peaks rising up to 26,000 feet, and we may be quite assured that the Dihong, beyond where it was explored, runs in a most stupendous gorge. It is rather interesting to observe, in the course of the various rivers in this part, the almost eccentric turns they take, and also how often big rivers nearly meet and then turn aside, and this is characteristic over a very large area of country. The Yangtse, rising in Tibet, flows east, turning due south, then north again, and then away east to the sea. We find the Subansiri and the Dihong present similar characteristics. Between the Yangtse and the Salween in one place it is only about 58 miles, and yet a big river like the Mekong flows between them. The curves of the rivers everywhere are most eccentric; this arises from the Himalayas which lie generally east and west meeting the system on the north of Burma which runs north and south, so we have as the result the most confused crumbled-up mass of mountains in the world. It is not at all surprising to find

that geographical problems, when examined on the spot, differ very materially from what was expected or conjectured.

Captain L. A. BETHELL: The other day I put before the secretary of the Society a few facts I have been able to gather lately in Abor land. It seems rather venturesome to open a subject of this sort, but what I want to talk about is whether the Tsang-po and the Dihong are one and the same river. I have been asked to put the matter before you to-night. If you will refer to your maps you will see that the Dihong, as it is marked on the map, comes out into the plains at a place called Pasighat. When the Abor expedition left the country they left behind two hundred military police to look after it, and one of the principal posts we had was this place Pasighat. We stayed there most of the time, —though we moved about a bit. Well, while we were there we had every opportunity of studying the river, and the volume of water that came down, under all sorts of weather conditions. That is how the question starts. When we went to Lhasa in 1904 with Sir Francis Younghusband, we crossed the Tsang-po twice—once at a place called Chaksam, and, on the way back, crossed it again at a point 6 miles further up. While we were there both at Chaksam and this point further up, we got to know the river rather well. We shot and fished on the river-banks. The thing that struck one then about the river was that it was a very big river indeed, and wherever it came out in India it must be a thing well worth looking at. That was in August, 1904, in the rainy season. Eight years later down at this place Pasighat one saw the same river, or what was called the same river, at the same time of the year—anything from June to September—and it struck one at once that the water output of the Dihong, where it emerges from the hills, is actually less than one had seen at Chaksam and at this crossing 6 miles north of it. You cannot account for it by the fact that the water might have been deeper although the breadth of the river is the same, because opposite where we were there was a rapid which ran right across the river from side to side, and, through this rapid, the water looked nowhere more than 6 feet deep. After we had watched the river for a bit, it became absolutely borne in on one that the thing hadn't the amount of water that the Tsang-po has at Chaksam, a point more than 700 miles above Pasighat. If that is the case, and the river is not the same, one has to ask, What is the Dihong? Where does it come from? One cannot help thinking it is a river of local origin, and the arguments I wish to place before you are these. You will see that brown patch marked on your maps; it forms a huge catchment area. It is a huge basin that catches all the local rain in one of the most rainy places in the whole of Asia, I suppose. All the tributaries in that catchment-area run into the Dihong, and it strikes one that this huge basin is sufficiently large to hold enough affluents to account for every gallon of water that comes out at Pasighat.

The second point is the extreme sensitiveness of the river, where it joins the plains, to local weather conditions. The rain we got up there came across the plains from the south-west, whence the monsoon comes, and we were able to see every storm that came up. As soon as a storm came up and passed over the foothills into this big catchment area behind, the river rose at once, and so long as the storm went on among the foothills the river remained high; when each storm stopped the river began to fall again. I would suggest to you that a river with pretensions to the length and volume of the Tsang-po has no business to behave in this skittish fashion. There is another argument. The rivers Dibang and the Sisseri, both of which come from the same part of the world, join into the main Brahmaputra river very near the mouth of the Dihong. Both of these are considerable rivers. These rivers we investigated last year in the Mishmi

exploration. You went up them about ten marches and they became fordable streams. If you grant that the Dihong is twice as big as the Dibang or the Sisseri, or possibly three times as big, I do not see what is to prevent the Dihong becoming fordable in thirty marches. Those are only the arguments from a point of view which is strange and may not have very much else to support it. There is an expedition up there this winter which we trust will settle the matter once and for all. It will probably double the number of known affluents that run into the Dihong. It is ticklish work, dashing into a large question of this sort; but I would remind you that the question is still an open one. Our best authority for believing the two rivers to be one and the same, is the opinion of Kinthup, and our recently ascertained facts have not yet put the seal of finality on his opinion. If it should prove the case that this geographical question has not yet been cleared up—if the Dihong should prove, as is surmised, to be a local stream and not the Tsang-po—then we are left with our old question, where does the Tsang-po go to? And as General Bower reminds us, "Rivers do marvellous things in that part of the world." They twist and screw themselves between barriers into unexpected places. If the Dihong and the Tsang-po are not one, then it remains to us to find out where the Tsang-po does go to. That is a problem worth having in these days when unsolved geographical questions are rare.

Sir THOMAS HOLDICH: I have listened with something more than interest, with considerable sympathy, to the account which Mr. Bentinck has given us of the exasperating difficulties of dealing with the Abor country, for I have had some little experience of it myself; of the everlasting waiting for clouds to roll by which never roll, for mists to lift up sufficiently to allow one to see just a few miles further than the place where one stands. Considering all these difficulties you will not be surprised that our mapping of that part of the world has been of a somewhat sketchy nature, derived partly from reconnaissance and partly from the reports only of native surveyors and explorers who have been able to make their way sufficiently far over the border to get useful observations. Mr. Bentinck was rather sarcastic about the Gurkhas speaking of the Himalayas as "undulations." I do not think that this is necessary. I never heard of "undulating" as a Gurkha word, and I think you will probably find that that expression is much more due to the translator than it is to the Gurkha. It may happen that just as we climb up the rocky sides of the mountains and talk of "going to the hills," the Gurkha may regard the whole mass of the Himalayas as mere undulations, but I doubt that. I think you will find probably that the explanation of that expression lies with a translator.

But about the explorer Kinthup there should be no misapprehension. He left India for a particular purpose. It was his business to discover, if he could, whether the Sangpo and the Brahmaputra were one and the same river or not, and after three years of most strenuous work, during which a great deal of misadventure befell him, during which he was sold as a slave and lost all his survey instruments so that he was quite unable to bring anything in the shape of a map-record back with him, he finally did (I think most conclusively) prove that the Sangpo and the Brahmaputra were one and the same river. It is really quite interesting to me to hear that question raised again to-night, but if Kinthup was wrong, you have got to get rid of this difficulty. Certain marked logs were put into the Sangpo by him which were to float down to the Brahmaputra. I have always understood that they *did* reach the Brahmaputra and were identified; if so, it is a little difficult to see how they failed to follow a continuous stream. I think we must say that we have known now for the last twenty-five years that the Sangpo and Brahmaputra are one and the same river,

and the credit of that discovery distinctly belongs to Kinthup. Now, Kinthup, like Mr. Bentinck himself, was, there is no doubt, a little dependent on information which he derived from hearsay evidence. It is always a most dangerous form of evidence to take. I have known many officers, both political and military, find themselves most inconveniently tied up in a web of apocryphal geography woven by too zealous informers. However that may be, Kinthup did certainly claim two things. He claimed to have visited the falls on the Brahmaputra and the rough monastery which is just below the falls, and to have passed through the mountains into the Abor country. Whether he was on the same route or any part of the same route as that followed by Mr. Bentinck is problematical. For if the north-east frontier is anything like the north-west frontier (and I believe it is), not only do routes change, but villages constantly change the names which they adopt sometimes from the hills and the natural features about them, and sometimes from the name of the ruling chief. I think myself it is no exaggeration whatever to say that in another thirty years' time there are none of our frontier maps from the borders of Persia to the borders of China that won't need very drastic correction. It is never safe to say, when dealing with the records of past years, that they were wrong at the time they were made. Kinthup's report was simply his reminiscence of what happened to him, and I think we should any of us, if we spent three years such as he spent, find it a little difficult to recall correctly all the names of the villages and the places we had seen during such a very eventful period.

Regarding the falls, I find that they are placed in the position where they are on our map (91° 17' E. long.) on the evidence of a well-educated Tibetan lama who knew the monastery below the falls and who related his experiences to that eminent orientalist Colonel Waddell. Now, Colonel Waddell has obtained not only the evidence of this lama, but that of many other Tibetans besides who had visited the monastery, and amongst them one who showed some artistic skill in the production of a sketch of the falls. When that artist depicted the King Demon of the falls showing his face out a little from the water, he doubtless drew on his imagination; but I decline to believe that the whole thing was imagination, and I do not see how such a feature as falls should be invented by people who previously had no acquaintance with them. I believe myself that those falls exist. The estimated height of them is only 70 feet, but probably that is enough to be impressive to people who had seen nothing like them before. On the whole perhaps we may congratulate ourselves that there is at least one little corner in this far-off north-east frontier of ours about which a little mystery still hangs, for surely the unexplored portions of the globe now are getting all too narrow for our practical explorers.

The PRESIDENT: We have had a very interesting evening, not less so because there has developed a difference of opinion on a matter which is of high scientific importance. The question of the Sangpo-Dihong is one that has puzzled all geographers who have studied that part of the Indian frontier. I heard for the first time to-night Captain Bethell's theory, and, knowing that Sir Thomas Holdich was seated on my right, was glad that it would be sharply contested by that eminent geographer. I was certain to hear Sir Thomas say a word for our native Indian surveyors, who, in spite of occasional inaccuracies, natural enough, have in general maintained a high standard of ability and accuracy on the frontiers of India. As regards Kinthup in particular, I am not concerned to defend him, because his character for veracity still lies in the womb of the future, and will be decided by considerations not yet at our disposal. For myself, I have always imagined that the falls do not exist in the form of any substantial cataract, but are probably a

series of rapids of no very great elevation, though capable of being misrepresented as, or even of being mistaken for, falls. Sir Thomas did not say anything about the big lake which I think has been supposed to extend at the foot of the falls. However, that is a matter which the future will decide. The other issue raised by Captain Bethell is a much more important one, and it would be with the greatest reluctance that I should surrender the view that the Sangpo and Dihong are identical. Captain Bethell, after ingeniously showing us the area from which the Dihong might derive its water, was confronted with the problem of what to do with the Sangpo. Aware of the existence of the latter, with a great volume of water only a few hundred miles away, if he had expected us to accept his view he should have endeavoured to dispose of that formidable claim. Mr. Bentinck's lecture has been marked not only with a good deal of novel information, but by a vein of sub-acid humour, which must have rendered him a most agreeable companion of journeys in those parts. I noted from his paper with pleasure that although the tribes have been guilty of these unhappy and deplorable murders, their general attitude appears to be friendly. If this be so, it would be the more regrettable that the curtain, once lifted, should be allowed again to fall. I hope, therefore, that from the germs of this expedition may emanate in future a wider exploration and a much greater knowledge of that interesting borderland. With regard to a point made by General Bower, every one who had anything to do with frontier expeditions is aware how much of success is due to the tact, skill, and knowledge of the people possessed by the political officer attached to them. During the time I was in India, I can recall no successful expedition which was not in the main successful because of the abilities of the political officer. I am quite certain that the compliment paid to Mr. Bentinck by General Bower was deserved, and I will ask you to join me in giving a cordial vote of thanks to him for his paper.

FROM THE VICTORIA NYANZA TO THE KISII HIGHLANDS.*

By FELIX OSWALD, D.Sc., B.A., F.G.S.

THE immediate object of my journey last winter to the Victoria Nyanza was the investigation on behalf of the British Museum of some Miocene deposits found early in 1911 by Mr. G. R. Chesnaye near Karungu, on the east coast of the lake. Subsequently Mr. C. W. Hobley, C.M.G., H.M. Provincial Commissioner, presented to the British Museum a fragmentary mandible of a *Dinotherium*, and some other fossils which had been collected at his instigation by the late Mr. D. B. Pigott, a Government official, who was shortly afterwards killed by crocodiles when his raft was upset by a hippopotamus he had wounded. Much interest had been aroused in scientific circles by Dr. C. W. Andrews' description of the specimen, and since nothing was known of the nature of the deposits in which it was found, I offered to collect specimens and to make a thorough examination of the locality.† To save time in reaching Karungu, H. E.

* Royal Geographical Society, December 16, 1912. Map, p. 200.

† By the generosity of Mr. Charles Storey, together with the Rev. R. Ashington Bullen, Sir Henry Howorth, Dr. G. B. Longstaff, Dr. A. Smith Woodward, and

towns of this region are appreciatively described. Travellers of musical inclination will find interest in the collection of old local airs in an appendix.

'Austria: her People and their Homelands.' By J. Baker. (London: Lane. 1913. Pp. xiv., 310. *Map and Illustrations*. 21s. net.) The author comments rightly on the paucity of English works on Austria; he is less fortunate when he adduces as an example of English ignorance certain views as to the extent of the Carpathians, and then describes them as sweeping "round southern and eastern Austria for the length of over eight hundred miles." He has travelled widely to collect material for this volume, which contains a mass of miscellaneous information under a fairly systematic arrangement; there are some excellent illustrations, and it is unfortunate that that chosen as the frontispiece, and representing Cattaro, is quite inaccurate in regard to the position of that town.

'Langholm as it was.' By J. and R. Hyslop. (Sunderland: Hills, etc. 1912. Pp. xv., 922. *Maps and Illustrations*. 7s. 6d. net.) This is a local history of Langholm and Eskdale, beginning from the earliest times, and carried down to the recollections of a lifelong inhabitant but recently dead. It is interesting to trace the development of modern methods of transport in these more remote districts. The whole volume is a monument of patient research; it is also one of the heaviest of its size which has ever come into our hands. Some interesting maps are given, such as the reproduction of Bleau's map of 1662, still retaining miniatures, and, of course, showing relief in perspective.

'A Wanderer in Florence.' By E. V. Lucas. (London: Methuen. 1912. Pp. xi., 391. *Maps and Illustrations*. 6s.) Mr. Lucas is well known as an author of what may be termed "wayside" books, so that, although the subject which he treats in this volume is thoroughly covered by previous writers, it may be taken for granted that what he has to write of it is worth reading. We are also provided with many photographs, of which those showing close details of art are specially good, while some of the coloured pictures are well above the average.

'The Cities of Lombardy.' By Edward Hutton. (London: Methuen. 1912. Pp. ix., 322. *Maps and Illustrations*. 6s.) Mr. Hutton, again, is a writer who is splendidly qualified to deal with Italy on "wayside" lines. The familiar histories of the great Lombard cities of the north Italian plain are here retold, and we find also some pleasing descriptions of the plain itself, given with an intimacy far beyond that of the ordinary traveller. The northern lakes also come in for treatment, and the whole is well illustrated.

ASIA.

THE INDIAN SURVEY.

'Records of the Survey of India.' Vol. 1: 1909-10. Prepared under the direction of Colonel S. G. Burrard, C.S.I., R.E., F.R.S. Calcutta. 1912.

The Indian Survey Reports have assumed the above title with the new issue which marks the reorganization of the Department. The report is distinctly technical in character, and it is, at the same time, comprehensive, without including any of those picturesque narratives which enlivened the pages of former publications. A good deal may be said in favour of compressing a report of this class into the smallest compass consistent with full and fair explanation of its subject matter, but there still remains something to be regretted in the loss of much interesting and useful geographical information which, unless it appears in the pages of this report, will certainly never appear at all.

The Record for 1909-10 opens with the Topographical Surveys. Ten parties were at work in the northern, southern, and eastern circles in scattered detachments, the scale of mapping varying between 1 inch, 1½ inches, and 2 inches per mile. Altogether about 34,000 sq. miles of country were mapped (including a certain amount of revision) of which over 5000 miles were in the Punjab. This includes every class of country from the flat and open plains of the north-west to the dense jungle-covered hills of Eastern Bengal and Burma. Naturally the cost per square mile differs accordingly; varying from five and a half to twenty-five rupees per square mile, inclusive of mapping. This, it may be noted, is a very considerable reduction from the costs under similar conditions which obtained some time ago. On the whole, the method adopted for the work of revision was not found satisfactory. The existence of previous mapping, when placed in the hands of the native plane-tables, must undoubtedly prove to be something of a temptation to "fudge"; whilst the introduction of contours practically necessitates a complete re-survey.

Triangulation of a first-class character was extended in Northern Baluchistan, in Kashmir, and along the Irawadi. Apparently no larger instrument than the 8-inch micrometer theodolite was used for observations on certain very high peaks.

With the triangulation, observations to test the value of mercury barometers, aneroids, and hypsometers as height-measuring instruments were recorded, with the result that "the aneroid barometers differed greatly from one another and from the mercury barometers. The mercury barometers, so long as both were intact, gave sensibly the same readings, but the deduced heights were too small. The hypsometers invariably gave a height considerably in excess of that obtained by triangulation. At 16,000 feet the excess was as much as 600 feet." For the ordinary mountain climber these results (which are further elaborated in an appended table) should be most suggestive. There follows in the Records a valuable report on the levelling operations. There, again, a comparison of results with G.T. values is most instructive. The triangulated values were generally in excess (as much as 20 feet on one hill station) of those deduced by levelling, but the error varied between + and - in the Indus flats and seldom exceeded 1 or 2 feet either way. The great difficulty of preserving immovable markstones always faces the Indian surveyor and introduces an element of uncertainty into his results. Even a record graven on native rock may be liable to displacement by earthquake. Observations of latitude for geodetic purposes were systematically continued, and the question of isostasy as applied to India was investigated. In connection with this intricate subject it is worth while to quote a remark of Colonel Burrard's on page 87 of the Record, where he refers to the "weaknesses inherent in all mathematical methods of treating questions regarding the constitution of the Earth's crust. We are attempting to apply invariable rules and methods to a subject where every variety of condition may exist." The pendulum, magnetic, and tidal observations, and the elaborate tables relating thereto, fill quite half the volume. They are doubtless most valuable records, but no new proposition of general interest arises from them. They are simply the records of patient systematic investigation. The few pages devoted to the work of the photo-litho office might well have been extended. Experiments in the direction of colour photography are specially interesting; and we can only hope that the great problem of a system of map reproduction in Calcutta really worthy of the excellent character of the field work may ultimately be solved.

T. H. H.

THE HIMALAYA.

'Karakoram and Western Himalaya, 1909.' An account of the expedition of H.R.H. Prince Luigi Amedeo of Savoy, Duke of the Abruzzi, by Filippo de Filippi, F.R.G.S. With a Preface by H.R.H. the Duke of the Abruzzi. Put into English by Caroline de Filippi *nee* Fitzgerald and H. T. Porter. *Illustrations from Photographs taken by Vittorio Sella.* London: Constable & Co., Ltd. 1912. Price 63s. net.

A notice of the Italian edition of these fine volumes has already appeared in this *Journal* (vol. 39, p. 598), but the publication of the English edition presents an opportunity for further mention of some of the more technical points discussed by the author. For besides being a most readable account of a memorable expedition, Dr. de Filippi's book is a serious geographical work. Almost every chapter raises interesting points in physical geography, and discusses them in such a manner that the most ordinary reader has no difficulty in following the argument. Particularly interesting is the discussion of the past history of the Indus valley. The author appears sceptical as to the capacity of the lacustrine theory to account for the deposits actually found and to which he is inclined to attribute a fluvial origin during some former moister period.

The strange fact which has puzzled previous observers that the Baltoro and others of the longest glaciers in this region present no frontal moraine, is ascribed by the author to the immobility of the terminal portion, which has in fact become a mass of mere stagnant ice. Though slight degrees of advance or recession have been noted, yet in comparison with their great length the lower ends of these glaciers have remained relatively stationary for many years. Awakened activity on the part of the glacier might result in a flow of ice over the older stagnant portion and there is indeed an indication that this has actually occurred in the illustration on p. 183, and on the beautiful plate facing p. 186; or if the pressure were sufficient the underlying mass might be revived. This theory is a plausible one, and the present writer has observed what would appear to be a further stage in this process in south-west Tibet, where masses of dead ice deeply covered with moraine extended about a third of a mile below and completely severed from the living ice of the Gurla glacier. The author objects to Dr. Workman's habit of classifying as "nieves penitentes" diverse ice-formations "which have neither origin, production, nor composition in common." With reference to the longitudinal ice-ridges chaotically broken across but not crevassed, which are found on the Baltoro and other glaciers, he is convinced that uneven melting due to varying thickness of the moraine layer is the main factor, though he does not altogether discard the theory of lateral pressure advanced by Sir Martin Conway and Dr. Workman.

The singular fact that the most careful barometric readings consistently gave a lower value than trigonometrical observations gives occasion for a most suggestive reference to variations in gravity.

With regard to anthropology, the author agrees with Ujfalvy, against practically all the other authorities, in ascribing to the Baltis an Aryan as against a Mongol origin. Though there were no opportunities for strict anthropomorphic investigations, many of Mr. Sella's illustrations appear to bear this out, as does a Balti skull obtained in the Saltoro region and now in the museum at Oxford. For the Balti coolies the author has nothing but praise, and indeed the testimony in their favour is all but unanimous amongst mountaineers, who should be the first to admit that such successes as they have gained in these inhospitable regions would have been impossible without their services. Fortunate indeed

are subsequent visitors when their predecessors have left behind them such a good record for fair dealing as in the case of the members of this expedition.

H. R. H. the Duke of the Abruzzi undertook this expedition chiefly to contribute to the solution of the vexed problem as to the greatest height which may be reached by mountaineers. In this he attained a remarkable degree of success. He and his guides lived for thirty-seven days at or above 16,000 feet, and then for another seventeen were never below 18,000 feet, of which nine were spent at or above 21,000 feet. K_2 proved unassailable, but two high ascents, both marred by bad weather, were made on Bride peak. On the last attempt, starting at 5.30 a.m. from their camp at 22,483 feet, the highest camp yet made, they reached a height of 24,600 feet at 1 p.m., having been delayed by bad snow conditions and a laborious climb up a rib of rock which cost considerably more time to accomplish at such an altitude than a similar stretch of snow. Here they waited in vain for two hours, hoping that the mists would clear away and show them a safe route along the dangerous snow cornices on either hand, where it would have been madness to venture under such conditions. Thus it was that under adverse circumstances the Duke carried the "man-level" 700 feet higher than any previous mountaineer. It was not the low atmospheric pressure of $12\frac{9}{32}$ inches which stopped them. If those last two hours had been clear there is hardly a doubt that the Duke would have attained the actual summit of Bride peak, 25,110 feet. In spite of almost continuous bad weather at his highest camps and a consequent degree of hardship which it must be admitted few constitutions would be capable of resisting, the Duke and his guides seemed to have been little the worse for their exertions except for marked loss of appetite and weight. They slept without difficulty. They did not suffer from mountain sickness. It is obvious that the limit has not yet been reached. But the prize is for the very few in any generation.

With regard to the very numerous illustrations and the large panoramas, Mr. Sella's name alone is a sufficient guarantee of excellence. They combine with the letterpress to give an extraordinarily vivid description of a marvellous region. The translation has been well done in spite of the lamentable blow of fate which prevented the same hand from finishing the whole task. The appendices are of great interest, especially that on the Photogrammetric Survey by the Marquis Negrotto, and on the geological results by Messrs. Novarese and Oldham. A feature of the book, only too rare nowadays, although it never fails to enhance any narrative of travel, is the careful manner in which the author has read, digested, and given references to the work of former travellers in this region. In addition to writing a most interesting account of a memorable expedition, Dr. de Filippi has given us the best book of reference extant on this region.

T. G. L.

AFRICA.

MOROCCO.

'Le Maroc Physique.' By Louis Gentil. Paris: Félix Alcan. 1912. Pp. 319. Price 3 fr. 50.

It is with great pleasure that we welcome the first attempt to give in book form a review of our present knowledge of the geology and physical geography of Morocco. During the last decade Louis Gentil has himself been responsible for much exploration in different parts of Morocco, and the results of his labours have appeared from time to time in various scientific journals.

In this book we find that where reliable data exist they are handled in a clear and convincing manner; where the author considers the data insufficient he

fate was as much against him here as it had been for him at Hejaz. He ventured to Hodeidah in his own proper character, avowing his genuine intentions. The Turks promptly concluded—of course they did!—that, whatever his real intentions might be, they were not at any rate what he was pleased to profess. The moment was unfavourable. Chronic disorder was gathering into a general rising against the Ottoman occupying force. Mr. Wavell's arrival was believed to be not unconnected with this coming outbreak. He was treated as a spy, dogged, and reported on. Weary of asking to be allowed to go up country, he took French leave at last and rode into Sana'a, having forestalled the news of his departure by an hour or so. Hardly was he there before the Imam's hordes appeared and laid siege to the place. He remained till a force sent from Constantinople effected the relief, and then found that, after all his waiting, he was to be sent back, not forward. He got out of Sana'a by a ruse, but through the bad faith of an accomplice was captured and put under closer guard than ever. Finally he was sent back to Hodeidah.

On his misadventures at Sana'a Mr. Wavell based a serious complaint to the Foreign Office, and a claim for compensation, and he puts his case before his readers. It will perhaps seem less strong to every one else than to himself. He played with much courage, astuteness, and science a game of bluff—or, perhaps, rather of hide-and-seek—with the local Ottoman authorities, and lost it after a very fair run for his money. There, we venture to think, he had better have left the matter. If, strictly speaking, owing to the anomalous position of Europeans in Turkey, his rights under treaty were infringed by the refusal of the authorities to let him go wherever he pleased in Yemen, it was hardly reasonable to insist on those rights in Arabian Turkey; and he might reflect that no other Power, if it had been occupying Yemen at that moment and in that state, would have allowed him to go about the country at his own sweet will. If he wishes to get to Marib and beyond, he must not expect the Turks to further him with their blessing until their position in Yemen is vastly better than he himself has painted it.

Mr. Wavell does not profess to set forth geographical matter in this book. Nor had he much opportunity of adding to our knowledge. A pilgrim following the well-worn Mecca tracks, and bound to keep himself to himself, cannot hope to tell us as much as Snouck-Hurgronje and others have told us already. But it is interesting and not without scientific importance to get a fresh first-hand account of Medina and Mecca at the present day, as well as of Sana'a and the Hodeidah road. Mr. Wavell's is the best description of the capital of Yemen since Manzoni's, and the juncture at which he visited the place enabled him to learn a good deal about the political condition of South-Western Arabia in general. We should like to have heard more, even at hearsay, about the Imam's country and the communications with Mecca, and perhaps some day Mr. Wavell may tell us this. His courage and his qualifications are so singular that it will be more than a pity if he is not encouraged to revisit Arabia.

D. G. H.

THE INDIAN NORTH-EAST FRONTIER.

'In Abor Jungles; being an account of the Abor Expedition, the Mishmi Expedition, and the Miri Mission.' By Angus Hamilton. London: Eveleigh Nash. 1912. *Maps and Illustrations.* Price 18s. net.

Mr. Angus Hamilton, who has lately been very busy between Bulgarians and Turks, has written a most useful account of the late little frontier campaign against the Abors which was carried through successfully, without a single

contretemps which could rank as a disaster, by Sir Hamilton Bower. It is very seldom that these little frontier wars, which necessarily entail the employment of several columns of troops acting more or less independently, are brought to a conclusion without any episode of a disagreeable character calling attention to their existence in the public press. When no such episode occurs the ignorance and apathy of the public mind with regard to them remains undisturbed. No such episode occurred under General Bower's able management, or that of his equally able staff—consequently, the public knows little and cares little about the Abor expedition. Mr. Hamilton's book, then, is a sort of revelation to those whose interest in the subject could only be kept alive by stray little paragraphs in the newspapers from time to time, and its usefulness is all the greater that, added to a vivid and picturesque account of the north-east frontier tribes generally, of their manners and habits, and of the unpleasantly fascinating jungles in which they live, there is a short epitome of all previous missions which have taken place on this part of India's frontier within the last century. The action of the three columns which formed the expeditionary force against the Abors under General Bower is followed out in most lively detail, and we now hear something, for the first time, of two other almost simultaneous expeditions which were pushed into the Mishmi and the Miri countries respectively for definite political purposes. The Mishmi expedition under Mr. Dundas was for the purpose of finding out the exact extension of Chinese occupation in advance of Rima along the Lohit Brahmaputra. The Miri mission was carried out under arrangements made by the Assam Civil Government for the apparent purpose of effecting a peaceful promenade amongst the friendly Miris. But it was found that the Miris were anything but friendly, and the oft-repeated blunder having been committed of placing the mission under Civil Control, there was as near a disaster in the heart of the Miri hills as any soldier would care to risk. In fact, but for the gallantry of Captain Graham who commanded the escort, and who on extremely short notice (he was roused out of bed) shot down ten armed tribesmen who formed part of a gang bent on raiding the camp, that camp would certainly have been annihilated.

To appreciate the awful difficulties of a campaign in jungles such as those of the North-East Himalayan foothills, infected with poisonous insects, "80 per cent. of which stung and 20 per cent. stank," and beset with myriads of ingenious devices for the sudden destruction of the unwary invader, one should read Mr. Hamilton's fascinating description of them. "Little wonder," he says, "that the Abors regard these haunts as inviolable, for dark, mysterious, and rising like some evil enchantment before the traveller, the forest presents an impregnable rampart of trees and undergrowth, impassably entangled." "There was, too, not a little mystery in the almost total stillness and the dim half-lights of the dark glades. From their moist recesses Nature defied herself, for, while every form of tropical growth preyed upon its neighbour, one and all combined to suspend the curtain of their entanglements before the sun." It was in the twilight of jungles such as these, and under a canopy of perpetual and torrential rain, that the columns moved slowly to the appointed end. There was no lack of fighting before that end was attained, and some of the best stories in the book are those which tell of the splendid courage of the attack and the occasional desperation of Abor defence. There are numbers of most excellent photographs in the book, from which it is easy to gather that these children of the mists and the forests are no children when it comes to hard blows. Mr. Hamilton's book should be a text-book for frontier students. The geographical results of the expedition have yet to be fully worked out.

T. H. H.

SIBERIA.

'Siberia.' By M. P. Price. London: Methuen. 1912. Pp. xxviii., 308.
Maps and Illustrations. 7s. 6d.

There is probably not in the department of Commercial Geography at this moment any more interesting comparison or contrast to be drawn than that between Siberia and Canada. To this Mr. Price refers on the first page of his preface, and any one who reads the book with consideration for the future possibilities of Siberia will get a better understanding of them by keeping the Canadian model in mind. Canada has not been closed to all nationalities save British, as Siberia has to all save those of the Russian empire; it is approached by an easy seaway from its insular mother-land, while from Russia the land-ways are long and costly, and the seaway, though Wiggins proved its feasibility, is beset with difficulties. Siberia lacks any parallel to the natural route of the St. Lawrence and the Great Lakes. On these and other grounds, it is hardly conceivable that under existing conditions Siberia should, in an economic sense, overtake and excel Canada; yet, considering natural resources independently of the present means of making use of them, it is possible to foresee Siberia victorious in the race, as the author does. In the mean time, he describes not only the economic possibilities of the country, but also its social and administrative conditions and problems, with an authority which is the outcome of wide travel both on and off the better-known routes. This he was enabled to undertake by accepting an invitation to accompany the expedition of Messrs. Carruthers and Miller, with whose scientific results Fellows and readers of this *Journal* are well acquainted. Among several maps in this volume is an interesting one of the vegetation zones of Western and Central Siberia; there is also an ethnographical map, and in studying the two side by side, some need is felt of one which adequately shows the relief of the land. The chapter on the present economic conditions of this area is suitably prefaced with a short survey of its geography, in so far as it affects those conditions. In the same connection, as bearing upon the direction which economic development has taken thus far and may be expected to take in the future, not the least valuable part of the author's work is his account of the inhabitants of some of the remote settlements which he visited; he spent considerable time in some of them, and came to know the people unusually well.

THE ABOR EXPEDITION.

'On the track of the Abor.' By Powell Millington. London: Smith, Elder & Co. 1912. 3s. 6d. net.

An unpretending little volume of some two hundred pages, descriptive of the incidents that enlivened the many discomforts of the Abor expedition. The author takes all his numerous and other trying experiences with perfect sang froid and good-humoured philosophy, which are probably the best frame of mind in which to meet the uncouth manners and customs of these semi-savage mountaineers. Some may hesitate to believe that the recent expedition is likely to have brought about any permanently tranquillizing effects on the north-eastern frontier. There can be no doubt, however, that sooner or later intercourse between Assam and the Tibetan and Chinese trans-frontier tracts will be regulated and roads and communications improved. The three powers concerned will then find the Abors too much of a nuisance to tolerate the practices—raids and murders and the like—in which hitherto they have too freely indulged, and which will obviously require a strong hand to be definitely eradicated. It is a pity that there are no photographs to convey a general idea of what the Abor country is like.