

Survey of India Department,

GENERAL REPORT,

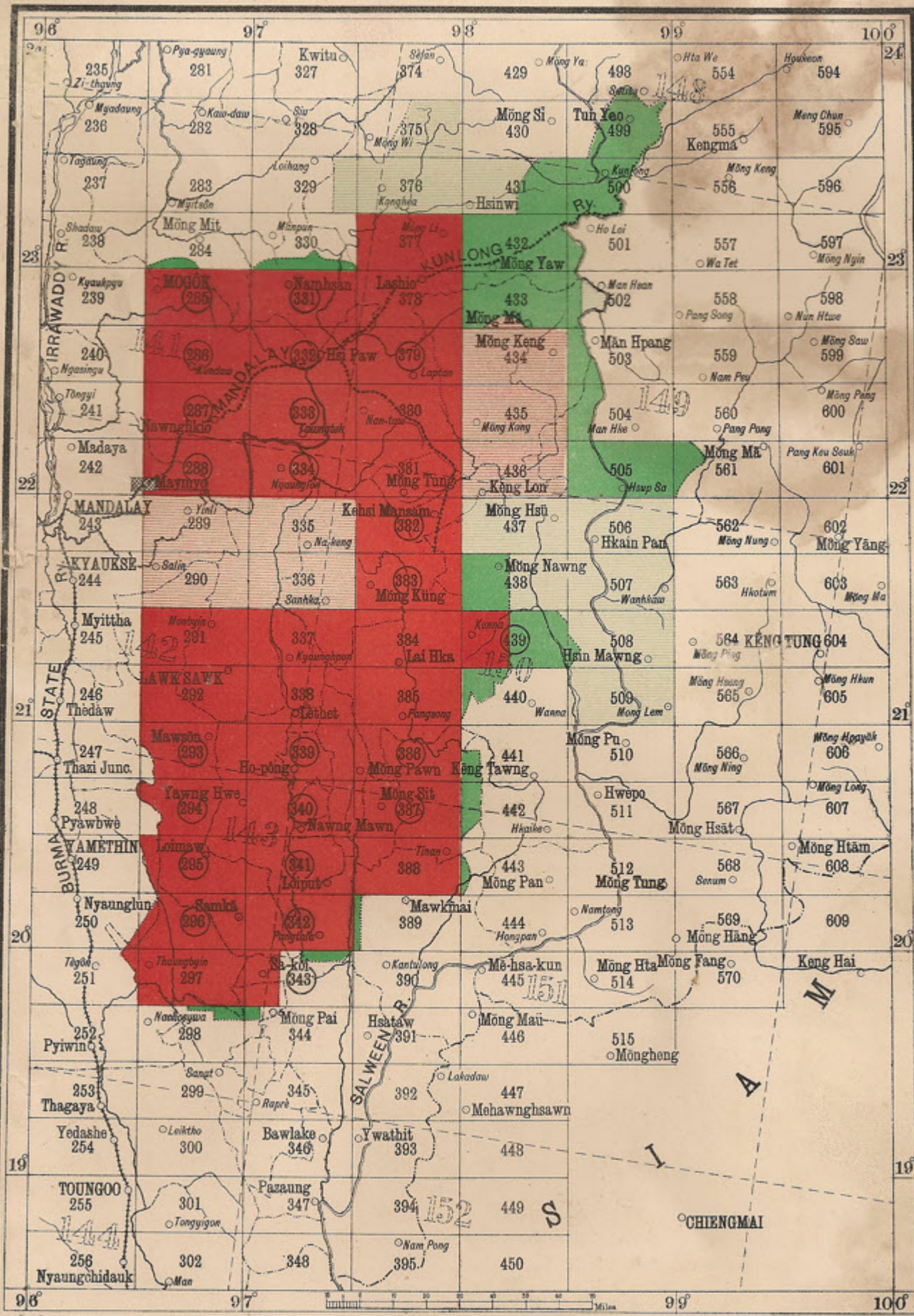
1899-1900.

UPPER BURMA SURVEY

INDEX TO THE TOPOGRAPHICAL SURVEY IN UPPER BURMA & SHAN STATES

1899-1900.

Nos. 11 & 21 PARTIES.



Reg. No. 430, S. I. D.—Feb. 01.—550

Photo. S. I. O., Calcutta.

NOTES.

The numerals 243, &c., indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

REFERENCES.

Sheets published are shown thus 240
 Area previously Surveyed
 Surveyed during 1899-1900
 Triangulated during previous seasons
 during 1899-1900
 Maymyo Survey, 16 Inches = 1 Mile, 1898-99

No. 320-S. 01.

44. In connection with the Magnetic Survey about to be inaugurated, Captain H. A. D. Fraser, R.E., proceeded to England on deputation on 18th May 1899 to arrange for the purchase of Magnetic instruments and to study the methods of observation in vogue at Kew. When his period of deputation expired on the 30th June 1899 he remained in England on furlough till 30th September 1900. He was replaced on duty in England under the orders of the Secretary of State for India on 1st October 1900, and he is expected to arrive in India in December 1900, when he will be given charge of the Magnetic Party that is now being formed. Dehra Dún has been selected as one of the base-stations of the Magnetic Survey, and a Magnetic observatory is being built there. Sub-Assistant Superintendent Aulad Husein has been appointed the Magnetic observer at Dehra Dún: he joined at Dehra Dún on the 11th May 1900, and during the summer studied the theory of Magnetism, the methods of observation, and the use of the instruments.

GEOGRAPHICAL SURVEYS AND RECONNAISSANCES.

45. Under this head are included surveys and reconnaissances which are executed on the scale of $\frac{1}{2}$ inch = 1 mile or smaller scales. During the year an area of 3,256 square miles was surveyed on the $\frac{1}{2}$ -inch scale in Kashmir and reconnaissance surveys over an area of 27,515 square miles on the $\frac{1}{4}$ -inch and $\frac{1}{8}$ -inch scales were carried on in the North-Western frontier.

On the Eastern frontier Captain Ryder spent the field season in reconnaissance work in Yunnan, adding largely to our geographical knowledge of that region. The party under Major Renny-Tailyour which was attached to the Burma-China Boundary Commission also reconnoitred a considerable area of country and a party under Captain Robertson accompanied a military expedition against the Mishmi tribe on the extreme north-eastern frontier of Assam and made a reconnaissance survey of 808 square miles on the $\frac{1}{2}$ -inch scale.

Captain Hare with Mr. Hertz as a Political Officer was engaged for part of the season in exploring the Nmai Kha, the Eastern branch of the Irrawaddy.

The total area reconnoitred on this frontier on the $\frac{1}{4}$ -inch scale during the season amounts to upwards of 92,000 square miles.

HEAD-QUARTERS OFFICES.

46. The details of the work done in the various offices at head-quarters are given in Part III of the report. The offices in Calcutta, as usual, were supervised by three Assistant Surveyor-Generals; Mr. A. E. Spring continued in charge of the Drawing, Engraving and Map Record and Issue Offices and also of the Bengal Provincial Drawing Office up to the 28th June 1900, when he proceeded on leave and Major J. M. Fleming, I.S.C., succeeded him, continuing in charge up to the close of the year. Mr. T. A. Pope continued in charge of the Photo-Litho. Office throughout the year. The Correspondence and the Mathematical Instrument Offices were at different periods under Captain P. J. Gordon, I.S.C., Majors J. M. Fleming, I.S.C., and F. B. Longe, R.E.

47. The geographical section of the Drawing Office has again been busily employed with the maps of the N.E. and S.E. Frontier Series; new editions of three sheets have been published and of 17 are under publication while 17 other sheets have been brought up to date.

Of the 1-inch standard sheets 14 new sheets of Upper Burma and one of Assam have been published in addition to 18 sheets of the special survey of the Burma-China boundary. New editions of 72 sheets of various parts of India have also been published, while 15 new sheets of Upper Burma, one of Assam and one of Bombay and new editions of 11 various old publications are in hand, three being sheets of Upper Burma.

48. The maps of India on various scales have all been in hand for revision in the matter of railways, boundaries, &c. Sheet No. 4 (Burma) of the 32-mile engraved map has had much additional topographical work added to it which has also been drawn for engraving on the duplicate plate of the map of India on the scale of 1 inch = 64 miles. A new map on this last scale is being compiled and has been projected on copper.

49. The stones of the 32-mile lithographed map of India have become quite worn out, and a new set is being prepared by transfers from the engraved

skeleton plates, which will be brought up to date ; the hills being drawn on the stone for publication in two colours.

50. The Railway map of India on the scale 1 inch = 32 miles has been brought up to date. The District maps on the scale of 1 inch = 8 miles, the Provincial maps on the scale of 1 inch = 16 miles and the Administration maps on various smaller scales are all brought up to date.

51. As usual there has been a large amount of work in the way of map making and supplying professional data for other departments, and these demands which are almost continuous and increasing have much interfered with and retarded the legitimate work for which the office was designed. In many cases it is quite plain the applicants do not appreciate the amount of work their demands entail. The most important non-departmental map in hand has been that for the new Bengal Route book drawn for reduction to half (1 = 32 miles) scale. Proofs of this were sent for examination, but were returned with numerous additions and corrections, and it must be some considerable time before the map can be issued. The Military map of India on the same scale was also completed during the year and published. Maps of China on the scale of 1 inch = 72·8 miles, and the Yangtze Valley were drawn in two colours, at very high pressure, necessitating the suspension of all other work, in response to an urgent demand from the Quarter-Master General. The preparation of a set of provincial maps for Census purposes has also been commenced.

A beginning has been made of a much needed revision of the Provincial map catalogues and those of Bengal and Punjab have been completed. That of the North-Western Provinces is in hand.

52. In the Revenue Section the map of Calcutta in two sheets on the scale of 6 inches = 1 mile which was prepared last year has had additional material and corrections added and is at press. Seven sheets of Burma on the 1-inch scale have been revised from material supplied by the Director, Land Records, Burma, from local surveys on the scale of 16 inches = 1 mile. Two sheets of Pesháwar district have been compiled on the scale of 1 inch = 1 mile from the 4-inch settlement trace maps which are themselves reductions from the original *patwáris* surveys. The publication of these sheets has been delayed owing to discrepancies between them and the professional surveys which they meet on the north.

53. A number of standard sheets of the North-Western Provinces, Bengal and Burma have been brought up to date, also 18 sheets of Assam and of Bombay and Sind. The republication of the old Bengal sheets is a most unsatisfactory undertaking. The originals being drawn in colours are not fit for reproduction and lithographed copies have to be utilized as originals. An immense amount of touching up is entailed and after all a most unsatisfactory result is obtained.

54. The comparison of the coloured office copies of maps from which issues for the public are made with those on which corrections are from time to time entered as received, as well as the replacing of dilapidated sheets has been commenced. A large number of volumes of computations were received from the field parties and cursorily examined, and copies of traverse data, village maps, etc., have been supplied to officers of the department and other Government officials.

55. In the Cadastral Section 4,402 sheets were published of which 3,522 belonged to Burma, 213 to Bengal (Tikári Ward's Estate, district Gaya), and 667 to Assam.

56. The Bengal Provincial Drawing Office continued the compilation of standard sheets from the cadastral maps of Bihar, Orissa and Chittagong. The outlining and typing of six standard sheets of Bihar were completed ; also the outlining and typing of two standard sheets of Chittagong and one standard sheet of Orissa was drawn, completed and reduced by photography. Of the special edition of maps on the scale of 2 inches = 1 mile for the Government of Bengal, showing the irrigated area of Orissa, nine sheets were published. Owing to numerous corrections to the village names on the standard sheets by the Settlement Department, a very large percentage of the names had to be retyped and the sheets had again to be photographed, consequently the publication of the maps has been delayed.

57. The work in the Engraving Office has steadily continued to progress. The preparation of the quarter sheets of the Atlas of India has been the chief

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104. The total cost for the season, R87,418, is higher than it was last year. This excess is due to having to keep up permanent carriage during the whole season for the supply of rations to the men working in the less populated parts and a change in the transport used. Bullocks had to be substituted for carts to take the party out, and bullock transport is very expensive. The cost-rates are therefore somewhat higher.

Triangulation for the 1-inch survey, R111.

Detail survey on the 1-inch scale, R20'4.

105. The programme for next season is:—The detail survey of sheets Nos. 456, 457, 525 and 526 and the triangulation of sheets 459 to 462 and 529 to 531.

The Surveyor-General inspected the party on the 11th and 12th September, and expressed himself as quite satisfied with the state of the work.*

UPPER BURMA.

No. 21 PARTY.

106. This party was in charge of Mr. James at the beginning of the year. On the 25th October Captain

Personnel.

Captain C. H. D. Ryder, R.E., Officiating Deputy Superintendent, 1st grade, on special duty.

Captain H. J. Hare, R.E., Officiating Deputy Superintendent, 2nd grade, in charge from 25th October to 17th November 1899, and from 25th August to 25th September 1900.

Mr. C. F. Hamer, Extra Assistant Superintendent, 2nd grade, from 18th September.

Mr. A. J. James, Extra Assistant Superintendent, 2nd grade, in charge to 24th October 1899.

Mr. H. Todd, Extra Assistant Superintendent, 2nd grade, in charge from 18th November to 24th August 1900.

Mr. W. F. E. Adams, Sub-Assistant Superintendent, 1st grade.

Mr. P. Williams, Sub-Assistant Superintendent, 2nd grade.

Ikbaluddin, Khan Sahib, Sub-Assistant Superintendent, 3rd grade.

Mr. S. S. McA'F. Fielding, Sub-Assistant Superintendent, 3rd grade.

Mr. P. A. T. Kenny, Sub-Assistant Superintendent, 3rd grade.

Surveyors and Sub-Surveyors.

Lachman Jadu, Ganu Mal, Natha Singh, Muhammad Latif, Kudrat Ali, Jamna Pershad, Keshao Jadu, Abdul Gafur, Hazrat Ali, Permanand, Samshuddin and four Probationary and Apprentice Sub-Surveyors.

107. The party left recess quarters at Bangalore on 2nd November 1899; left Mandalay between 21st to 28th November and proceeded to Mōng Yai the capital of Southern Hsinwi in the Northern Shan States, where the temporary head-quarters were established and returned to recess quarters on 1st June 1900.

108. Triangulation in advance and revision triangulation was carried out; the former in parts of sheets 329, 375, whole of 376 and 431, and the latter in parts of 432, 433 and 434. The detail survey of sheets 434, 435 and 436 and a small portion of 433 on the scale of 1 inch to a mile was completed. The proposed programme of the season was thus fully carried out, inclusive of the preliminary triangulation and theodolite traverses for the large scale (16 inches to a mile) survey of Hsi Paw town and environs.

109. The outturn of work is as follows:—

	Square miles.
Triangulation for 1-inch survey	1,535
Revision triangulation	1,575
Triangulation for Hsi Paw (Thibaw)	81
Detail survey on the 1-inch scale	1,701
Reconnaissance survey in Yunnan $\frac{1}{4}$ -inch scale	92,400

* Mr. Doran reports in very high terms of the work of all his European assistants, but specially singles out Mr. Kelly for his cheerful and willing assistance. Babu Roy for the first season has done well.

The surveyors and sub-surveyors with three exceptions are reported on favourably. Among the native staff, Hayat Muhammad is prominently brought forward.

110. The total cost of the party from 1st October 1899 to 30th September 1900 is Rs. 1,05,210, and the cost-rates *per* square mile are as follows:—

	R	a.	p.
Triangulation for 1-inch survey	9	14	7
Detail survey „ 1-inch scale	17	12	2
Triangulation for Hsi Paw (Thibaw) 16-inch scale	17	5	10

which figures compare favourably with last year's returns.

111. The health of the party was very good throughout the field season, there being no serious cases of illness and only a very few of ordinary intermittent fever.

112. The country surveyed in detail included parts of Kehsi Mānsām, Mōng Hsū, Mōng Nawng, and Kēng Lōn in the Southern Shan States, and parts of Northern and Southern Hsinwi States, Mōng Tung and Mang Lūn in the Northern Shan States. The ground is all very hilly, and more or less covered with heavy tree and scrub jungle. The highest hill (Loi ling, 8,771 feet above sea level) in the Northern Shan States fell in the area surveyed during the season. On this hill indigenous tea trees are found, which attain the height of forest trees, and many of which have a diameter of a foot or more.

113. The programme for the coming season is to survey in detail on the 1-inch scale sheets 431, 432 and the unsurveyed portion of 433, the large scale survey (16 inches to a mile) of the town and environs of Hsi Paw (Thibaw) and to triangulate sheets 282, 283 and the untriangulated portions of 284, 328, 329, 330 and 375.

114. The Surveyor-General inspected the party on the 6th and 7th September 1900, and was quite satisfied with what he saw of maps, records, etc., of the party.

115. Captain Ryder was employed on special duty throughout the year on exploration surveys in China in company with Captain H. R. Davies of the Oxfordshire Light Infantry and Major Manifold, I. M. S. He also took with him 4 native surveyors from this party. Starting from Bhamo at the end of November 1899, the various members of the party travelled independently till early in April 1900, when they met at Atentzū in the extreme north of Yunnan, whence the native surveyors returned to Bhamo by way of the Mekong river. The rest made their way to Shanghai *via* Batāng and the Yangtse river, which they struck at Yachou, reaching Shanghai unharmed just after the recent outbreak of disturbances in China. The total area of reconnaissance surveys carried out by Captain Ryder and his companions on the $\frac{1}{4}$ -inch scale is some 40,000 square miles.

116. Captain Hare joined a military police expedition that was despatched from Myitkyina towards the end of November 1899 for the purpose of defining and mapping the watershed of the Salween and Nmai-kha rivers and tracing its connection with the Burma-Chinese boundary. Starting from a point on the Nmai-kha about 20 miles above its junction with the Irrawaddy, up to which it had already been mapped, he has made a reconnaissance survey on the scale of 4 miles to the inch of the Nmai-kha river for a distance of about 50 miles, including the whole of the basin on both sides. The area mapped is about 1,320 square miles. The expedition returned to Myitkyina about the middle of March having experienced very bad weather with constant rain and intense cold, some of the hills visited running to an altitude of 12,000 feet. Their movements were also much hampered by mule transport which necessitated a good deal of road making, and also to the fact that the probable attitude of the inhabitants had often to be ascertained before an advance was made. Unfortunately, no detailed report of Captain Hare's journey is forthcoming, as he fell ill in October 1900, while on leave, and died in Ceylon to the great regret of all who knew him.*

* The officer in charge reports that Messrs. Adams and Williams have rendered valuable assistance, and that Messrs. Fielding and Kenny did well in their first year. Of the surveyors and sub-surveyors the following are reported to have done well:—Lachman Jadu, Natha Singh, Kudrat Ali, Jamna Pershad, Keshao Jadu, Abdul Gafur, Hazrat Ali, Shamsuddin and Ramsaran.

Opposition on the part of the inhabitants to the progress of the expedition through the country there was practically none, as, although the path on the north side of the pass had been stockaded at one point and some 20 stone-shoots built commanding it, the stockade was not held nor were the stone-shoots released. Such Mithun villages as were visited and burned were in every case found to be deserted. The villages in most cases appear not to be built with a view to defence, though some of them were found with a bamboo stockade of sorts round them.

The hardships undergone by all members of the detachment in carrying out the survey of a country presenting the natural difficulties met with in the Mishmi country, in the middle of winter, with continued bad weather and on a scale of transport which not only precluded the taking of tents but also of any but the veriest necessities in the matter of warm clothing, blankets, etc., have been considerable, but, with the exception of the very heavy losses among the Khásia coolies supplied for the transport of the detachment, the health of all members throughout has been excellent. Should it ever be considered necessary to visit this country again for survey purposes an earlier period of the year (the end of October to the beginning or even the end of December) than that during which it was visited in the present case would probably allow of finer weather being experienced than was met with in this expedition.

Narrative Report by CAPTAIN C. H. D. RYDER, R.E., on his work in Yunnan, season 1899-1900.

During the previous field season the party under Captain Davies, Oxfordshire Light Infantry, had travelled over the greater part of Yunnan, but it required another season to complete the work. I had arranged with Captain Davies, while on leave in England, the routes we should each take to avoid, as far as possible, routes already surveyed. Captain Fraser, R.A., and Captain Rigby, Wiltshire Regiment, were also sent on to Yunnan, each accompanied by a Survey of India surveyor; Major Manifold, I.M.S., also came up from Bhamo to meet Captain Davies and myself at Atuntzú. The result of the season's work on the whole has been that practically every town in the province has now been visited and reported on, every important route and many others have been surveyed and reported on, my share being this year 1,400 miles of new routes, which I handed over to Captain Davies. Surveying was carried on on the $\frac{1}{4}$ -inch scale and a large area brought in, from which a very accurate, complete 16-mile map could be compiled, as well as the usual $\frac{1}{4}$ -inch sheets. On these latter, of course, many large blanks occur, and there remains still plenty of work to be done, but it would be advisable now to take any opportunity of pushing forward triangulation, as the work is necessarily up to now entirely of a reconnaissance nature.

We considered it advisable, in order not to draw any unnecessary attention to our work, not to carry on any triangulation and to march daily with a very occasional halt. The surveying consisted of a compass traverse, distances measured by a measuring wheel, plotted on a plane-table. Whenever some point was reached from which the surrounding country could be sketched, Captain Davies and I also took constant latitudes; and were also able to fix the positions of Yunnan-fu and Puerh-fu by telegraphic longitudes, in addition to the places I had fixed with Captain Pirrie at Bhamo the previous season. Owing to my being appointed to the China Field Force, immediately on my arrival at Shanghai, I am unable to report on the fair maps of Yunnan.

I arrived in Rangoon early in November 1899, meeting Captain Davies there and travelling with him up to Myitkyina, it being our intention to enter Yunnan by two different routes from there. On our arrival, however, we found that the mules belonging to the Yunnan Company, which we were to use as transport, had been so reduced in number that there were only sufficient for Captain Davies, so as mules could not be hired locally, it being too early in the season, I came down by steamer to Bhamo, hired mules there and started on November 17th. My start was not very propitious, as I took the wrong road, finally got into the old road towards Myothit, but about 10 miles out we found a bridge washed away and an unfordable stream; we then had to turn off through the jungle and finally got into the new road being built by the Public Works Department and camped by the road side. My party consisted of a surveyor, three Gurkha Military Police, a *khalási*, two servants (one Indian and one Chinese), a Chinese interpreter, some four Chinese coolies for carrying instruments, and about 18 mules for carrying our baggage.

On November 18th we had an easy march to Myothit, and from there up to Momien we followed the same road as on the previous occasion. On the 23rd I met Captain Davies and we travelled on to Momien together, where we were met by the Consul, Mr. Jamieson. Owing to his presence in the city the populace, who gave us so warm a reception last year, were quite friendly; this, however, was only temporary, as Major Manifold in the following February was mobbed. It is impossible to pass Momien without being struck by its suitability as a hill station for Burma; it is situated in a well cultivated plain, height 5,400 feet, good climate and good supplies, and a railway could be built without much difficulty from Bhamo. We halted a day here and left on November 27th, Captain Davies making for Puerh-fu and I for Yunnan-fu, agreeing to reach these places on 30th December in order to connect them by telegraphic longitude observations.

I struck away north-east across the plain and soon got amongst low hills crossing the two branches of the Shweli river next day by two good bridges—one of wood, the

other a chain suspension bridge. It rained that day and I could see snow on the range ahead. This range we had to tackle next day, crossing it at 11,100 feet, the last 2,000 feet being through about one foot of snow, but luckily the path, though very steep, was very fair. At the top there is a temple inhabited by two old men, who as a work of merit, supply all travellers with a cup of hot tea and a warm by the fire,—very welcome as the cold was intense, thick icicles hanging from the caves of the temple as thick as my arm. There had been four of these old men: two others, who had died, presented each traveller—one with a bowl of rice, the other with a pair of grass sandals. Well-to-do men, I was told, they were, but they had given up an easy life and the pleasures of this world in order to do these simple acts of kindness, for which we, like many other travellers, were exceedingly grateful. Very glad we were to hurry down the other side. Lately arrived from the plains of Burma no one enjoyed the cold, though the view was magnificent; we could see the Salween in the valley below, but it was a long way off yet; two camps before we crossed it. At one we saw some barking deer, and the Gurkhas shot one. The Salween valley is not pleasant, too hot; we crossed in a big punt which took us over in three trips and had a very hot climb up the bare hills on the other side. The valley is mostly peopled by Shans, the Chinese wisely preferring the higher and healthier hills. We had some very hilly marching then, marching all day but only going 12 miles or so a day, crossing the Salween-Mekong watershed in a small cultivated plain at about 7,000 feet, but immediately afterwards climbing to 11,800 feet before dropping down into the main valley by a very bad rocky path. That day the path was so bad that my baggage never turned up; however, I was not uncomfortable in a Chinese house on Chinese food. Next day December 6th, we crossed the Mekong by a very fine chain suspension bridge at Fei-lung-chiao and here came on to Prince Henry of Orleans' route, which we followed for several days. December 7th, we reached the small town of Yun-lung-chou, where I was received in style with a band and soldiers, a little boy heading the procession as lictor, with a whip to keep the crowd back. In the neighbourhood there are salt wells and we had met many mules and coolies carrying the salt away down towards Yung-chang-fu.

Another five days' march continually up or down hill brought us to the small town of Teng-chuan-chou at the north end of the Tali-fu lake. Mr. Grahame, of the China Inland Mission at Tali-fu, came out to meet me. After a day's halt for shooting amongst the duck, which were in hundreds over the somewhat marshy plain, I skirted the northern and eastern sides of the lake for a couple of days and then struck eastwards. The country from here onwards to Yunnan-fu does not present any remarkable features. The streams flow either towards the Yangtze or to the south to the Red river—several fair-sized plains are passed, and the marching is hard, as there are many steep ascents and descents—finally after a march of 23 miles we reached Yunnan-fu. We had followed paths to the north of the main road through unsurveyed country *via* Pin-chuan-chou, Gei-yen-ching, Tayao-hsien, Ting-yuen-hsien, Fumin-hsien—all fair-sized towns.

At Yunnan-fu I remained eight days, obtaining telegraphic connection with Captain Davies at Puerh-fu and failing to connect with Major Fleming at Bhamo. During my stay I received much kindness from the missionaries, whose houses were all burnt down in the following June, they themselves having to retire to Tong-king.

January 8th, owing to my having stayed at Yunnan-fu longer than I had anticipated I now had some very long marches to meet Davies at I-men-hsien, but the country hereabouts is much flatter. We passed through 9 towns in the 10 days, and as each town means a plain, marching was much easier. I had also discharged my mules and engaged a new lot. The first day I went back on the main Tali-fu road to Anning-chou. On the 9th we followed up the river flowing from the lake for 12 miles to its outlet at Hai-kon; here I was urgently requested to halt, but pushed on over the downs bordering the lake to Kuei-yang-hsien, arriving there long after dark and having great difficulty in getting quarters in a temple. Another day led us round the south end of the lake. We then had a range to cross on a bitterly cold day in a blizzard with a long descent to the very rich plain of Cheng-chiang-fu situated at the north end of a very fine lake, surrounded by mountains. The path then led round the shore of the lake through lovely scenery for 10 miles and gradually ascended over a range, two long marches, 40 miles in all, through rather poor country, bringing us to the small town of Tingchou; from here we struck west again to Tunghaionyet another lake,—a very busy little town with a telegraph office. Two days more to Sin-hsing-chou, a prosperous plain through which the French railway line will run, and then two very long tiring marches of 48 miles in all brought us to I-men-hsien, where I found Captain Davies had arrived the day previous. Two days' halt here were very welcome, after which we separated, I going to Tsu-hsiung-fu, which I reached in three days, while Captain Davies went to Yunnan-fu. We were very fortunate the same evening in obtaining telegraphic communication, and thus at last getting the longitude of Yunnan-fu, as Tsu-hsiung-fu was connected with Bhamo last year.

Another five days' north-east to Wuting-chou where Captain Davies and I had arranged to meet for the Chinese new year, entailing a two days' halt, it being very difficult to get any Chinese to work or march at this their great holiday time. We then once more separated to meet again two months hence at Atun tzü; and I struck across by a little known and very bad path for Tung-chuan-fu, which I reached on 9th February after 8 days' march. In one place the path was so bad on the face of the cliff that the mules had to be unloaded and baggage carried across. When I had got half-way across the

bad bit myself I met a Chinese woman stumping across, and as she did not seem to mind the *khud* below, I had to look much happier than I felt. We had been coming through some rather lower valleys, but the day we reached Tung-chuan-fu was bitterly cold; and I was very glad to get into the hospitable house of Mr. and Mrs. Grist, missionaries. Next day it was snowing hard, and with the thermometer below freezing point at mid-day I decided to halt.

From Tung-chuan-fu to Chaotung-fu we followed the main trade route for five stages; long marches with a good deal of up and down hill. It is easy to understand that a traveller seeing the main trade route with such very steep gradients, would come away under the erroneous impression that railways were an impossibility in such a country.

From Chaotung-fu we turned south-west and crossed the Yangtze at Chiao-chia-ting, but this distance, though short on the map, took us 7 days. The route I had heard of was only a coolie path, travelled over by Mr. Baber; we had to cross a range over 10,000 feet in height in the snow and then drop down to the river at 2,000 feet; this sudden descent made us feel the heat of the valley.

Another 4 days' skirting the Solo country, a few villages of which people I came across, and we reach Hui-li-chou—a very prosperous town in Ssü-chuan. I here found a difficulty about getting on; some Solos were up in rebellion on the path I wished to follow, and I was informed that it was quite impossible that I should go that way; however, on sending a message to the Magistrate that I should go the way I mentioned, the following day I was provided with a stronger escort, and started on 2nd March. We had two good sized rivers to cross—the Anning river and the Yalung; the latter much the same size as the Yangtze. From here the path gradually got worse, it was only a coolie track, and it was with the utmost difficulty we could get the mules along. Gradually rising we finally reached the plateau on which is situated the town of Yen-yuan-hsien; here I got a go of fever, which necessitated a day's halt, which my mule men took advantage of by getting into a row with some local men. This took place about midnight, and feeling somewhat annoyed I got up, saw about 20 quarrelling Chinese in the vineyard, and told one of my Gurkhas to turn them out; into the middle of them he went with a short stick and in half a minute they had disappeared, leaving one of their number senseless in the pig's trough; then the Gurkha thinking he had been too violent in his methods, picked the man up and I heard him for about half an hour afterwards alternately trying to persuade him in broken Chinese to drink water and recover and then cursing him black and blue for coming and disturbing his *sahib's* rest.

I now wished to go on to Yung-ling, a Mosso State, but the officials were unwilling to allow me to go: the road was full of robbers, nobody knew the way and finally nobody had heard of the place. My day's halt, however, got me the necessary guide, an escort of two men came two marches with me, and then returned, not liking the country. We left on March 11th and did a short level march to Mokoyenching, some salt wells; the height of this plain was 8,800 feet, and it took another long march to get out of it. That day was hazy, the only day in which surveying was in any way interfered with by that bugbear of any surveyor in Burma. We then climbed a fine range at 13,000 feet and gradually descending the following day to a small river at 7,000 feet. About this time I found great difficulty in getting over the marches and surveying, as I had a go of tonsillitis, and for about three days a most agonising form of itch, enough to drive one mad, as my feet and hands swelled up to half as large again as at ordinary times; however, another two long marches brought us to Yunzuing, a mere village in a large plain, but the capital of a Mosso State. The last march was in most lovely country, height 10,000 feet, and half the day we skirted the edge of a large lake. A day's halt put me all right. The people at Yunzuing were very pleasant. A young Lama guided me on to Chung-tien, the next large place, 5 days' distant. We had now got into most fascinating country, the scenery of a Tibetan nature, height from 10,000 to 14,000 feet, except for one drop down to the Yangtze where it makes a great bend to the north. This is not marked on any map, but Mr. Amundsen, a Swedish missionary, had the previous year noted this bend in a journey from Ta-tzien-lu to Talifu. The 22nd March was a stiff day, 20 miles including a climb of 4,000 feet, and late in the evening we got into a long cultivated valley, the inhabitants of which were most inhospitable and turned us away from three houses. We finally found one without an owner and into this we settled, lit a fire and waited for the baggage; presently the owner turned up and rudely said "get out;" however, I was too tired to move, and so we offered him a seat by his own fireside and soon became friends, on his finding he could not get rid of us. He then proceeded to sell us fowls, etc., at an exorbitant price. These people here, Tibetans of sorts, are not hospitable. They have one invariable answer to a request for lodging "there's an excellent place,—will just suit you—about half a mile on." The unfortunate traveller who took the villager at his word would find himself sleeping the night out on the bare hills.

We were now well into the region of *yaks* and Lamas and at Chung-tien, where the population is half Chinese, we excited that intense and persistent curiosity which only the Chinese possess to so great a degree: the roofs of the neighbouring houses, the courtyards, my own verandah, every conceivable place was covered with spectators from morning to night. However, I knew that in a few days I should have the pleasure of European companionship again. There was plenty of snow anywhere over 13,000 feet, but three marches brought us down to the Yangtze at Pung-dze-la, the head man of which place was exceptionally polite. I was told it was three marches to Atuntzū and

left on March 27th; but next day we got into the snow and only did 6 miles, the following day 2 miles. I then sent back the mules for more food and halted in a most uncomfortable place on the hillside at about 13,000 feet. I had agreed while in England with Captain Davies that I should reach Atuntzū on March 28th and he on March 26th. This unfortunate snow had blocked me. I thought it would be best to go in to see him and try to arrange for *yaks* to bring my baggage over the pass; so on the 30th started at five o'clock with one Chinese and one Tibetan. There were three passes to cross, with a drop of 1,000 feet between each. The snow soon got soft, there was nowhere less than three feet, often 10 feet or more, and with only one halt of 15 minutes we finally got out of the snow at 2 P.M.—9 hours to do 12 miles; we then had another 10 miles to do and finally to breast a long gradual slope up to Atuntzū. On arrival after dark we found that Captain Davies had not arrived, but I luckily found a small inn, the owner of which, a Chinese with his Tibetan wife, were most obliging, and very soon I was resting with a nice meal of fried eggs, tea and Tibetan bread, on the floor before me. Both my men were suffering from snow blindness, so I decided to halt next day and then returned to my camp, but in two marches this time, camping out just below the snow with a couple of blankets. Luckily it was a fine night. Next morning we started early (3-30), and groped our way up in the dark; the snow was hard, however, and we made very light of the passes this time, finally reaching camp about 11. I had just had my bath when I heard shouts that Captain Davies was coming up the hill and very soon he arrived. He too had been delayed by the snow and been obliged to come south on to my road. A large caravan of 100 or more mules passed us, and with the help of the path trodden down by them we managed to get across the passes next day. My mules got through all right, but Davies' we finally had to leave, about 5 P.M., a mile short of the last pass after hours of hard work reloading mules and picking them out of the snow. They passed a wretched night, it snowed all night, one mule died and the rest struggled in about mid-day the following day, we then packed up and pushed on to Atuntzū that night, April 4th. We then waited for Major Manifold, who arrived on the 6th, his baggage coming in next day.