

## WITH THE TIBET MISSION FORCE.

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THE mission to Lhasa will soon be a thing of the past, but though as a military expedition it may be remembered only as one of our many small expeditions, yet the altered political relations with the country make the experiences gained of the climate and its effects on health of some interest. For a year the force in Tibet has been living at altitudes of 10,000 to 15,000 feet, and the effects of this have been noticeable in more ways than one. At these altitudes the boiling point of water is approximately 90° to 85° C., at which temperatures meat requires considerably more prolonged boiling than we are used to to render it fit to eat; while in the case of cereals and pulses on which native troops and followers largely live, this is scarcely sufficient to soften the envelopes of the starch grains, and the food is, therefore, much less easily digested. This has been particularly noticeable in the case of dhal and peas. Of course, the difficulty can be got over by baking, but this is not always easy under field-service conditions. Cooking pots with screw-down lids and safety-valves blowing off at a pressure of 14 lbs. would also be effectual, but would be heavy and scarcely suitable for the use of troops and followers.

At altitudes of 14,000 feet and upwards a considerable number of men have suffered from mountain-sickness, the most usual symptom being headache, in some cases with slight fever, general lassitude, loss of appetite and nausea. For the most part the symptoms passed off after a night's rest, but in some cases lasted two or three days, and occasionally only commenced on the second day at high altitude. It seems probable that a fatiguing march played a part in producing the symptoms. The experiments of Whympers in the Andes seem to show that the symptoms are due to the reduced atmospheric pressure rather than to diminished oxygen.

At 14,000 feet and above breathlessness is experienced by all, on the least exertion; this naturally makes the marching pace slow, and running or climbing very laborious. There is a corresponding increase in the heart-beats, and the increased work thrown on the heart has inevitably told on the weak or damaged ones. No less than nineteen men died from heart affections, and eighteen were invalided from the same cause, in a force of about 5,500 troops and 12,500 followers. Besides these, a considerable number of men, weakened by other diseases, died suddenly from syncope; several

while on sick convoy. In the cases in which no valvular disease existed the symptoms consisted of tachycardia, irregular action and bruits, with evidence of dilatation. These for the most part improved rapidly with rest at lower altitudes.

Chest measurements were made of men of the 19th Punjabies and 40th Pathans on their joining the force, and again after four months' residence at altitudes of 10,000 to 15,000 feet. The following table shows the results.

Total Number measured	Number per cent. showing increase			Average net increase per man	
	Maximum and minimum	Maximum only	Minimum only	Maximum	Minimum
688	35.3	9.4	10.5	0.14	0.16
	Number per cent. showing decrease				
	24.8	10.3	7.3		

Captain W. B. Turnbull, I.M.S., has carried out some observations on the effects of altitudes on the composition of the blood, of which the following is a brief summary.

	Red blood corpuscles.	Leucocytes	Ratio
W. B. T. at Rungpo (1,800 ft.), average of 12 observations	5,184,000	9,584	$\frac{1}{540}$
W. B. T. at Chungu (12,500 ft.), average of 14 observations	5,652,000	8,136	$\frac{1}{693}$
Residents in the country (Tibetans, Sharpas and Sikkimese), average	6,275,000	10,820	$\frac{1}{575}$
British officers who had lived at 12,000 ft. and over for several months	6,787,250	9,911	$\frac{1}{684}$
Natives who had lived at 12,000 ft. and over for several months	6,668,000	10,948	$\frac{1}{609}$
New arrivals at Chungu (12,500 ft.), chiefly British officers passing through	5,723,600	9,634	$\frac{1}{594}$

The hæmoglobin percentage was found to rise and fall with the rise and fall of corpuscles. Differential leucocyte counts showed them always to remain in their normal relative proportions to each other. The isotonic point was not altered from normal. These results agree in the main with those of previous observers.

Judging from the rapid increase of the number of red blood corpuscles and the absence of normoblasts on arriving at the higher altitudes, and of any signs of blood destruction, such as high-coloured urine, jaundice, &c., on descending to lower altitudes, Captain Turnbull thinks the increase in the corpuscles is relative, and due to a

decrease in the proportion of plasma, and not a compensatory increase to allow of the carrying of more oxygen, as has been supposed by some writers.

The winter climate in Tibet is severe, and the effects of the cold are made more intense by a strong south wind which blows daily, occasionally accompanied by blizzards. The lowest temperature experienced was on the Taugla (15,300 feet), on January 7th, 28° of frost. At Phari (14,300 feet) and Tuna (15,000 feet) about 20° of frost were experienced almost nightly from the middle of October to the middle of March. Five deaths occurred from frost-bite, and forty-five men were invalided during the expedition. Over 200 cases of snow-blindness occurred in General Macdonald's force of about 2,500 troops and followers on the return march, as the results of two days' marching after a heavy snow-storm; and about the same number in another smaller column. The following records of temperatures have been made during the expedition:—

CHUMBI (9,700 feet).

Mean daily temperature at 9 a.m.

July	August	September	October 1st to 15th
59·1	58·7	55·8	49·1

The minimum temperatures recorded in September and October, up to 15th, were 38·5° and 36° respectively.

GYANTSE (13,000 feet).

	April 21st to 30th	May	June	July	August	September 1st to 18th
Mean daily maximum	74	75·9	76·6	73·1	68·9	64·3
Highest recorded ..	82	89	89	89	78	70
Mean daily minimum	32	33·4	43·7	46·2	42	40·7
Lowest recorded ..	25	25	37	41	38	30

Tibet has, up to the present, been thought to be almost rainless; this is, however, far from being the case. During the period while the force was on the march to and in Lhasa, heavy rain fell almost daily, and the soil at Lhasa was practically water-logged. Sarat Chandra Das, in the account of his travels, describes the rain at Shigatse in August as "continuous." The following records were made of rainfall:—

	Jan.	Feb.	Mar.	April	May	June	July	August	Sept.	October
Chumbi ..	Nil.	4.58		7.69	5.55	6.07	4.68	4.10	5.69	2.89
Gyantse ..	—	—	—	—	—	—	2.36	2.4 (to 10th)	—	(to 20th)

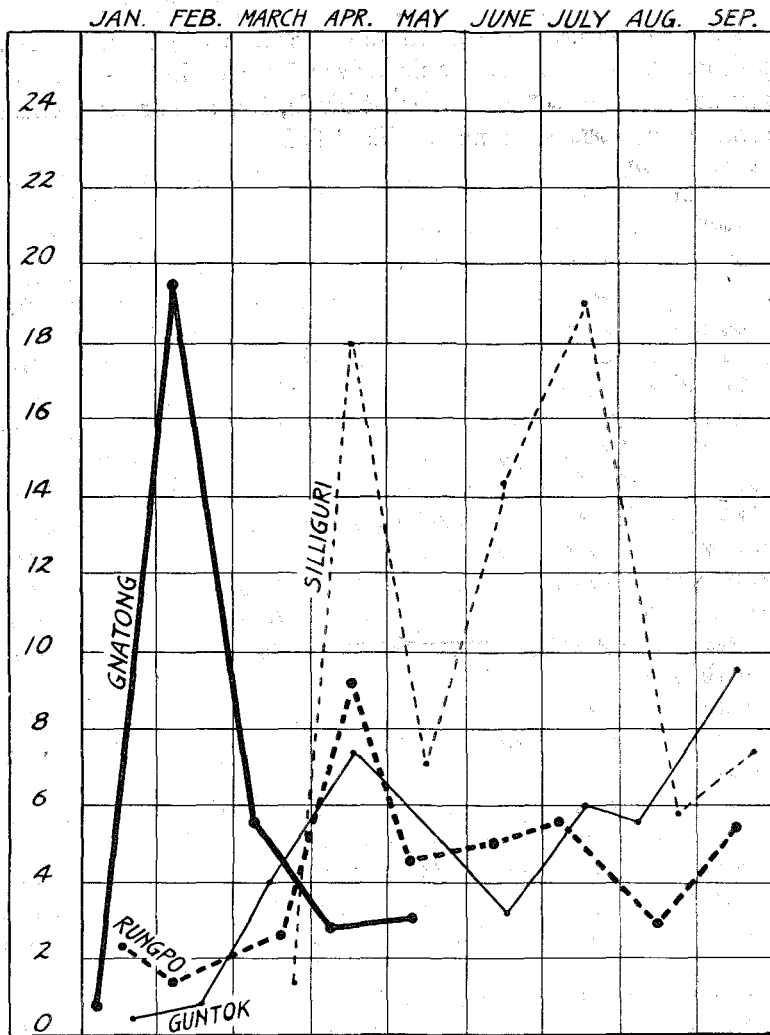
Very little enteric fever occurred. This was no doubt largely due to the small amount of susceptible material in the shape of British troops; for it must be admitted that the sanitary conditions of some of the standing camps were by no means unfavourable to its propagation. Two cases of the disease in Tibetans came to my notice. In one, under the care of Lieutenant Abbott, I.M.S., which was fatal in the second week, the lesions in the intestine were typical of the disease; and in the other the disease ran a typical course, with hæmorrhage from the bowel, and the blood serum agglutinated a dead culture of *B. typhosus* in a dilution of 1 in 40 in thirty minutes. From enquiries which I made it seems probable that the disease is not uncommon among Tibetans, and was not merely imported. A very considerable number of cases of continued fever of severe type and somewhat high mortality occurred at various posts from Phari to Gyantse, that is, at altitudes of 13,000 to 15,000 feet, in native troops and followers. Though returned as "remittent fever," they had not the characteristics of malarial fever, and in the few in which I had an opportunity of examining the blood malarial parasites were not found. As was to be expected, malarial fevers were common in the Teesta Valley and in Sikkim.

Of 300 cases in which the blood was examined by Captain Turnbull, I.M.S., malarial parasites were found in 57; benign tertian, 28; quartan, 3; malignant tertian, 26. Most of these cases occurred at or near Chungu (12,500 feet), in coolies who had come from various parts of India, and no mosquitoes were found there; the remainder at Rungpo (1,800 feet), where only *A. listoni* and *Stegomyia fasciata* were found. It is, therefore, probable that the infection was acquired either in India or while the men were coming through the Teesta Valley. At Chumbi (9,700 feet), I found specimens of *A. gigas* (Giles), and *Culex fatigans* (?), but no evidence was obtained that fresh malarial infections occurred in Tibet proper.

Dysentery and diarrhœa, on all parts of the line, and pneumonia at the higher altitudes, have accounted for a large proportion of the sickness and nearly half the deaths; they have existed at all times

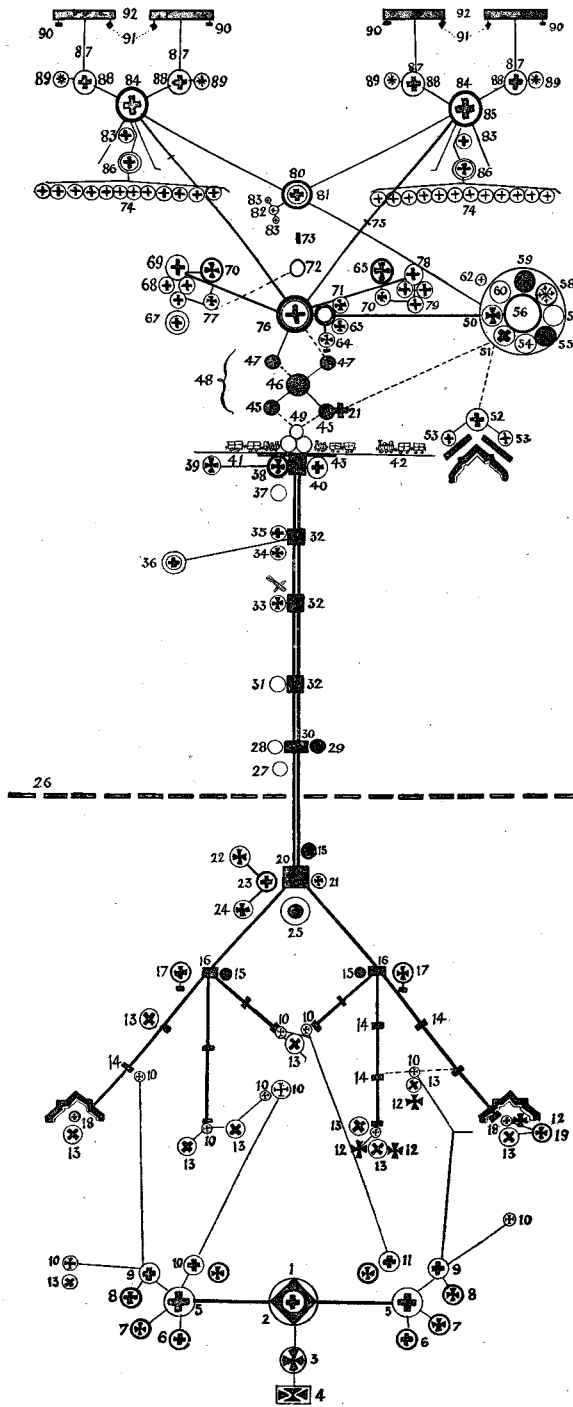
of the year, but can scarcely be considered to have occurred in epidemic form at any place.

CHART TO SHOW MONTHLY ADMISSION PER 100 FOR MALARIA, TEESTA VALLEY FOLLOWERS.



Sikkim and Tibet seem to be somewhat liberally supplied with poisonous plants. Aconite is very plentiful in parts, both *Aconitum napellus* (L.) and *Aconitum paniculatum* (Lamarek) being repre-

sented. The natives, in parts where it is found, are in the habit of muzzling their animals. A considerable number of mules have died from aconite poisoning during the expedition. At Rungpo fifty-two coolies suffered from symptoms of poisoning from eating the seeds of the *Jatropha curcas*. The symptoms were those of severe gastro-intestinal irritation, with hæmorrhagic stools in some cases, and collapse. None of these cases were fatal. A fatal case of poisoning occurred in a mule driver from eating some berries; but as he had eaten several different kinds, the one or ones causing the fatal symptoms could not be identified.



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