Medico-topographical report of the North-West frontier of India, Beluchistan, and Southern Afghanistan / by Thomas O'Farrell.

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APPENDIX No. II.

MEDICO-TOPOGRAPHICAL REPORT OF THE NORTH-WEST FRONTIER OF INDIA, BELUCHISTAN, AND SOUTHERN AFGHANISTAN.

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Recent events, and the not distant possibility of military operations being necessary in the above districts, as well as having, for some time, served in those parts, have induced me to adopt them as the theme for my medico-topographical essay.

Frontier.

Before entering more particularly on the special regions embraced in this report, it may be well to remark, a rugged and lofty barrier of mountains separates Beluchistan and Afghanistan from the plains of Sind and the Punjab, and that the north-western frontier of our Indian possessions from Peshawar to Kurachi all lies west of the Indus.

Cis-Indus railways.

On the left or India side of this wide and unfordable river, with its tributaries, we have a broad gauge, single line of railway, nearly 1,000 miles long, extending from Rawal Pindi through Lahore, Mooltan, and Bhawalpur to Rohri, where it strikes the river.

There is here unfortunately a break in the line and the Indus has to be crossed by steam ferry to Sukkur. From Sukkur the line follows the right bank through Ruk and Kotri to Kurachi on the seaboard.

In order to enable the Indian Government to mass any number of troops, at any given point, along this defensible line between Peshawar and Kurachi, it is now proposed to complete the bridge over the Indus at Sukkur, and make further additions to our frontier railway system.

Frontier railways.

From the main line above described several short railways run towards the frontier.

The first extends from Rawal Pindi to Peshawar, near the mouth of the Khyber Pass, the terminus being only 160 miles from Kabul. On this very important strategical line there is a bridge over the Indus at Attock both for rail and ordinary traffic.

The second joins Rawal Pindi with Khushalgarh on the Indus.

The third runs from Lala Musa below Jhelum to Bhera. This narrow gauge line, now known as the salt branch, has been converted to broad guage and forms the first section of what will be one of our most important strategical railways.

The new line starting from Lala Musa will cross the Jhelum to Pind Dadan Khan; follow the right bank of that river until it reaches Kushab, opposite the city of Shahpur, on the high road from Lahore to Dera Ismail Khan; strike due west across the Sind-Sagar Doab, to the left bank of the Indus, some distance below its junction with the Kurrum River. Thence following the left bank of the Indus it will run south past Darya Khan, which is opposite Dera Ismail Khan. From Darya Khan it will skirt the river for nearly 100 miles, then taking a final bend to the S.E. it will join the Chenab, opposite Sher Shah, which is but a few miles from Mooltan.

A short line (25 miles) will connect the Chenab at this point with the Indus at Kurashi facing Dera Ghazi Khan. The Jhelum will be bridged, and there will be ferries over the Indus and Chenab.

This line will connect Dera Ismail Khan, Dera Ghazi Khan, and the Derajat generally, with the main railway systems of Upper India; and at Mooltan, with Kurachi and England, and will be of considerable service in all military operations in Beluchistan and Southern Afghanistan.

Sind-Peshin Railway.

The fourth railway line runs north from Ruk near Sukkur, on the right bank of the Indus, through Shikarpur and Jacobabad, to Sibi, one of the districts assigned to us by the treaty of Gandamak. Though only 133 miles long, it is most important from a military and medical point of view, as it connects the roads and intended railways, leading from the Quetta, Peshin,

and Kandahar valleys, with the main or Indus valley line; at Ruk, with Kurachi, Bombay, and England; and at Sukkur, with the large cantonments and Hill Sanitaria of Northern India.

Unfortunately it is liable to interruption during the season of the year it would be of most value, viz., during the hot weather, its lower portion being altogether dependent on the stability of a series of embankments, along the right bank of the Indus, from Kasmor to near Sukkur. A break in this bank would submerge the country for miles. The upper section is in considerable danger of being washed away by the flood-water of the mountain torrents.

Before the construction of this line the road from the Indus to the foot of the hills at Dadur in the Sibi district was through the Put or desert, and even now water for the engines has to be carried the whole distance by rail. Indifferent drinking water is procurable along this desert road, and it is utilised to some extent as an adjunct to the railway.

Indus line.

It is intended to further perfect our military communications by a broad gauge railway right up to and all along the left bank or Indian side of the Indus. To attain this desirable object it would be necessary to connect Attock with Khushalgarh, Khushalgarh with Kandian, on the Sind-Sagar Railway.

The line from Ruk to Karachi being on the right or enemy's side of the river is a source of danger, and a new line should run from Rhori to Hyderabad, with a bridge at Kotri, and thence on to Karachi.

Efficient steam-ferries and boat-bridges at Kalabagh, Dera Ismail Khan, Dera Ghazi Khan, and Chachar would make the river equally important as a base of operations and as a line of defence.

The Derajat.

Our territory between the Indus and the eastern slopes of the Suleiman Mountains is more or less of an arid, sandy waste, and with the exception of the Sind-Peshin line has no railways and but indifferent roads. The extension of the Khushalgarh line to Kohat, and a railway from Bannu to the Indus, along the southern bank of the Kurrum River, to join the Sind-Sagar line, would be of great assistance in either massing troops at Tull, for the defence of the Kurrum Pass, or for furnishing military and commissariat stores for a force operating beyond our frontier in the direction of the Shuturgurdan.

It is decided to improve our communications in this region by constructing a good metalled road from the railway at Khushalgarh through Kohat and Bannu to Dera Ismail Khan, with bridges over the Kurrum and Gumbela Rivers.

In all operations beyond our frontier Dera Ismail Khan will attract considerable attention, as it is the nearest station to Ghazni, and would no doubt be used as a base, for the purpose of either barring an enemy marching through the Goumal Pass, or for feeding an offensive army, pushed along the Sarmalan plain through Katawaz to Ghazni. It is further of importance from the fact that the chief roads from Peshin through the Zhob valley join the Goumal, or Ghazni-Dera Ismail Khan road, just before it debouches on the plains, in front of Dera Ismail Khan.

The military significance of the Sind-Sagar Railway will be understood when we remember it practically links Dera Ismail Khan with Mooltan and the large garrisons of Northern Punjab.

Suleiman range.

South of the Goumal Pass the Suleiman Range is pierced by numerous defiles, all along the line facing the Dera-Ismail-Khan-Mangrota-Dera Ghazi Khan road. These passes lead into the Zhob, Bori, and Thal-Chotiali valleys, and thence on to Peshin and Kandahar. Some of these routes are perfectly practicable for troops, and have been traversed by considerable columns. The water along many of these roads is brackish, but fresh water could, no doubt, be found under the surface of the rivers. They are at present impassable for wheeled carriage, and supplies are very scanty, but a good military road is now being made from Dera Ghazi Khan, by Fort Monroe, the Rakni plain, the Chamalang and Bori valleys, and thence by Yusaf Katch to Peshin. These routes are of considerable importance, as they lead very soon to elevated plateaux, which are comparatively cool in the hot weather and could be used for marching small bodies of troops at that season, or even for large bodies, railed through Mooltan to Dera Ghazi Khan, when from any cause the Sukkur-Sibi Railway was impracticable. They afford alternative routes to Peshin and Kandahar, and a cool climates could be reached in seven days, after leaving the terminus at Kurashi opposite Dera Ghazi Khan.

The climate of the strip of country between the Indus and the hills is too well known to need description. Suffice it to say there are few places with such an oppressive hot weather, which is very much aggravated by the scarcity of water.

Main roads. The chief highways, however, from Sind to Peshin, Kandahar, and Central Asia are the Bolan and Harnai routes; and would be adopted by an invader from the north-west for the main body of his army, and by the Indian Government for throwing supplies, men, and munitions of war into Quetta and Peshin, not only to resist attack on our frontier at the Kojhak, but to strike beyond it in the direction of the Kandahar—Herat, or Kandahar—Kabul lines.

The Bolan route follows the course of the Bolan River, and the Harnai, the valley of the Nari River.

There are two short railways running from Sibi for some distance along these roads. One, the continuation of the main line, goes north to Kilat-i-Kila on the Harnai route, and the other due west across the well-watered plains of Gundava-Kutch to Pir Chowky at the mouth of the Bolan.

Climate. The climate of Pir Chowky and Kilat-i-Kila, and indeed on either road until Mach or Harnai is reached, is tolerable in winter, but the heat is terrific in summer. The writer had charge of No. 3 Field Hospital at Pir Chowky for some months during the last Afghan war, and though he left it as early as the end of May, has vivid recollections of the intense heat.

Cholera, sunstroke, scurvy, small-pox, liver disease, dysentery, and fatal fevers are common, and during last summer the railway works between Pir Chowky and Mach had to be suspended in consequence of the extreme unhealthiness of the Pass; over 50 per cent. of the railway staff were at one time on the sick list from fever, dysentery, and sunstroke, and the coolies left in a body, scared by a fatal epidemic of cholera.

Bolan route. We will first follow the Bolan route, as it is the best and shortest. During the last war, Pir Chowky, at the entrance of the Pass, as the rail head was the depôt from which troops and material were dispatched to the front, and all sick convoys coming down the Pass, after having halted at No. 3 Field Hospital, were railed to the Indus for subsequent dispatch either to Kurachi or Lahore. It was also the starting point for transport trains and hired carriage.

The presence of such a large number of men and animals made the water liable to pollution, and later on the depôt was retired to Rindili, which is some three miles nearer to Sibi. At Rindili the water was plentiful and good, and mud sheds were built for the convenience and protection of the troops returning to India on the evacuation of Kandahar. The arrangements were then so complete that not a man of the returning army died there from sunstroke, although the heat was intense. The importance of both Rindili and Pir Chowky has dwindled into insignificance since the line has been pushed on to the central Bolan station of Mach. The latter becoming the rail-head and depôt, the former, way side stations.

Mach.

When we remember there is nothing produced in the Peshin or Quetta districts but what is required for the support of the inhabitants, and that food for a force, for the army of followers, and food even for the transport animals themselves must be sent from India, the advantage derived from this railway extension to Mach will be apparent. Transport trains will start from here, and men and baggage animals will be spared the rugged and tortuous defiles of the lower Bolan. As Mach is 3,000 feet higher than Rindili, troops detraining there will at once enjoy a comparatively cool climate, and will not have to undergo the long and dusty 42 miles between Pir Chowky and Mach.

Bolan Railway. This new line is laid in the bed of the Bolan River, and winds up the Pass by steep gradients and sinuous curves, reaching an elevation of 1,100 feet at the Baluch village of North Kirta, 2,500 feet at New Ab-i-gum, and 3,500 feet at Mach.

The rail follows the road between precipitous cliffs and over stony plains, crossing and recrossing the river, and not more than a few feet above its normal level.

It is hoped the Bolan floods, which are very sudden and violent, will pass as harmlessly over the rails as traffic over an ordinary level crossing. But as these freshets sometimes reach a height of 10 feet this anticipation requires

the trial of experience, and as the military road may have to be at times resorted to it, may be well to give a short description of it.

Bolan road. The road from Pir Chowky to Kohandilani, after crossing the river frequently between high conglomerate hills, enters the Kohandilani gorge, about 300 yards wide, distance eight miles. From Kohandilani to South Kirta is eight miles, and four more on to North Kirta. The road at first enters a narrow gorge, frequently crosses the river, and is especially liable to flooding from South to North Kirta, it ascends a long low hill which separates it from the river. At North Kirta there is a walled enclosure, bungalows, a hospital for natives, commissariat transport and railway depôt. Water is obtained from the stream and a well in the vicinity, it is plentiful and good. Of the Bolan water generally it may be said to be excellent, though somewhat hard. The usual precautions of taking the drinking water higher up than the portion reserved for ablution and watering of animals must be strictly attended to, as well as the removal and burying or burning of any transport animals that may have died in the vicinity of the stream. From North Kirta the road ascends to New Bibi Nani, nine miles, and thence on to New Ab-i-gum, seven miles. The water on these stages is uncertain and liable to be interfered with.

Water.

From New Ab-i-gum to Mach the distance is about six miles, thus making it six marches to Mach from Pir Chowky, and somewhat more than 42 miles.

Mach. The present camping ground at Mach is very cramped and occupies the high bank on the west side of the river; the water is a considerable distance off, and has to be carried up a high ramp. During the last war there was a large depôt of commissariat and transport stores at Mach, and a rest depôt with a medical officer was established there. There was also a telegraph and post office at some distance higher up the Pass. As being the rail-head now it will become a much more important place, and a large hospital will have to be provided there for the sick of parties, either going up or down the Pass. At some villages near, eggs, milk, and fowls are procurable. There are some low hills on the opposite side of the river, presenting indications of coal, and fossils abound, geological specimens of the Bolan formation were presented by the writer to the Netley Museum.

Bolan Railway. From Mach to Quetta, for the present, troops will have to march, and transport which has hitherto been the great difficulty hampering our movements beyond the Indus will have to be resorted to. It is, however, contemplated to join Mach with Quetta by rail, and the works have already been started. From Darwaza to Quetta will present no difficulties, but the steep incline beyond Mach will be the crux of the undertaking. This latter section it is intended should be narrow gauge, and will be worked by powerful Fairley engines. Rolling stock, rails, and materials inteuded for the extension of the line to the foot of the Kojhak will be placed on trucks, and thus drawn up the steep gradients and sharp curves between Mach and Darwaza.

Upper Bolan road. But as at present the distance between Quetta and Mach has to be marched a short description of the route is necessary.

From Mach the road ascends 1,000 feet to Sir-i-Bolan, distance over four miles. Sir-i-Bolan is the source of the Bolan River, the water comes sweet and wholesome as a spring from the foot of the mountains.

From Sir-i-Bolan to Lower Dozan is 4½ miles, a narrow defile, known as the Zigzags, is traversed on this march. At Lower Dozan there is a large commissariat and transport depôt, bungalows, &c.

The water is a long distance off, and comes by an aqueduct from the Dozan spring; the water is excellent, but much inconvenience is caused by its being on the opposite side of the river.

From Lower Dozan to Darwaza is 7½ miles. The Kharlaki Kotal or termination of the Bolan Pass is crossed on this march; it is about 6,000 feet high and 56 miles from the entrance of the Pass. From the Kotal the road descends to the plain of the Chota Dasht.

Darwaza to be avoided. At Darwaza there is a fort and bungalows; indifferent water is obtained from deep wells. In winter time, at all events, Darwaza should be avoided as a halting place, not only on account of the intense cold but for the scantiness of the water. It is 5,800 feet high, and on no account should sick convoys, especially native ones, be halted there for a night in the cold weather.

The 25 miles between Dozan and Sir-i-ab should be done in one march. When the railway is completed it is intended to pump water from the Dozan springs up to Darwaza, and thence by pipes onwards towards Quetta.

From Darwaza to Sir-i-ab, a distance of 17½ miles, is totally without water, and the road is, for a good part of its course, through the Big Dasht.

Karez. At Sir-i-ab the first karez is seen—a karez is an underground aqueduct, leading from the hills, a likely place at the foot of the hills is chosen, and a shallow well is sunk; following the natural slope of the country another well is dug in a line, and at a short distance from the first the space between the two wells is then tunnelled by men working from each well; by a series of such wells and tunnels water is brought from the hills to the villages of the plain; these karezes are sometimes two or three miles long.

The distance between Sir-i-ab and Quetta is only six miles; the road is good, and runs through the Shál Valley.

Brahooes. The inhabitants of the Bolan are Brahooes, Mohamedans of the Sunite sect; they are a brave and warlike race, and few of the chief men are without scars of old tulwar wounds; most of the scars which came under writer's notice where not on the head, were in the vicinity of the hip and shoulder joints, possibly dealt with the intention of opening a joint and disabling a limb. The Brahooes are nomads, and migrate to the plains of Gundava Katch in the winter, where they feed their flocks and sow barley, or as it is more generally known, "Kusseel."

These people are very well disposed towards us, but it must be admitted the Bolan road is well "metalled."

Shál Valley. The Shál or Quetta Valley is traversed by the Bolan road, and communicates on the south with the Dasht-i-be-daolat, and on the north and west with the Peshin district. It is about 20 miles long, and five to seven broad, and is shut in on nearly all sides by high mountains; but to the north-west is a low range of hills across the mouth of the valley, separating it from Peshin. This ridge, with its passes, extends from the northern end of the Chilhaltan range to an offshoot from the Takatu Mountain, and is about four miles long.

The Chilhaltan range bounds the Shál Valley on the west, and separates it from the Kanak Valley, the latter in its turn is separated from the Sharod Valley by the Kanak range. The Zarghun Mountains bound the eastern side of the Shál Valley, and separate it from the Harnai Valley.

River. The Shál Lora is the principal river, and after draining the valley passes northwards through a gap in the low range of hills above mentioned to join the Kakar Lora at Haidarzai in Peshin.

Roads. The main road from Quetta to Peshin, and Kandahar, traverses the whole length of the Shál Valley, crosses the Shál Lora, and leaves the valley through the Gazarband Pass. Roads communicating with the Kanak and Sharod Valleys, Mastung and Kelat branch off from this at Samanguli, a large village seven miles from Quetta.

The old road through the Kakar Lora Valley *viâ* Kuchlak to Kach—the old Kandahar road *viâ* Haidarzai and Haikalzai to the Kojhak—as well as the Kushdil Khan-Ghazni route, leave the valley as one road, through the Margha Pass, a narrow gorge, to the west, but near the foot of the Takatu Mountain. Kuchlak is 12 miles from Quetta and 19 from Gharkai.

To the east of the Takatu Mountains a road leading to Kach on the Harnai road, in two marches, quits the Shál Valley at the Sharkalla Pass. This road is of great strategical importance, as it would allow of a flank attack from Quetta on an army endeavouring to force a passage down the Harnai route.

Nigandi. On the east the Han Pass leads to the Han Valley, at the head of which is the new Sanitarium of Nigandi, which, though only 15 miles from Quetta, is 1,000 feet higher, and immensely more healthy. The principal water supply of Quetta comes through the Han Pass.

On the left the Nishpa Pass leads to Mastang.

The Shál Valley is well watered and fertile; there are numerous walled villages, enclosing considerable orchards, and a large population.

Quetta. Shálkot or Quetta, lat. 30° 12′ and 66° 55′ E. long., and 5,514 feet above the sea, is at the northern end of the Shál Valley, and consists of the fort, military cantonment, civil lines, and the new bazar or native town.

Fort. Originally, as in other trans-Indus towns, all the inhabitants lived either inside the fort or under the shadow of its walls, but in 1879 the houses within

the fort were pulled down to make way for artillery barracks, and those outside levelled to form the glacis.

The fort covers about a quarter of a square mile; it is surrounded by a high mud wall and a deep wide ditch. There is a citadel in the centre on which guns are mounted. The siege train is composed of 40-pounder and 25-pounder rifled muzzle-loading guns, and 6·3″ rifled muzzle-loading howitzers.

There are artillery and infantry barracks, inside the fort, capable of accommodating some 70 or 80 men. All the drinking water is obtained from the outside; there are, however, two wells inside which could be used if the water was filtered. The made ground inside the fort is some 14 feet thick, and contains human bones.

Cantonment. The cantonment, which extends for about a mile to the N.E. of the fort, consists of the old and new barracks, hospital, &c. Barracks. The old barracks, now occupied by native infantry, are mud huts with flat roofs and mud floors, and admit the rain freely; they are badly ventilated, and very unhealthy. The native cavalry barracks have domed roofs, and are consequently somewhat better than the infantry ones.

The new barracks are capable of accommodating an European infantry regiment, and consist of eight one-storied isolated blocks placed *en echelon*; they are built of sun-dried bricks, have zinc roofs, and are fairly comfortable.

Hospital. The hospital buildings were originally built for stables. The roofs and floors are of mud; they are low, dark, and dusty, and very unhealthy; they are capable of accommodating some 180 patients. During the last Afghan war they were full of enteric fever cases, and still maintain their old reputation.

A new hospital is, however, in the course of construction on some elevated ground, about a quarter of a mile from the new barracks.

Bazar. The Quetta bazar is situated south of the cantonment, it contains a fruit market and many shops; everything can be got there, but the prices at present are exorbitant. Peaches, pears, and apples are to be had in abundance.

Diseases. Notwithstanding its elevation the climate of the Shál Valley is bad; sunstroke, enteric fever, pernicious ague, cholera, diarrhœa, dysentery, abscess of the liver, epidemic pneumonia, tonsillitis, bronchitis, and jaundice are very common, and the death-rate is very high. Two causes contribute to make the Quetta Valley unhealthy—bad water, and extreme variations of temperature; to these are added in cantonments ill-ventilated and leaky dwellings.

Water. The water of the Quetta Valley comes from springs in the mountains, either by karezes or open streams, it contains large quantities of the salts of lime and magnesia, as well as marked quantities of organic impurities. The graveyards in many places are dug in the beds of streams, and the water is always "suspicious" and generally "bad." Nearly everyone complains of diarrhœa, and the number suffering from jaundice is remarkable. This jaundice, supposed to be due to catarrh of the bile ducts, is ushered in by Jaundice. vomiting, and loss of appetite, which persists for days, and these symptoms only abate when the yellow discolouration appears.

Meteorology. As to the extreme variations of temperature, it may be stated, the summer heat varies from 80° to 100° Fahr. In winter the snow lies deep on the mountains and in the valley, and the mercury falls below the freezing point; besides there is a difference of 40° Fahr. between the temperature of the day and that of the night.

The rainy months are March, April, July, and August. The atmosphere is loaded with moisture during the spring rains, and in the autumn, which is the most unhealthy season, cold bitter winds blow from the north, while the solar rays are still very powerful. The average highest temperature in July is 95°, while the average lowest temperature in December is 28°. Moreover, during the summer the air is loaded with dust to such an extent that at times the sun is obscured. There are, as in England, four seasons, but here they are very rigorous.

The writer was for some time Sanitary Officer of Quetta, and can bear testimony to the unsanitary construction of the buildings, bad water, and trying character of the climate.

The important strategical position of Quetta, commanding as it does the lines of communication by road and railway, necessitates the proximate

presence of a large garrison, and the injurious effects of the climate are in a measure mitigated for Europeans by the establishment in its neighbourhood of Hill Sanitaria. At present there are two, the one before alluded to on the Zerghun is only 15 miles from Quetta, while the other, Gwashki, is 63 miles distant. Gwashki is only 29 miles from Kach in Harnai, and when the railway is complete Kach will be the station for this sanitarium. Most favourable accounts of the health of men sent to these sanitaria are published, and when houses and hut barracks are built they are likely to be favourite resorts during the summer and autumn, and will permit the European garrison to be frequently changed to the hills.

Sanitaria.

Three batteries of artillery and four companies of infantry were this year accommodated at Gwashki, and two companies of infantry and a battery at Nigandi. It has been suggested that native soldiers at Quetta should be allowed a meat ration, and there can be no doubt of the necessity of giving lime juice occasionally throughout these regions.

Lime juice.

We will now follow the Harnai route.

Harnai route.

The Harnai route was originally chosen for the construction of the Sind-Peshin Railway, and though longer than the Bolan route it was expected the engineering difficulties would have been less, but the bridging, tunnelling and cutting on the line has been found fearfully heavy, and the frequent floods have much retarded the work, so that in all probability the line up the Bolan will be completed first.

At present the rail-head is at Kilat-i-Kila, and from there a good cart road ascends the valley of the Nari River, goes over the Bahdra plain, and through the Kuchali defiles. It traverses the long Harnai Valley, passes through the Chappar Rift to Kach, and on through the gorge to Gharkai in Peshin. At Gharkai it turns to the south-west down the Kakar Lora Valley, passes Bostan and Kuchlak, and going over the Marghi Pass enters the Shál Valley and on to Quetta.

The distance from Kilat-i-Kila to Gharkai is about 110 miles.

The first part of the road from Kilat-i-Kila to Spintangi is through the Mari country; the inhabitants are ill-disposed and gave a lot of trouble after the investment of Kandahar.

Harnai.

At Harnai the people are friendly, and supplies are procurable. Harnai is 2,600 feet above the sea, and the climate is tolerable throughout the year. A new road is now being built from Harnai to Singawi in Bori.

Sharg.

At Sharg, two marches beyond Harnai, it is proposed to build a strong post; water is plentiful and good, the valley is fertile, supplies are obtainable, and being 3,800 feet above the sea is a fairly cool climate, and in this respect resembles Mach in the Bolan. Sharg would be a good position for a large rest depôt or small general hospital.

Chappar.

At an elevation of about 500 feet, and between Dargi and Mangi, we have the Chappar Rift, it is about $1\frac{3}{4}$ miles long and is of eliptical shape, the ends or mouths being only a few yards broad.

The cliffs at the entrance are about 300 feet and rise to 1,000 feet in the centre. The rift is very subject to floods, sometimes rising to 30 feet.

Kach Post is a strong defensive enclosure, containing quarters for a native infantry regiment; there is a good encamping ground, and water is abundant. Kach is connected with Quetta by a very important cart road, through the pass of Sharkhula. The elevation of Kach is 6,300 feet.

Climate.

The climate of the Harnai route resembles that of the Bolan, the heat in summer is intense and even in houses at an altitude of 4,000 feet the thermometer in August last registered 98° Fahr.; and fever, sunstroke, and cholera put a stop to the railway works recently.

Twin railways.

The Harnai route, as offering an alternative road to Peshin, is of great value, and when the twin railways are finished our communications with the Peshin plateau will be comparatively complete.

Yagistan.

Allusion has previously been made to the routes leading from the Indus to Peshin and Kandahar over the Suleiman Mountains, and this portion of our frontier has of late attracted considerable attention, as it has been suggested an enemy from the north-west could take a straight road from Kandahar to Mooltan, either feigning to attack Quetta, or avoiding it altogether. It is claimed for this route that it runs over an elevated table-land, everywhere

habitable, for Europeans, fertile, well watered, rich in forage, sparsely populated, and belonging to neither Kelat nor Kabul. The climate is the climate of Simla, and it commands the Bolan, and blocks the whole series of passes into the Derajat, and finally that its owner will command the gates of India.

On the other hand, it is stated this Sewistan or Yagistan, or independent territory for the most part, consists of an inhospitable wilderness, that the water is saline, and the climate, except in the higher valleys, detestable. That the routes through the country are so numerous it may be said to be open. With the exception of the Maris, it is admitted the people are inoffensive and peaceable, and it is conceded also good grass is obtainable on the plateaux; but that here the supplies end.

Peshin-Punjab road.

As all the country east of the Khwaja Amran range was ceded to us by the treaty of Gandamak, Yagistan already belongs to us, and to improve our communications a road is being constructed from Dera Ghazi Khan to Peshin. It will run north of the Harnai Railway, so as to provide covering movements of troops, to guard the line from tribal attacks, and with this view a branch road will run north from Harnai to the Bori Valley.

The main road will go to Fort Monro, at the foot of the Suleiman Mountains, and crossing the range will traverse the Rakni plain to Anambar, and thence through the undulating plains of Bori Valley to Chingan.

From Chingan the road will mount the Chari Momand (8,285 feet), which is the water parting between Bori and Peshin, and thence passing through grand scenery lead to Yusuf Kach and Balozai in Peshin.

The route, at either end, is very hilly, but the country is well under control; on the other hand, the Bori Valley—38 miles long and 5 to 15 broad—is open; but opposition may be expected from the tribes.

From the main track numerous roads pass over the mountains into Jhob on the north, and into Thal-Chotiali on the south; of the former may be mentioned a gap through the hills called the Tokazai Kotal, which leads into Jhob and through the Vihowa pass into the Punjab; and another from Chingan to Hindu Bagh in Jhob, and of the latter a road passes south-east from Chingan to Biani, Sinjawi, to Duki, and thence to Thal and Chotiali.

The general elevation of the route is over 5,000 feet, and it would be a great advantage if we could abandon some of our unhealthy stations on the right bank of the Indus for strategical positions on these highlands.

Mithankot road.

From Mithankot on the Indus confronting the railway terminus at Chachar (where the Punjab rivers become one), we have a very important road traversing Sewistan. It passes through Harand, over the Sham plain to Quat Mandai and Harnai, and communicates with the Thal-Chotiali road.

Thal-Chotiali road.

The Thal-Chotiali road goes north of this through Vitakai to Chotiali, Thal, and Duki, and thence on to Chingan, on the Punjab-Peshin road. It is intended to build a strong post at Thal.

Zhob or Jhob Valley.

The Punjab is also connected with Peshin and with Ghazni and Kandahar by means of the Jhob Valley. This valley lower than the Bori Valley stretches eastward from the Toba highland, and is about 100 miles long and 20 broad. It communicates on the north-east with the Goumal route, on the east by the Darband and Vihowa passes with Dera Ishmail Khan, south with Chingan and Bori, on the south-west with Balozai, in the Peshin district, and on the north-west by Gurdan and Maruf, whence there are roads to Kandahar and Ghazni.

In the centre of Jhob there is a tract of tamarisk jungal, some 20 miles long, which affords forage for large herds. The climate of Jhob is intermediate between that of the Punjab and Peshin, and resembles that of Harnai. The rainfall is greater than that of Peshin, and it is more fertile. The valley slopes gently to the east, the average elevation being about 3,500 feet. The inhabitants are contumacious and predatory.

Peshin.

To return to the Bolan-Kandahar road, we find the Gazarband ridge with a branch of the Brahnic hills, separates Shal from Peshin, or in other words, Beluchistan from Afghanistan; and Peshin itself is separated in its turn from the valleys of Kadanai and Kandahar by the Khwaja Amran range, which is an offshoot from the Toba plateaux.

Peshin consists of two portions, a mountainous district and the plain of Peshin proper; the latter is only about a quarter of the whole. The average

elevation of the Peshin Valley is about 5,000 feet, and it is about three times as large and 500 feet lower than the Shál Valley. The general elevation of the Khwaja Amran range, which bounds it on the north-west, is about 7,500 feet, and that of its highest peak is said to be over 8,800 feet.

Of the hills separating Peshin from Shál, the Takatu rises to 11,000 feet.

Peshin Valley. The valley may be described as a parallelogram between the two ranges above alluded to, and closed in on the north by the Toba plateau, while it is separated from Shorawak on the south by an extensive tract of low hills.

Peshin Lora River. Its river system begins in the north, where the Barshor Nala and Tor Margha stream join some two miles north of Khushdil Khan to form the Peshin Lora. This Peshin Lora, joined by the Dori nulla and Surkab River, finally unites with the Kakar Lora at Shadizai forming the Lora River, which is eventually lost in the sandy region south-west of Shorawak.

Kakar Lora River. The Kakar Lora River is formed by two tributaries, one coming through the Gharkai Gorge, and another down the Gwal Valley, uniting some distance below Manzakai. The Kakar Lora passes out of its valley, through the low red hills which separate it, from Haidarzai; here the river has a deep bed with perpendicular banks 20 feet high.

At Haidarzai the Kakar Lora is joined by the Shal Lora, and the united streams continue north-westward to Shadizai, where they empty themselves into the Lora proper or Peshin Lora.

Irrigation schemes. The general slope of the valley is towards the Lora River. Peshin is very badly cultivated, but this is mainly due to the absence of irrigation, and it is now intended to supply this want by either having an inundation channel from the Kakar Lora, below Haidarzai, to the plain at Shebo, or to divert the flood water of the Barshor stream, above Khush-dil-Khan, and to store it in a reservoir below New Bazar.

In addition to the river system above described there are numerous karezes and streams which run down from the mountains on all sides.

Climate. The climate of Peshin is very relaxing, and somewhat similar to that of Shàl, but it is warmer in summer and colder in winter. March and April are the cool months, but a strong wind from the south-west raises an enormous amount of dust, the whole air is pervaded with it, and this sometimes occurs even at night. The dust very frequently takes the form of columns.

In May, June, and July in addition to the dust the wind is hot and oppressive, and there is a regular plague of flies.

When the writer was at Killa Abdulla in August 1880 the dust filled the air from about 9 a.m. to 5 p.m. No fires could be lighted without some protection against the wind, and the usual practice was to cook all the food in the morning, and heat it up again when wanted for dinner in the evening. In September and October the flies diminish in number, the dust only gives annoyance for a few hours in the day, and there is a sensible coolness in the weather. The winter is cold, bleak, and gloomy, the leaves fall from the trees, and even the grass disappears. On the whole, the climate is trying to both Europeans and Indians.

Peshin is barren. The inhabitants are friendly enough, but supplies and firewood are scarce. The chief crops are wheat, barley, rice, Indian corn, and lucerne. Apricots, plums, peaches, grapes, apples, figs, pomegranates, and walnuts are cultivated.

Strategical value of Peshin. The chief value of Peshin is that here all the roads leading from Kelat, Shorawak, and the Indus meet those coming from Kandahar, Ghazni, and South-western Afghanistan, and that it makes an excellent *place d'armes* for an advance on Kandahar, and dominates the most of Southern Afghanistan.

There are not, as yet, many good roads through the valley, and we will now notice a few of the principal ones.

Kandahar Road. The main road up the Bolan is prolonged beyond Quetta over the Khojak Pass to Chaman, and thence to Kandahar. The first march to Mehtarzai from Quetta is nine miles, in this stage the Shál Lora is crossed.

From Mehtarzai to Dinar Karez is 12 miles. The Salt Lora is crossed and the Ghazarband defile is mounted and quitted; the water at Dinar Karez is brackish.

From Dinar Karez to Segi, distance nine miles. Just near Segi the Lora River is crossed, the banks are very high, and it is about 300 yards across. The

water in the river is saline, and at some distance from the camp. There is a direct road from Segi to Killa Abdula of about 15 miles.

Gulistan. From Segi to Gulistan Karez is 10 miles. There is a pretty large fort at Gulistan, and its position at the foot of the hills is an important one, as it guards the entrance to the Gwajha Pass to the south-west, and the Roghani Pass on the north-west. The water at Gulistan is good and abundant, there are some trees and vegetation about, and it is altogether the prettiest place in the valley.

From Gulistan the road leads along the outer spurs of the hills to the east of the range, and joining with the direct road from Segi, passes into the small plain of Abdula Khan Kila. There is a large fort at Abdula Khan Kila, with commissariat and transport depôts. The water comes from an irrigation channel, and is liable both to contamination and interruption. There is a village near the fort from which some supplies are procurable.

Abdula Kila or Killa Abdulla.

In consequence of its being at the foot of the Kojhak, the ground when writer was there was saturated and the air impregnated with the decomposing bodies of transport animals. In fact, his chief work as sanitary officer was to personally see if his directions as to removing the carcases were carried out. At first, large fatigue parties dug huge graves, and it was a strange sight to watch three or four camels drawing a dead comrade by his hind legs to his last resting place; it was found, however, the sandy nature of the soil had not sufficient deodorising properties, and the carcases were subsequently burned. A little straw or brushwood soaked in kerosine oil does the business; the entrails should, however, be first removed and buried.

From Abdula Khan Kila to Chaman the Kojhak Pass is crossed at 10 miles, and the distance between the two forts is 15 miles.

Khwaja Amran. The Khwaja Amran range is about 50 miles long, and extends from Toba to Shorawak, and is pierced by numerous passes, viz. (from north to south), the Kojhak, the Sauzal, the Roghani, the Zargani, and the Gwajha. The Sauzal is practicable for cavalry, but the Azanga or Zargani, as it is sometimes called, is a mere track. The Kojhak and Gwajha are both practicable for artillery, but the Roghani is not.

Passes.

The Khwaja Amran range, like most of the mountains in this region, has at its base on each side a *daman* or skirt. It is formed of the debris of the mountains, and is a table-land sloping gently towards the plains, and extends on the Kandahar side 8 or 10 miles. It has been likened to the glacis of a fortress, but it is usually much cut up by mountain torrents. The *daman* on the Killa Abdulla side affords ample space for the encampment of 10,000 men.

The Kojhak. The road over the Kojhak is a narrow zigzag, exceedingly precipitate, but fortunately very short. The road in 1880 was fairly good for artillery, but it must have fallen out of repair, as it recently took the siege train on its way to Herat 10 days to cross it after much labour and difficulty. The elevation of the Pass is 7,200 feet.

Chaman. The Fort of Chaman is on a low spur to the right of the road, whereas the camping ground is on the left. Water is obtained from springs near the fort. In fact, springs are pretty abundant all along the western slopes of the range.

In all probability an entrenched camp will be formed at Chaman, and a strong force left in occupation, as the defence of the whole range depends to a great extent on its possession.

There is a road (28 miles) along the Daman on the western side, which joins Chaman with the opening of the Gwajha Pass on the Kandahar side. It covers the line of springs above alluded to.

Chaman-Kandahar road. Chaman, our advanced post in this direction, is 80 miles from Kandahar and 451 from Herat. The marches from Chaman to Kandahar are—1st, Gatai, 17 miles; 2nd, Dabrai, 9 miles; 3rd, Mel Karez, 12 miles; 4th, Abdul Rahman, 14 miles; 5th, Mand-i-Hissar, 15 miles; and 6th, Kandahar, 12 miles.

There is no water between Chaman and Gatai, and no supplies are procurable until Mand-i-Hissar is reached. There are ample means of feeding a large force around Kandahar, and it has been suggested that in the event of complications beyond our frontier in this direction it might be necessary, in

Kandahar Valley fertile.

consequence of the barrenness of Peshin, to push on one or two divisions to the vicinity of Kandahar for commissariat purposes alone.

Roads to Kandahar. There are two other roads from Chaman to Kandahar, one called the Barghana road, divided into seven marches, is some two miles shorter than the high road, and is used as an alternative route. The other over the Kussa Pass is 86 miles.

Gwajha Pass. The road from Gulistan Karez to Kandahar, over the Gwajha Pass, is 114 miles, divided into nine marches.

The Gwajha Pass is much easier than the Kojhak, and was used for the 40 pounder Armstrong's and General Stewart's Division in the winter of 1879. The great drawback to this route is the scarcity of water between the foot of the hills and Shah Pasand.

Roads. The old road from Quetta to Killa Abdulla is about 52 miles, or just a little longer than the road over the Gazerband Pass. It is thus divided: Kuchlak, 11½; Sayad Yarn Karez, 11½; Harkalzai, 9½; Asad Khan Camp, 10; Abdula Khan Kila, 9½. It is a good road, and practicable for wheeled artillery.

Road to Ghazni. The road to Ghazni from Quetta leaves the above at Sayad Yarn Karez, goes through New Bazar and Kushdil Khan, the total distance to Ghazni being 292 miles.

Harnai-Kojhak road. The road from Kilat-i-Killa up through Harnai, as before stated, goes through the Gharkai defile, here it sends a branch down the Kakar Lora Valley viâ Kuchlak to Quetta, and the main road goes across the valley to the Ishpezena Pass, crossing the Kakar Lora River, and then down the narrow valley of the Surkhab to Bagh China, 10½ miles. From Bagh China the road goes by New Bazar, and thence to Harkalzai, distance 12 miles. From Harkalzai to Asad Khan is 10 miles, the Dori Nala and Peshin Lora are crossed in this march. From Asad Khan to Killa Abdulla is 9½ miles.

This is a good road in dry weather, but as the soil is clay it is unsuitable for wheeled carriage during the wet season, it is then usual to go round by Kushdil Khan, Alizai, and Badwan.

Distances in Peshin. Among other distances in Peshin Valley may be mentioned, Quetta to Bostan, 20 miles; Bostan to Peshin, 18 miles; Peshin to Syud Hamid, 15 miles; Syud Hamid to Killa Abdulla, 12 miles; Killa Abdulla to Peshin, 26 miles; Bostan to Shibo, 10 miles; Peshin to Kanai, 12 miles.

Bostan. Bostan is on the Kasim Kala-Gwal road, and is two miles from Kasim Kala and half a mile from the Kakar Lora River. It is of some importance strategically, as it covers the proposed railway, and is the best defensible position in the Kakar Lora Valley.

Peshin. Peshin.—In 1881 a large fort and cantonment were built at Peshin, which is in the south-east of the valley. It can accommodate a full native regiment and a squadron of cavalry. There is abundance of water, but it is much impregnated with saline matter and organic impurities. Peshin is strategically of value, as it commands the road from Harnai to the Kojhak.

The cantonment has been tastefully laid out, and there are large commissariat and transport depôts formed there.

Syud Hamid. Syud Hamid, on the Lora is midway between Gulistan and Peshin Fort, and more than half-way between Peshin and the Kojhak. It is of importance, as being the locality chosen for the site of the new entrenched camp, which will be a large fortified work, covering the railway. It is not quite settled whether a considerable force will permanently occupy it or not. It is considered the best plan would be to keep a small permanent force there, while the greater part of its intended garrison are accommodated on some of the neighbouring mountains, during the unhealthy season at all events. There are several positions on the Toba plateau, overlooking the Kandahar province, which could be utilised for this purpose.

Khushdil Khan. Khushdil Khan Kila is a tolerably large fort, situated at the northern end of the valley, and its value consists in its position on the Quetta-Ghazni road and the protection it affords against incursions from Jhob and Toba.

Sind-Peshin Railway. The Sind-Peshin Railway will follow the Harnai road, through the Chapar Rift and Gharkai defile, into Peshin. It will then turn down the Kakar Lora Valley to Kasim Kala, whence the branch line is to go to Quetta; the main line to follow the Kakar Lora, north-westwards to Hardarzai, and thence by the Kakar Lora Gap into the plain of Peshin Proper. Turning westward at

Shebo the Lora will be crossed at Syud Hamid, the line to lead straight on to Gulistan and thence to Killa Abdulla.

The course, however, which the railway will take beyond Shebo towards Kandahar has not been definitely settled, but the following three schemes have met with support :—

Railway schemes.

I. As originally intended, by Gulistan and the Gwajha Pass, with a branch to Killa Abdulla.

Shebo.

II. From Shebo straight on to the Kojhak, with a bridge over the Lora, a tunnel through the Kojhak, and a strong post at the terminus at Chaman. Shebo is strategically well placed between the Lora and one of its tributaries, and the country is quite open between the Lora and the Khwaja Amran.

Our left flank.

III. It has even been proposed to avoid the Khwaja Amran range altogether, and go round by Nushki to Kandahar, or even to push on the rails to Seistan, so as to strengthen our left flank, which would naturally rest on the Lower Helmund, near Lash-Jawain.

Notwithstanding its length this latter line could be constructed with ease, and it could be used to oppose any attempt on the part of an enemy in possession of Herat trying to turn our left flank by a march across the desert from the Helmund *viâ* Shora-rûd and Kelat.

Great strategical triangles.

There are two great strategical triangles in Afghanistan, one known as General Hamley's and the other as Lord Lytton's. The former has for its angles Herat, Balk, and Kandahar; the latter Ghazni, Kabul, and Jellalabad, and with a view to the occupation of one or both of these it has been proposed to collect in Peshin a large quantity of railway material and to have the earth-work finished and bridges made, not only between Chaman and Kandahar, but between Kandahar and Kabul *viâ* Ghazni, so that in case of emergency the rails could be readily put down, and by the occupation of Kandahar with outposts on the Helmund we could assist our ally the Ameer in repelling invasion from the direction of Herat, and similarly by the occupation of Kabul, Ghazni, and Jellalabad we could help him to defend his kingdom from an enemy in possession of the passes of the Paropomissus.

APPENDIX No. III.

A SKETCH OF THE MEDICAL ARRANGEMENTS SUITABLE FOR AN ARMY CORPS OPERATING IN BELUCHISTAN AND SOUTHERN AFGHANISTAN.

By Surgeon-Major T. O'Farrell, M.A., M.D., Medical Staff.

Army corps.

The proportion of the different arms and the ratio of British to Native troops in an Indian army corps depends in actual warfare on the nature of the country, the service to be performed, and the enemy the force is likely to be pitted against.

It can therefore be readily understood that in all operations in the above countries, the composition of an army corps would much depend on whether it was mobilised with an offensive or defensive object, and as to whether its opponent was an Oriental one like the Ameer of Afghanistan or a great military power such as Russia.

In the former case, the usual proportion of two Natives to one British soldier would be amply sufficient, whereas in the latter the force would require to be well supplied with artillery and strong in the European element, and whatever enemy it was opposed to it should be powerful in cavalry, as thus only could the movements of a foe advancing from Kandahar across the Kadanai Plain be watched from the numerous peaks of the Khwaja Amran range.

Medical arrangements subject to variation.

That the medical arrangements would also be modified by like considerations is very apparent, for the long range ordnance and the modern perfected rifles of the Russians would very largely increase the number of men likely to be seriously wounded, thus necessitating a corresponding augmentation in the hospital provision, and the present arrangement by which the Indian field hospitals, with their bearer columns or companies, are advanced and established in the immediate vicinity of the scene of action would have to be discontinued, and bearer companies should be maintained as a separate and distinct organisation from field hospitals.

The rapidity of advance and the celerity of the movements of such an opponent, the great magnitude of the actions likely to be fought, and the way victory on either side would be pushed home, all have important bearings on the medical arrangements to be made. But for the better understanding the usual medical requirements, and in order to be in a position to readily modify the arrangements under all possible circumstances, it will be well to give the abstract organisation of the normal or standard Indian army corps, and it is hoped the table over leaf may tend to elucidate the matter, and show at a glance the rationale of our Indian field hospital regulations.

Normal Indian army corps.

An Indian army corps consists of three divisions of infantry, each with its own divisional troops. A cavalry division, and the corps artillery and engineers.

In all consisting of 21 regiments of infantry, nine regiments of cavalry, 15 batteries of artillery, and eight companies of sappers. The following table gives the detail, and from it, too, can be derived a synopsis or compendium of all possible field medical arrangements.

Detail of an Indian Army Corps.

Table No. 1.

—		Officers and Men.					Total for Brigade.		Total for Division.		Staff of Divisions.	Guns.
		Officers.		Warrant Officers, Rank and File.		Total of all Ranks.						
		B.	N.	B.	N.		B.	N.	B.	N.		
1st Division	1st Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,664	—	—	4	
	1st Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	2nd Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,664	—	—	4	
	2nd Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	Divisional Troops — 3 batteries of Artillery	15	—	471	—	486	504	1,491	2,360	4,819	12	18
	Divisional Troops — 1 regiment, Native Cavalry	8	13	—	537	558						
	Divisional Troops — 1 regiment, Pioneers	8	16	—	816	840						
	Divisional Troops — 1 company of Sappers	2	2	—	107	111						
2nd Division	1st Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,664	—	—	4	
	1st Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	2nd Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,664	—	—	4	
	2nd Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	Divisional troops — 3 batteries of Artillery	15	—	471	—	486	504	1,491	2,360	4,819	12	18
	Divisional troops — 1 regiment, Native Cavalry	8	13	—	537	558						
	Divisional troops — 1 regiment, Pioneers	8	16	—	816	840						
	Divisional troops — 1 company of Sappers	2	2	—	107	111						
3rd Division	1st Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,664	—	—	4	
	1st Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	2nd Infantry Brigade — 1 regiment, British Infantry	29	—	883	—	912	928	1,665	—	—	4	
	2nd Infantry Brigade — 2 regiments, Native Infantry	16	32	—	1,632	1,680						
	Divisional Troops — 3 batteries of Artillery	15	—	471	—	486	504	1,491	2,360	4,819	12	18
	Divisional Troops — 1 regiment, Native Cavalry	8	13	—	537	558						
	Divisional Troops — 1 regiment, Pioneers	8	16	—	816	840						
	Divisional Troops — 1 company, Sappers	2	2	—	107	111						
Cavalry Division	1st Cavalry Brigade — 1 battery, R.H.A.	5	—	157	—	162	655	1,100	—	—	—	6
	1st Cavalry Brigade — 1 regiment, British Cavalry	24	—	453	—	477						
	1st Cavalry Brigade — 2 regiments, Native Cavalry	16	26	—	1,074	1,116						
	2nd Cavalry Brigade — 1 battery, R.H.A.	5	—	157	—	162	655	1,100	1,310	2,200	12	
	2nd Cavalry Brigade — 1 regiment, British Cavalry	24	—	453	—	477						
	2nd Cavalry Brigade — 2 regiments, Native Cavalry	16	26	—	1,074	1,116						
Corps Artillery	3 batteries of R.H.A.	15	—	471	—	486	586	—	586	—	4	18
	1 Heavy Battery (Field)	5	—	95	—	100						6
Corps Engineers	5 companies of Sappers	10	10	—	535	555	10	545	10	545		
Staff of Corps		20	—	—	—	20	—	—	20	—		
Therefore Army Corps consists of	9,006+76 Europeans 17,202 Natives	—	—	—	—	—	—	—	9,006	17,202	76	90
Total	26,284											

Strength of army corps.

From foregoing detail it appears a typical Indian army corps consists of 9,082 British and 17,202 Natives, or 26,284 of all ranks. It will be seen the staff officers and the 192 British officers with Native corps are all included in the 9,082 British, as they would be treated in the British field and general hospitals.

Hospital provision.

The hospital accommodation for such an army corps is calculated at 12 per cent. on the total strength of both British and Native troops, and this would give 3,154 beds.

Ratio of field to general hospitals.

This 12 per cent. of accommodation is divided between field hospitals and general hospitals, nearly in proportion of four twelfths and eight twelfths respectively, or to speak more correctly of the 3,154 beds, 1,100 are given to field hospitals and 2,054 to general hospitals, being 34·88 per cent. of the total accommodation for field hospitals and 65·12 per cent. for general hospitals.

Field hospitals.

Of the 1,100 beds allowed for field hospitals, the British troops, including staff and British officers with Native corps, get 400 beds or four field hospitals, and the Natives 700 beds or seven field hospitals. This, as will be seen by calculation, is not quite in proportion to the strengths above given. The British portion getting 20 beds in excess and the Natives some 20 beds short, this arises from the fact that the lowest field hospital unit is 25 beds.

General hospitals.

Of the 2,054 beds allowed to general hospitals, 690 are allotted to the British and 1,364 to Natives; this also is not in proportion to strength, the British getting some 20 beds short and the Natives 20 beds in excess. It will thus be seen that the proper number of beds, viz., 1,100 is present in the field hospitals, and the full 2,054 beds are with the general hospitals, but the 20 added to the British field hospitals (in consequence of the field hospital unit being 25 beds) is taken away from them in their general hospitals, and *vice versâ* for the Natives.

Beds for followers.

The 35,033 followers of the conventional army corps are allowed hospital accommodation at the rate of 3 per cent. on strength, or 1,051 beds in all.

Ratio.

This 3 per cent. is divided into field and general hospitals in the proportion of one third and two thirds respectively, or to speak correctly, of the 1,051 beds allowed, 350 beds are allotted to field hospitals and 701 beds to general hospitals (or $\frac{4}{12}$ and $\frac{8}{12}$).

Total accommodation.

The hospital accommodation, then, for our army corps, calculated at 12 per cent. for troops and 3 per cent. of followers, would be as follows:—

TABLE No. 2.

Hospitals.	No.	No. of Beds.
Field hospitals, British troops - - -	4	400
Field hospitals, Native troops - - -	7	700
Field hospitals, followers - - -	3½	350
General hospitals, British troops - - -	—	690
General hospitals, Native troops - - -	—	1,364
General hospitals, followers - - -	—	701
Total for army corps - -	14½	4,205

The large number of followers, considerably more than one to every fighting man, has always been a problem for military men, and it is now usual to cut down the number to one follower per soldier, and the beds allowed in above to followers in general hospitals would thus be reduced to, say, 438 beds. The beds allowed to followers in field hospitals should not be interfered with as so many of them as kahars drivers, &c. have to go into action.

Russian army.

In the Russian army there are no kahars, no grass-cutters, no private servants; and in a conflict with it, we, with our army of followers, all requiring to be guarded as well as fed, would be at a great disadvantage; and it is considered by introducing the home system of bearer companies, medical staff corps, regimental bearers, and soldier servants there would be a great saving in the number to be sustained from our Cis-Indus base; and in operations in barren countries like Beluchistan and Afghanistan all such economy is desirable.

As before stated the proportion of British to Native troops is liable to change, and again referring to the detail it may be said the modifications would be chiefly in the divisional troops. British rifles or light infantry battalions being substituted for pioneers, European for Native cavalry, and mountain batteries, European or Native, for field batteries. It must be remembered the Native drivers with European mountain batteries are counted as fighting men.

Sick provision liable to variation.

The sick provision of 12 per cent. and 3 per cent. for followers, though considered quite enough under ordinary circumstances, would have to be increased if the season was peculiarly unhealthy, or the number of battle-field wounds likely to be large, and it might require extension to 14 or even 18 per cent. as in Egypt, with a corresponding increase for followers.

In defensive warfare the proportion of general to field hospitals, would be much in favour of the former, and *vice versâ* in offensive operations, and the ratio $\frac{4}{12}$ of field to $\frac{8}{12}$ general hospitals would also be liable to modification. For instance, when an army corps is marching *en l'air* general hospitals would be altogether an impossibility; and it may be said the less secure the lines of communication, the fewer the general hospitals should be, and the great bulk of the sick and wounded would be treated in field hospitals in order to take advantage of the protection afforded by the army. Similarly, if our opponent was a civilized power like Russia, we might expect the Geneva Flag would be respected, and our unprotected general hospitals to remain unmolested; whereas with a barbarous and fanatical foe, such as the Afghans, our general hospitals should be kept within the range of our guns.

The detail.

By the aid of the foregoing and detail table, we can readily calculate the amount of hospital provision required for a division, a brigade, a regiment, and even for a battery, or for any combination of the three arms of our army corps. The value of such a table to the Principal Medical Officer of the typical army corps will be apparent when we consider how often on field service the general officer in command issues orders for a force to be detached from the main body with some definite purpose. The detail of the column is generally given, but even if not, the Principal Medical Officer has only to refer to his table, and he can see at a glance the amount of hospital provision required, and can direct the Principal Medical Officers of divisions to prepare such hospital accommodation as he sees is necessary and with the divisions.

British field hospitals for a division.

For example, we want to find the number of field hospital beds required for the British troops belonging to a division.

We say, if 9,006, the British troops, belonging to the army corps plus 76 staff are allowed 400 beds or four field hospitals, how many should be given to 2,360, the British troops, with a division, plus 20 divisional staff officers and five of the army corps staff, who it is presumed would accompany the division, or 2360 + 20 + 5 = 2385.

Thus—

$$9082 : 2385 :: 400 = 105 \text{ beds, F.H.}$$

Similarly for British troops belonging to the brigades and divisional troops.

By adding the brigade staff 4 to 928 the European troops in a brigade, we get 932, and say—

$$9082 : 932 :: 400 = 41{\cdot}04 \text{ beds, F.H.}$$

And for divisional troops—

504, the British troops, plus 12 for divisional staff, and 5 [army corp officers presumed to be attached, or 504 + 17 = 521.

Thus—

$$9082 : 521 :: 400 = 22{\cdot}94 \text{ beds.}$$

Or British troops—

1st infantry brigade would require	-	41·04 beds, F.H.
2nd infantry brigade „ „	-	41·04 beds.
Divisional troops „ „	-	22·94 beds.
Total for division	-	105·02 beds.

which corresponds with what we found above, or 105 beds.

Native field hospitals for a division.

In like manner can be derived the field hospital beds for the Native fighting men of a division:

17202 : 4819 :: 700 = 196·04.

Similarly for the Native troops belonging to the infantry brigades and divisional troops—

For brigades—

17202 : 1664 :: 700 = 67·70.

For divisional troops—

17202 : 1491 :: 700 = 60·67.

Or Native troops—

1st infantry brigade would require	-	67·70 F.H. beds.
2nd infantry brigade „ „	-	67·70 „ „
Divisional troops „ „	-	60·67 „ „
Total for division -	-	196·07 beds.

which agrees with what we found to be necessary for the Native troops of the division, viz., 196 beds.

Cavalry division.

By a like calculation we find the British portion of each of the brigades of cavalry would require 29·11 field hospital beds, and, taking the two brigades together, they would require 58·22, and the native portion of each cavalry brigade 44·76, or the two brigades together 89·52, while the corps, artillery and engineers, would give 26·64 field hospital beds for British troops and 22·17 for Natives.

Tabulating them, we find the number of field hospital beds required for an army corps to be—

Table No. 3.

Army Corps.	Number of Field Hospital Beds.	
	British.	Native.
1st Division - - - - -	105·02	196·07
2nd Division - - - - -	105·02	196·07
3rd Division - - - - -	105·02	196·07
Cavalry Division and Corps troops - -	84·86	111·69
Total - - - -	399·92	699·90

Or only a fractional point below that allowed, viz., 400 field hospital beds for British troops and 700 for Natives, or total for fighting men 1,100.

Sections o field hospitals.

It is unnecessary to say the proportion of beds for each division, &c. in general hospitals is also obtainable by calculation from the table.

Now an Indian field hospital, British or Native, consists of 100 beds, and is separable into two divisions, right and left, each of 50 beds, and the divisions can themselves be split each into two sections, or four in all, named A, B, C, D. Each section contains 25 beds, and the section is the smallest unit of a field hospital.

Number of field hospitals with army corps.

In order, then, to see how the field hospitals allowed should be distributed to the different branches of our army corps, we must bear in mind the lowest field hospital unit is 25 beds, and allot 25 beds, or a multiple of it, or none at all. The preceding table, by the addition of the field hospitals for followers, is reconstructed thus :—

TABLE No. 4.

Army Corps.	Number of Field Hospitals.			
	British.	Native.	Followers.	Total.
1st Division - -	1	2	1	4
2nd Division - -	1	2	1	4
3rd Division - -	1	2	1	4
Corps, Artillery and Sappers, Cavalry Division.	1	1	½	2¼
Total - -	4	7	3½	14½

We can readily reckon from the detail how many and what field hospitals or sections thereof should accompany any given force; but, speaking generally, field hospitals attached to divisions should be equally divided between the infantry brigades. And in any splitting up of field hospitals it is well to remember Sections A and B or the right division is better equipped than the left division, Sections C and D, and that next to A Section C would be the most independent, then B, and D least. Section A should be always the head-quarters of the field hospital.

Followers treated in Native field hospitals.

There is no separate medical or hospital establishment allowed for field hospitals for followers, their requirements are met from and they are treated in the Native field hospitals.

The regulations regarding field hospitals, their establishment and equipment, their position in camp, and on the line of march, will be found at paras. 39–75A, Indian Army Circulars, 1884, clause 82, and clause 171 Army Circular, 1885, and their appendices.

It is contemplated in the regulations that British and Native field hospitals, or sections thereof, might be combined or encamped together, and it may be remarked there is but little difference between British and Native field hospitals in respect to medicines, surgical instruments, appliances, books, necessaries, stationery, and furniture, whereas they differ considerably in regard to personnel, camp equipage, clothing, and dieting. Anyone acquainted with the habits and customs of the natives will know where to look for disagreements in scale, and in cases of emergency many articles can be borrowed and deficiencies made good.

Equipped for three months.

Field hospitals are equipped only for three months, and all expenditure from the stores authorised for corps units will be replenished from the field hospital stock. The mode of packing, equipment, transport, and weights of the different packages, comprising British and Native field hospitals, will be found in the Report of the Field Hospital Committee, Calcutta, 23rd February 1885.

Field hospitals are intended for the treatment of the sick and wounded of the force to which they are attached; beyond the first dressings applied by the medical officers with corps, and by the bearer column or company at the dressing station, all operations and other necessary treatment of the sick and wounded of the fighting line is carried out in the field hospitals, and here the wounded get, for the first time, comparative rest and comfort after the heat of action.

Field hospitals mobile.

Field hospitals must, therefore, be pre-eminently mobile, and should conform with the general formation of the force, and only become stationary, when from the number of sick and wounded, or from want of transport, they cannot be moved, and as soon as these impediments can be rectified must immediately join the force.

No bearer companies.

Unlike the arrangement for a purely British force acting against a European power, there is no separate bearer company organisation. The Indian bearer column or company is merely a portion of the field hospital equipment and establishment, pushed forward to the fighting line, for the purpose of succouring the wounded near or where they fall, and conducting them to the field hospital, an Indian field hospital itself performing most of the functions of

the large dressing stations of European armies. As soon as the bearer column brings in the wounded it merges into its field hospital. Each field hospital should be able to equip two bearer columns. The regulations for bearer columns, the orders for the formation and position of dressing stations, together with detail of a bearer column, are to be found at paras. 58–70, clause 82, and Appendix, Army Circular, 1884. Patients taken into field hospitals bring their arms, kits, accoutrements, bedding, clothing, diet utensils, and unexpended portion of their day's field ration with them. While in hospital field rations will be drawn by the medical officer in charge and will be cooked under medical instructions. The field ration thus treated is supplemented by such medical comforts as may be necessary from the field hospital stock.

Rations.

See note Appendix E., page 47, Field Hospital Regulations on Subject of Diet for European and Native Sick.

A small quantity of bedding, clothing, and diet utensils are allowed on the field hospital scale for special cases.

Bedding.

Dandies are used for the sick and wounded to lie on, and when the number of dandies is insufficient 12 lbs. of straw and a waterproof ground sheet is issued to each patient.

The slightly wounded and those sufficiently recovered before the field hospital requires to be evacuated in anticipation of an action will return to their corps, but the seriously and severely wounded and those not likely to become effective within a reasonable time should be sent to the base.

Patients in field hospitals being still in the immediate vicinity of their corps, all malingerers must be stopped here, as it is hopeless to expect to get them again to the front once they have been passed to the rear.

Way-side hospitals.

To admit of the regular and systematic evacuation of sick from front to base, or from field to general hospitals, rest-depôts or *etappen* hospitals are established along the lines of communication where the sick and wounded may rest and have their requirements attended to. They are also of great use to troops advancing to the front in rapid relief. These troops being supplied with but little ambulance can drop those too sick to travel at the rest-depôt, where they remain until they are sufficiently well to rejoin their corps or be returned to the base, and the smaller the proportion of sick carriage in the possession of corps the greater need for rest-depôts along the line of route.

Buildings, when practicable, should be used for rest-depôts, and if not available tents of the heavy camp equipment character should be issued.

Rest-depots. Distance.

The general officer in command directs where the rest-depôts should be formed, but the usual rest-depôt distance is about 20 to 30 miles apart by road, and if no ambulance railway carriages are supplied about 100 miles by rail.

Regulations for rest-depôts will be found in paragraphs 71–74, clause 82, Army Circulars, 1884.

It will thus appear rest-depôts are stages between the field hospitals at the front and the general hospitals at the base and on the lines of communication.

General hospitals.

As the field hospital aims at quickly putting the sick or wounded man in a place of safety and *comparative* comfort, the object of the general hospital is to afford him every comfort, convenience, and aid to recovery which the circumstances of warfare will permit of. With this end in view, general are worked like station hospitals, having all the necessary appliances, surgical, medical, and dietetic. They are dieted hospitals established at the base of operations, or other suitable locality on the lines of communications, for receiving the sick and wounded from the front, and for replenishing the stores of hospitals in the field.

Military depôt.

Each general hospital has a pack and accoutrement store and a medical store attached to it, and depôts for British and Native troops are established in its vicinity, to which discharged men can be sent, and from which necessaries for those in hospital can be provided.

As field hospitals are intended for the treatment of men of its own force, general hospitals are for the treatment of men detached from their corps or division.

General hospitals when advanced.

Field hospitals must be prepared to move at a moment's notice with their own force, whereas general hospitals are for the most part stationary, and are only advanced as the whole or a great part of the army corps advances.

Whenever practicable buildings should be utilised for general hospitals, otherwise heavy camp equipment tents. General hospitals are equipped for six months, and must replenish the field hospitals from their stores.

All general hospitals are based on the scale of 100 beds for Europeans and 100 beds for Natives. Officers, warrant officers, and Native officers are admitted into general and field hospitals, and are allowed separate accommodation.

Orders for choosing sites for general hospitals and other regulations affecting them will be found in paras. 1–14A, and Appendix, clause 82, Army Circulars, but it may be stated general hospitals, when practicable, should be in open spaces near towns, and not inside fortresses or fortifications, and small general hospitals in very advanced positions would be in reality only large rest-depôts or *etappen* hospitals, and the number required would depend on the length of communication line.

It will be seen from above account the general hospitals on field service in India answer the purpose of "advanced depôts of medical stores," "stationary "hospitals on the lines of communication," "general hospitals at the base, "with military depôt attached," and "depôt of medical stores at the base" of the home army. The great difference being that in the home army the medical store depôts are not attached to hospitals, but are under the principal medical officers of the base and communication line, independent organisations, and that there is a military depôt attached to *each* general hospital in India. General Orders, No. 30, 13th April 1885, says the military depôt "will ac- "company the hospital on active service when and where it may be moved or "established." It is not quite clear why *every* general hospital should have a military depôt with it.

Corps-units.

It now only remains to be said each corps-unit has a medical officer and medical subordinate attached; the equipment, together with rules for guidance, will be found at paragraphs 28–38, clause 82, Army Circulars, 1884.

Shamming.

While the medical officers with corps-units should not allow sick or unfit men to remain with the corps and encumber the front, they should do what they can to prevent shamming and scheming, and no man should be sent to hospital for treatment unless he requires it; with the field panniers now supplied most trivial cases can be dealt with. It should be remembered a picked strong mule must be given for the panniers, as they weigh a stone more than the usual mule load.

Surgical assistance.

To recapitulate, then, a man falling severely wounded in battle is tended by the medical officer with his corps until the staff of the bearer column arrives.

Field dressings (Appendix D., clause 82, Army Circulars, 1884) are issued to 10 per cent. of fighting men; these, with the other surgical materials at his disposal, are applied by the medical officer with corps, and in this he is assisted by medical officers attached to other corps of the same division which are not engaged.

When the staff of the bearer column arrives, the wounded man is removed to the dressing station, thence to the field hospital, which has been so placed as to preserve touch with the fighting line. The dressing station should be beyond the range of rifle fire, and the field hospital wide of artillery distance.

From the field hospital he is sent to the general hospitals on the line of communication, thence to general hospital at the base of operations, halting on his way from time to time at the rest-depôts.

Transport.

We now come to the all important subject of transport, and unless this is efficient our field hospital regulations are mere *tabula rasa*. Two kinds of transport are allowed to the hospital service, viz., transport for material and ambulance or sick transport; oddly enough, and in curious contrast with what obtains at home, neither kind of transport is under the control of the medical officer, but is administered and controlled by a distant divisional or brigade transport officer. This system is sure to lead to friction, and consequent loss of efficiency in actual warfare; even now we have the confusion and ambiguity of the "bearer column" of the transport officer and the "bearer company" of the medical officer. The whole aim of modern transport is to confide the necessary transport to commanders of corps-units, and to charge them with the responsibility for the mobility of the corps. Why then should field hospitals, whose *raison d'être* altogether depends on mobility, be expected to succeed when failure seems unavoidable?

The medical officer should command the transport.

Whatever sophisms may be cited in favour of disuniting the medical officer in charge of a field hospital from his ordinary transport, he should, in common reason, have command and undisputed control of the ambulance transport, both animal and manual.

Anyone acquainted with the present plan, even in peace time, can see what little grip the surgeon has over the ambulance, and indeed the same may be said of the absentee transport officer. The irregularity in payment of the men, and the confusion arising from so many possible masters, is so deterrent, few good kahars can be induced to join; and those now entertained—being chiefly employed in punkah pulling, shifting commissariat stores, tending government gardens, and such like coolie work—have forgotten whatever they knew of sick bearer work. It may be said the "new hands" are not good, and the "good ones" are too old. The scheme for ambulance sanctioned (No. 1376C., Medical Department. Ambulance), though complete enough in itself, is, in the writer's opinion, the play without Hamlet, and he thinks no matter how elaborate and apparently perfect the plan may appear, if the surgeon's authority is not paramount the ambulance will break down.

He is convinced the system will snap and collapse when war is actually upon us, but fears it will be unfortunately then too late to improve it, and the shortcomings will be laid at the door of the field hospital arrangements, and administrative and executive medical officers will be blamed for a breakdown which they foresee, but are powerless to avert.

Ambulance.

Be this as it may, the field ambulance allowance is 5 per cent. on strength of troops, and 1 per cent. on that of followers. This sick carriage is divided into dandie and animal carriage thus—

Table No. 5.

Troops.		Followers.	
Dandie - -	3 per cent.	Dandie - -	½ per cent.
Animal - -	2 „	Animal - -	½ „

The camel.

The animal to be the one most suitable to the country, and the camel has been chosen for Afghanistan. The camel is probably much inferior to mules, ponies, donkeys, or even pack-bullocks for sick carriage, and anyone who has seen a camel with his kajawah carry a couple of sick men must be struck by his stubborn ungainly gait, shaking the occupants with every step he takes, and making their giddy perch a most undesirable seat; when used they should be equipped with the English cacolets and litters, and would be very useful on a desert march, such as an expedition through Nushki into Registan, to repel any attempt to turn our left flank by a march across the vast sandy plain extending from the Helmund towards Kelat.

Ambulance for cavalry.

In modern warfare cavalry are frequently many days in advance of the main body of an army, and the question of ambulance for them, especially during forced marches, presents many difficulties; if the pace is slow the dandie can keep up pretty well; but in rapid movements, such as those undertaken for the seizure of advantageous strategical positions, some speedier means must be adopted; as a rule, wounded troopers are brought on between two comrades, thus depriving the force of the services of two men, in addition to the disabled one. Cacolets carried by the galloway, known as the mounted infantry pattern, a strong solid little horse of about 14 hands, would, under ordinary circumstances, be able to keep pace with the cavalry, and if trained this class of animal could be used for litters, usually the animal might be led by a man on foot, or if greater speed was necessary, by a mounted man, or the driver could occupy the off cacolet or litter, only one patient being taken.

Camels could also be used in a similar manner for this service, but their swinging gait would make the litter or cacolet far less comfortable travelling. The big mules in India are all taken up for mountain artillery, and the small ones, 11 to 12 hands, would not be suitable for the English cacolet or litter. If, therefore, mules are to be used with mountain equipment in this country, a special class of animal is necessary.

For infantry, if carts cannot travel, the mule, the pony, the donkey, can be used as pad animals. Some of the donkeys about Quetta can carry as much as 16 or 17 stone, their small size, docility, and the readiness with which they find their own fodder render them very useful and suitable as sick carriage; or litters of various kinds might be constructed, such as the one in use in Persia, which consists of a palanquin slung between two mules or ponies; a native charpoy, with the legs up, may be used across the back of a pad animal for conveying a man lying down. Pad animals. Litters.

However, there is a good cart road all the way to Kandahar, and light service carts with mule transport would be the best mode of conveyance for all but the seriously sick or wounded. Carts.

Broken limbs and serious cases will usually require carriage by hand, and the Lushai dandie with cover is now authorised for field service, the usual number of bearers was *four* per dandie, but it is understood in future *five* will be supplied with each dandie in operations beyond the Indus. Two chaguls are issued with each dandie, and it should be seen that they are filled with fresh water before starting, and at the outset of a campaign it should be ascertained if they hold water. To make them effective when new they should be soaked in water, and then greased. New puckal mussaks should be similarly treated. Dandie.

The wheeled carrier for the dandie would be of great service where the roads were tolerably good, and would even over rough ground be easier for sick men than dandies carried by inexpert bearers; the carrier could only be used on the lines of communication and should not follow a force into the field. The carrier.

If possible the transport, as well as the personnel and materiel of field hospitals, should be kept together from the outset, and start by train as complete units. In his evidence before the Earl of Morley's Committee, Deputy Surgeon-General Ekin, C.B., says, "On the march down from Kabul to "Kandahar we were much more independent in this way; we had our field "hospitals equipped; we had our carriage entirely in the hands of our "medical officers, and that carriage was provided for us before we started;" thus equipped they were able to provide ambulance transport of some kind for the 800 or 900 sick brought into Kandahar. Kabul-Kandahar march.

At present the hospital transport is not in the hands of the medical officers, and as it is feared, in view of the confusion and on the plea of more pressing necessities elsewhere, it will be made up of all kinds of carriage, the following table gives the carrying powers for field hospital purposes, expressed in lbs. and coolie loads.

TABLE No. 6.

Description of Carriage.	Lbs.	Equivalent expressed in coolies.
Camel - - - -	320	As much as eight coolies or two mules.
Mule or pony - - -	160	As much as four coolies.
Pack bullock - - -	160	As much as four coolies.
Light cart - - -	480	As much as 12 coolies.
Army transport cart - -	960	As much as 24 coolies.
Donkey - - - -	120	As much as three coolies.
Coolie - - - -	40	

If a field hospital is supplied with different kinds of carriage, the mule would be the most moveable, coolies next, camels last; to ensure efficiency all should be mules, and whatever description is issued a per-centage of spare animals should be sent, and it must be remembered mules and banghy burdars should be supplied for the field panniers and petarrahs, and the mules should be strong ones. Spare animals.

It is confidently hoped, ere long, the hospital transport, both general and ambulance, will be as complete as that of a mountain battery; that it will be under the command and control of the medical officer assisted by his staff. The medical warrant officer who takes the dandie parties into the field of

action would be the most appropriate man to have subordinate charge of the kahars.

1st Army Corps for Peshin warned last spring.

To apply the foregoing principles to an army corps ordered to be mobilized for service in Beluchistan and Peshin. We have seen how the composition of the force may be altered, and it may also be increased by the addition of a British infantry regiment to each brigade or six altogether, and by the addition or substitution of mountain artillery. The strength and composition of an army corps is settled by Government, for instance, the strength of the army corps ordered to be mobilized last spring differed from one and other. The 1st Army Corps, which was evidently from its composition intended for an advance on Kandahar or farther, consisted of 27,841 troops, viz., British 12,425 and Native, 15,416, with 27,833 followers; the hospital provision was 12 per cent. for fighting men, or 3,341 beds, and 3 per cent. for followers, and this accommodation, both for troops and followers, was divided into $\frac{5}{12}$ field and $\frac{7}{12}$ general hospitals.

By calculations similar to those already indicated we find 1,392 beds were allotted to field hospitals and 1948·9 for general hospitals. But when we express the 1,392 beds in field hospitals we find there are 13 complete field hospitals and 92 beds over, as before stated the lowest field hospital unit being 25 beds, this gives us then 13¾ field hospitals and 17 beds over, which, is added to the general hospitals, or 1965·9 or 1,966, which was the actual general hospital provision. So much for the troops, now for the followers: the 27,833 at 3 per cent. would give 834·9, they were allowed 835, this divided into field and general hospitals in the proportion of $\frac{5}{12}$ and $\frac{7}{12}$ would give 347·9 for field and 487·08 for general hospitals; the 347·9 beds expressed in field hospitals would be three complete hospitals and 47·9 beds over; but as the lowest field hospital unit is 25 beds, the 47·9 beds are taken as 50, making 3½ field hospitals, and the two beds thus added are taken from the general hospital beds, making the latter 485, or all told 17¼ field hospitals or 1,725 beds, and 2,451 beds in general hospitals for the 1st Army Corps.

In using table No. 1, and referring to the different Presidency's army lists, the establishments of corps will be found and substitutions can be readily made, but it must be borne in mind that Native drivers of European mountain batteries are counted as fighting men not followers.

From paragraphs 1, 2, and 42, clause 82, Army Circulars, 1884, it will be seen the whole hospital provision, as well as the proportion of field to general hospitals, is, together with the position of the latter, settled by the responsible officers of Government; for example, for the present war in Burmah the hospital provision was 10 per cent. on strength for troops and 2 per cent. on strength of followers, and the proportion was $\frac{5}{10}$ field and $\frac{5}{10}$ general hospitals and the general hospitals to be established at Thayetmyo. Enough has been said in the foregoing to indicate the different factors likely to be taken into account by them, in fixing the composition of the force and hospital provision.

Hospital provision for Burma.

Supposed army corps, its object.

For the purposes of this paper we will suppose the army corps, whose strength and composition is given in Table No. 1, and which in a measure may be taken as a prototype, has been ordered to be mobilized, that the hospital provision has been fixed at 12 per cent. for troops and 3 per cent. for followers, and that this accommodation has been divided into $\frac{4}{12}$ field and $\frac{8}{12}$ general hospitals, and the beds distributed as in Table No. 2. We will assume the object of the force to be defensive generally, trusting to the home army making an attack on the Russian line by way of the Black Sea or elsewhere, and always being in a position not only to resist attack, but to meet the enemy when numbers and strategical standpoints were in its favour, and to follow him up when defeated; and we will further take it for granted the present Quetta force—but with its own hospital provision—would assist in keeping open the communications, and thus free as much of our army corps as would be sufficient to cling to the Kojhak line with pertinacity to offer a stubborn resistance to a Russian foe advancing from the Helmund through Kandahar, and to give battle in the open if necessary.

The Principal Medical Officer of such a force should be a strong and active man, and he should be consulted as to the appointments of the Principal Medical Officers of Divisions, and as far as practicable the patronage of appointments to field and general hospitals should be placed in his hands, and his wishes as to medical staff appointments generally complied with. Nothing

Appointments.

is so calculated to make the machine work evenly and smoothly as a thorough knowledge of all its component parts by the foreman. When medical officers know and feel their advancement, their hopes of honours and decorations and rewards, depend on the word of the Principal Medical Officer they are much more likely to render him that loyal and willing support without which success is unattainable. General rules for administration will be found in paras. 22–27, clause 82, Army Circulars, 1884, and Appendix. A Principal Medical Officer for the cavalry division, as well as administrative staffs for the base and communication line, would be most desirable, and it may be mentioned the number of medical officers in reserve in the field hospitals or on field service generally is inadequate or so barely sufficient that the least casualty causes men to be transferred from one kind of duty to another just as they were becoming useful at their present posts, and it should be a golden rule of active service that no man should be moved from any hospital, post, or corps unless for promotion, the good of the service, or at his own request.

Paucity of medical officers.

Medical examination.

Immediately the orders for mobilization are promulgated all ranks and followers, both public and private, should be medically examined, so that no man would accompany the force who is likely to fall sick and encumber the army; the medical officer in charge of the hospital where the men are treated, as well as the medical officer who will have permanent medical charge of the corps, should be members of the board, and it must be kept in mind that many healthy men are disinclined for service and "weeds" are frequently keen on going, and in neither case should their wishes be met.

Troops whence drawn.

The troops of our army corps would be drawn for the most part from Bengal, the Punjab, and frontier force, but doubtless Bombay and Madras would send their quota.

14½ field hospitals are ready for service.

Now there are in India exactly 14½ field hospitals already prepared for service, viz., four British and 10½ Native, or the quantity required for our army corps. Those on the frontiers, 1 British and 3½ Native, are in every way complete for service; while the remainder, or those from army corps areas, have all the packages ready and require only to be filled, and could, being on the lines of railway, be easily trained to Mach in the Bolan.

With the exception of No. 3 British Left Division at Rangoon, No. 11 Native Eastern Frontier, and No. 13 Native at Rangoon all the field hospitals would be at once available, and orders should be sent to Madras and Bombay for the dispatch to Mach of their field hospitals.

Field hospitals stored at Quetta.

The 2 Native and ½ British required to complete the 14½ field hospitals could be procured at Quetta, where it is understood 3 British and 3 Native field hospitals got ready last May are now stored, or these 6 hospitals might be first requisitioned, the remaining 8½ being obtained from the frontier and army corps areas.

The medical officer in charge, assisted by the warrant officer in sub-charge, should at once take over the equipment and, if possible, the transport, satisfying himself as to their completeness, reporting the same to the Principal Medical Officer of the army corps.

No trouble about field hospitals.

There need, then, be no trouble or confusion in equipping our army corps with its 14½ field hospitals. Those required from the Quetta reserve should be pushed on to Chaman, where a strong force must be maintained, and one English and three Native field hospitals would be required there. The field hospitals from India having been railed to Mach should be moved on to Quetta, Peshin Fort, Sayud Hamid, Gulistan, and Killa Abdulla. Or if the troops derailed at Mach were marched thence in brigades, the requisite complement of field hospitals should accompany them. Similarly, if troops marched up the Harnai route by brigades, the necessary field hospital accommodation for the force having been railed to Kilat-i-Kila, should march with its force to Peshin by way of the Chappar Rift and Kach. On the march field hospitals, both British and Native, should be close up to the column, and on no account must regimental baggage be permitted to forge ahead of them.

To train such an army corps to Mach would take some 30 days, and it would be well to have some wayside hospitals or rest-depôts provided, and general hospitals established before the arrival of the army corps. Unfortunately the hot weather is the time of the year such an army corps would be put in motion, for the enemy could only begin his advance when the winter snows of Afghan Turkistan had melted.

General hospitals from the three Presidencies.

The equipment for the general hospitals required should be obtained from the three Presidencies, and it should be borne in mind that the scale is 100 beds, Europeans, and 100 beds, Natives, and that all general hospitals formed either at the base of operations or in the field or elsewhere must be based on this scale.

Indus River our base.

The Indus line would be the natural base of such an army corps. All stores, munitions of war, men, materials, and food should be derived from the east of this river, and in case of defeat it would be the position taken up by the army for a further stand.

We have stated that the army corps should have 2,054 general hospital beds for troops and 701 for followers, or, if the followers be reduced to one per fighting man, 438 beds, or a total of 2,492; and of this 2,492 beds, 690 would be reserved for British troops, and the remaining 1,802 for Native troops and followers. The following table gives the position and number of beds of the different general hospitals, European and Native.

General hospitals. The followers are treated in Sepoy's hospitals.

TABLE No. 7.

	2,492 Beds.		
	B. 690.	N. 1,364.	F. 438.
Lahore - - -	150	250	100
Kurachi - - -	100	150	50
Ruk Junction - -	—	200	100
Mach - - -	50	100	—
Quetta - - -	280	464	188
Kilat-i-Kila - -	—	100	—
Sharg - - -	50	—	—
Syud Hamid - -	60	100	—
Totals - -	690	1,364	438

Lahore hospitals.

The hospitals at Lahore would be used by the Bengal troops and their followers, and from there British soldiers could be sent to the different sanitaria of the Himalayas; those belonging to the Punjab being sent north to Muree, &c., and others to Dugshai, Kasouli, Laudour, &c. The Sepoys dispatched by rail to their depôts or homes, and the followers to their homes.

Kurachi hospitals.

The hospitals at Kurachi would be available for British troops invalided to England, and for British and Native troops and followers of the Madras and Bombay armies.

Hospital at Ruk Junction.

The hospital at Ruk Junction would be for Natives only, and here the Sepoys and followers of the Bengal troops proceeding north to Lahore could be separated from those of Madras and Bombay going *viâ* Kurachi.

Hospitals at Mach.

The hospitals at Mach would be for the convenience of troops embarking or detraining there.

Quetta hospitals.

The Quetta hospitals would be for the reception of sick and wounded from the army of observation in Peshin.

Reinforcements in by Bolan. Sick out by Harnai.

The hospital at Kilat-i-Kila for Natives only would admit men going up and down the Harnai line, and the British general hospital at Sharg would do the same for Europeans. If there was much press in the Bolan in consequence of the hurrying up of reinforcements or supplies, the Harnai route could be used for the sick returning to the Indus, thus establishing an "in" and "out." Under such circumstances the hospitals at Sharg and Kilat-i-Kila would be very handy.

Hospital for the Chaman force.

The small hospitals at Syud Hamid would afford rest, shelter, and comfort to the sick of the Chaman force after the trials of their return journey over the Kojhak; they should, however, be passed quickly back to Quetta.

The Quetta hospitals should be in buildings, and indeed the same may be said of the others; when buildings are not available hastily constructed huts of sleepers, railway iron and mud would be preferable to E.P. tents.

Diets.

The hospitals at Lahore and Kurachi could be fully dieted, but at the others there should be only two or three diets to choose from; milk, low and

full, would answer very well, any other articles required should be made up from medical comforts or extras; an ample supply of peptonised cocoa and milk for cases of enteric fever and dysentery should be available.

Rest-depôts. Along the line of railway the cantonment hospitals at Mooltan, Sukkur, and the like, should be utilised as rest-depôts when required, and it would be well to organise sanitary trains for the accommodation of sick convoys. Similarly rest-depôts should be formed along the Harnai and Bolan routes, and between Gharkai and Killa Abdulla, and between the latter place and Quetta.

Sanitation. General rules for sanitary guidance in the field will be found in the Bengal Medical Regulations, Sec. 17, paras. 60–82. The medical officers with corps units are sanitary officers to the corps, and one of the medical officers of each brigade should be nominated for charge of the brigade staff, and be charged to look after the sanitation of the brigade. The Staff Surgeon of each division would, under the Principal Medical Officer of the division, act as sanitary officer, and the Principal Medical Officer of the Army Corps should be assisted in sanitary duties by a special medical officer; but it must be understood the Principal Medical Officer of the Army Corps is himself the sanitary officer, and the others only his assistants, and the rule is that the senior medical officer on the spot is the sanitary officer.

Scurvy. In consequence of the barrenness of Afghanistan and the scarcity of vegetables scurvy is very common, and so is scorbutic dysentery. Lime juice should be issued to Europeans and *amchur* to the Natives; this latter, as its name implies, consists of peeled mangoes. The green mangoes are peeled, the stones removed, and the cut pulp is sun-dried. Sixty-seven grains of *amchur* contains 10 grains of citric and malic acids, and are, therefore, equal to one ounce of lime juice. The *amchur* is used as a condiment, and can be substituted for lime juice when scurvy is present. In the writer's opinion either of these anti-scorbutics should form a part of the daily ration in the field; it is the only way to prevent scurvy, and it should be borne in mind the inception of this and its allied diseases is frequently very obscure.

Amchur. It is usual to issue a meat ration at least once a week to Native soldiers, and no doubt it is very beneficial; it may be added, too, that on field service the Native frequently sees the necessity of abandoning some of his prejudices about food, and under the name of medicine will take anything, from rum to extractum carnis, when sick.

Europeans and Natives were treated in No. 3 field hospital. No. 3 Field Hospital, of which the writer had charge during the last war, was partly European and partly Native, and he found no difficulty in the management of them with regard to food. One precaution he would advise, viz., that great care should be taken to keep the arms and ammunition separate; there is not much likelihood of there being a mistake about the arms, but the Boxer cartridges in paper are not unlike the Martini-Henry, and he has seen the substitution of one for the other.

Ammunition. Rest-depôts should invariably accommodate Natives as well as Europeans; they can be kept a little apart; but one medical subordinate and one hospital assistant should be allotted to each, then one medical officer could readily manage all.

Suakin. Memoranda. As the limits of this paper will not allow anything like a detailed description of the chief diseases likely to arise on field service in Beluchistan and Peshin, nor yet the best mode of their prevention or cure, the writer takes the liberty of referring to the Director General, Sir Thomas Crawford's memoranda for the Suakin Force, Army Medical Department Report, 1883. It treats of antiseptics, sanitation, wounds, diseases, and disinfectants, and everything said in that article will, *mutatis mutandis*, apply with equal force to campaigning in Afghanistan. In dealing with the hospitals of an Indian army corps it will be best, for a time, to altogether abstract, in the logical sense, the difference in race, for as far as hospital provision is concerned they are alike, and thus viewed there is but little difference between the home and Indian regulations.

ools for improvising. With respect to field hospital equipment, the carpenters' tools should belong to the hospital and not to the carpenter, by the time the carpenter joins the hospital he has either lost or sold most of his tools; it would be easy to select suitable ones from the stock of any good Native tradesman; and such tools as tinker's scissors, drills, triangular files, punch with matrix, and wire cutter would be

found very handy in improvising hospital appliances. Each field hospital should also be supplied with some native reaping hooks, called "darati;" they would be very useful in clearing the ground for encampments and other purposes.

Kerosine oil can. The empty kerosine oil tin writer found most useful, it is only necessary to set fire to the few remaining drops of oil in it, wash it out, and it can be used for boiling water, and being so thin it is peculiarly adapted for this purpose in a country where firewood is so scarce. A board with a hole in it, placed over the tin, makes an excellent commode, which article is most necessary in a country, where, in addition to camp diarrhœa, the drinking water is in many cases purgative. The tin makes an excellent filter, cut into strips can be used for splints, opened along the length it makes a good water trough for surgical cases; in fact, it would be endless to enumerate all the uses it can be put to, no other can is so serviceable.

Broken bamboo poles of tents make good water pipes; rails, and sleepers, good huts, "boosa," good beds, and many other articles might be mentioned, which come in handy, and on this subject of "improvisation" reference should be made to Appendix VI., Army Medical Department Report, 1883.

Returns. No matter what efforts are made to keep down correspondence and returns, there will always be a considerable quantity of both. Unfortunately the writers supplied from corps are usually very bad, and the medical officer has to do most of the office work himself. Junior medical subordinates, with a small staff salary, could do the work efficiently in addition to their own; and a typograph for issuing orders, when several copies are required, would be very useful to Principal Medical Officers.

Having settled, then, the number, position, and sources of supply of our general hospitals, it now only remains to be said where our field hospitals should be placed, as before stated they must preserve touch with the brigades or divisions with which they are associated; if buildings are available near the scene of action they should be utilized, especially when they become immoveable; and in order to foresee where field hospitals are likely to be wanted, and be in a position to anticipate the possible hospital requirements of different developments, the Principal Medical Officers should have clear conceptions of the nature, scope, and object of the operations likely to be undertaken, and they should not only make themselves acquainted with the medical-topography of the country, but should also study it from a strategical point of view.

Importance of strategic knowledge.

Their calculations and designs would be more perfect and intelligent by the knowledge: that for the defence of the Kwaja Amran range it would be necessary to have a large force at Chaman; that the Kojhak, the Roghani, and the Gwajha defiles would have to be guarded; that the main body of the army corps would be drawn up on the Gulistan-Killa Abdulla line for battle, and in the event of the enemy forcing the range, and on his emerging from "the dark "shadow yonder that marks the pass mouth," would be ready to fall on him in flank; that in case of defeat we would retreat on our supports at Quetta by way of the main road over Gazardband Pass, and that retirement would also be possible across the plain of Peshin to Kach, and down the Harnai line; and that if the conflict at the foot of the mountains resulted in our favour, and the enemy thrown back on his stores, guns, and baggage, retreated in disorder on Kandahar, it would be our duty to follow him up with vigour and crown our victory.