

R. Tilbury Brown

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SANITARY REPORT OF MANŒUVRES, BURMA DIVISION,
1912.

By MAJOR R. TILBURY BROWN.
Royal Army Medical Corps.

IN this report I wish to draw special attention, in the first place, to the increased interest which has been displayed by combatant officers generally in the subject of sanitation and to the improvement consequent thereon. This was evidenced by a camp being in occupation for three weeks without the appearance of flies.

In the second place, to the good work and utility of that new unit—the Sanitary Section.

From a sanitarian's point of view the manœuvres consisted of two distinct phases, viz., the march to the standing camp and the standing camp itself. This report is, therefore, divided into two portions, viz., *The March* and *The Camp*.

THE MARCH.

The main column marched from Mandalay to Nawngpeng, preceded by an advance column from Maymyo.

The Mountain Battery marched from Bhamo to Nawngpeng.

REGIMENTAL SANITARY DETACHMENTS.

When on the march the sanitation of units was performed by the Regimental Sanitary Detachments (R.S.D.) These were well trained and organized with the exception of those in small units, such as Mounted Infantry, but there are a few points which require attention.

(1) *Organization*.—In infantry regiments the full complement of one N.C.O. and eight men is always employed, and in some cases this number is augmented by the men trained in sanitation (*vide* A.R.I., vol. ii, para. 893).

In smaller units, such as artillery, mounted infantry and sappers and miners, there is some doubt as to the number to be *employed* though there is none whatever as to the number who must be *trained*. A.R.I., vol. ii, para. 893, lays down that 2 N.C.Os. and 2 men per battery and company R.A., or per company sappers and miners, are to be trained in sanitation.

I.A.O. 708—10 lays down that 1 N.C.O. and 1 man per unit are to be employed in the R.S.D., but A.R.I., vol. ii, para. 893, omits the N.C.O. and employs only 1 man per unit. As N.C.Os. must be trained, and so recent an order as 708—10 lays down that one must be employed, and as it is necessary to employ one in order to obtain efficient sanitation, it is desirable that these units should have regimental sanitary detachments composed of 1 N.C.O. and 1 man per unit. The unit consists of a battery or company of R.A., a company of mounted infantry and a company of sappers and miners.

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(2) *Employment.*—In infantry regiments the R.S.D. should work more as an independent unit of the regiment. After a rest camp or bivouac has been cleared the R.S.D. should resume the march in a body with the first line of transport. Before going into a rest camp or bivouac the C.O. or quartermaster should see that the R.S.D. are among the first on the ground so that they can commence work without delay.

In smaller units it may not be possible to work as above, but care should be taken that the R.S.D. get together and to work as soon as possible on arrival at the camp.

In rest camps on the line of march it often happens that too much of the executive work is laid on the sweepers. It is among the duties of the R.S.D. to dig latrines and urinaries, to make incinerators, &c. It is the duty of the sweepers to keep latrines clean, apply fresh earth, keep up the fire, &c.

On arrival at a post, units supply the post commandant (or Rest Camp officer) with 2 police per 100 men and followers (*Mob. Regs. Ind.*, para. 176). These police should not be taken from the R.S.D., although their duties may include guarding the water supplies, &c. The R.S.D. are for work only in the area which the unit occupies.

SANITATION ON THE MARCH.

When small bodies of men are out in the jungle; when they are on the move and no other troops are following them, it may be immaterial if no provisions are made to prevent fouling of the line of march. But when other troops are following them the matter is very different. Fouling the line of march may originate disease, by flies and infected dust, amongst all the units who are following. If we do not practise some efficient solution of the problem during peace and when on manœuvres, we shall certainly fail when on active service.

The following solution is suggested. I have seen it carried out with British troops with success, and I see no reason why some such method cannot be employed by Indian troops. Any reports on trials or suggestions will be welcomed. It is found, after a short time, units so quickly clear their camp or bivouac that the sweepers are ready to march with their units. Let one sweeper march close behind each company (or double company) and carry a spade, or have one handy. At a halt send a sweeper out to a flank to turn up the ground in two or several places as he finds necessary. On resuming the march the turned-up soil is replaced. Every regiment has several trained men (18) in addition to its R.S.D. (*A.R.I.*, vol. ii., para. 893). Every company should have one or more trained men. When the company (or double company) halts one of the above men should fall out to supervise the sweeper. When a man falls out to defæcate he should go to the place where the sweeper is at work. This spot could be more clearly defined by a yellow flag on a post also carried by the sweeper. The earth should be turned up

in places about 3 ft. apart, in line and behind a bush. It is not necessary to dig regular trenches, though with practice it is extraordinary how quickly a man can dig a proper trench of 4 or 5 in. deep.

SANITATION IN BIVOUAC.

On the whole the sanitation of bivouacs was very well done. Shallow trenches were used and well supervised, manure and refuse were burnt, water was policed and bivouacs were well cleared up.

The systematic working of the R.S.D. is referred to later; its importance is seen in bivouacs, which are often not entered till late in the day and after a hard fight or march. Unless the detachment works in a systematic manner, sanitation will suffer owing to the length of time taken to complete the arrangements. If the site is known, the R.S.D. can often be there and have their work finished by the time the regiment arrives.

Regimental Sanitary Detachments should have flags, and especially yellow ones, as a part of their equipment, and should use them at bivouacs.

Rubbish should always be burnt. A horse-shoe shaped incinerator is excellent for ordinary camp rubbish, and is very quickly made. Care should be taken to dig out the earth for making the incinerator from one place, thus leaving a pit into which, when the bivouac is vacated, the contents of the incinerator can be thrown and then covered over with the earth of which the incinerator is made.

In dry weather, when dealing with large quantities of manure (supply column, mounted infantry, &c.), it is better to get a fire well alight with dry refuse, then heap it over with all the manure rather than try to burn it in small quantities. In the former case, the fire will generally keep alight until the whole is burnt. In the latter case the dry litter burns quickly away and leaves the manure practically unscorched.

SANITARY SECTION.

Normally, upon the line of march and at bivouacs, the sanitary section is fully occupied in the sanitation of its own area. It has nothing to do with the sanitation of other areas, but leaves squads behind to sanitize posts as they are opened up.

The section, however, is specially trained in the preparation and protection of water-supplies, and this can often be taken advantage of, as was done on several occasions. For example, when on the march with the advance party they prepared several drinking supplies for the main column. Again, when in standing camp, they went out, prepared and policed the drinking-water supplies at two bivouacs.

The section marched with the advance party and assisted it in repairing roads. The O.C. section made route reports for information of the S.M.O. of the main column and the A.M.O. These may be of

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great service on future occasions and give information as to condition of road, cultivation, stores and milk procurable, water available, size of village, diseases in village, &c.

On arrival at a bivouac the section prepared its area. The O.C. section selected the nearest available site for the main column, made a plan showing the arrangements for water and any particular point, such as general sites for latrines, prevalence of disease in the village, &c., and forwarded it to the O.C. main column. The section put up flags and prepared water supplies when necessary; for instance, they made a drawing platform at one place, dammed a stream at another, opened a spring at a third, &c.

The N.C.Os. were trained to write down the sanitary arrangements they would make in the event of their being left behind to open a sanitary post. The N.C.Os. of Indian regiments were soon able to do this and write notes in an intelligent manner. They should be trained as above more frequently by the M.Os. of regiments. The British N.C.Os. were very good at this work.

THE CAMP.

The camp was at Nawngpeng. It was situated on slightly sloping ground at the base of a hill and about half a mile from Nawngpeng Railway Station. It was treated as a standing camp on the lines of communication.

WATER-SUPPLY.

(a) *Drinking Water*.—Water was limited in amount. The following account of the method of conserving it is rather full, as it well illustrates one of the methods capable of adoption in these difficult circumstances.

Fig. 1 represents the water-supply as it existed before the arrival of troops.

AB is a small surface drain collecting small quantities of spring water from the marsh to the north and a fairly large supply at F from springs situated at C. The water discharged at E through a bamboo spout into a small *nullah* 2 ft. below.

XX is the top of the watershed. All water east of XX drained away towards D which was a large stream of polluted water flowing south.

G, H and J were small springs flowing east.

At E the water had discharged at the rate of 600 gallons per hour, but had decreased to nearly 500 gallons per hour in the preceding fortnight. The water was extremely good, both chemically and bacteriologically, cold and palatable. It could easily be protected from any possible pollution.

It was estimated that 3,000 gallons would give one day's supply at 1 gallon per head.

Fig. 2 represents the arrangements for collection and methods of protection.

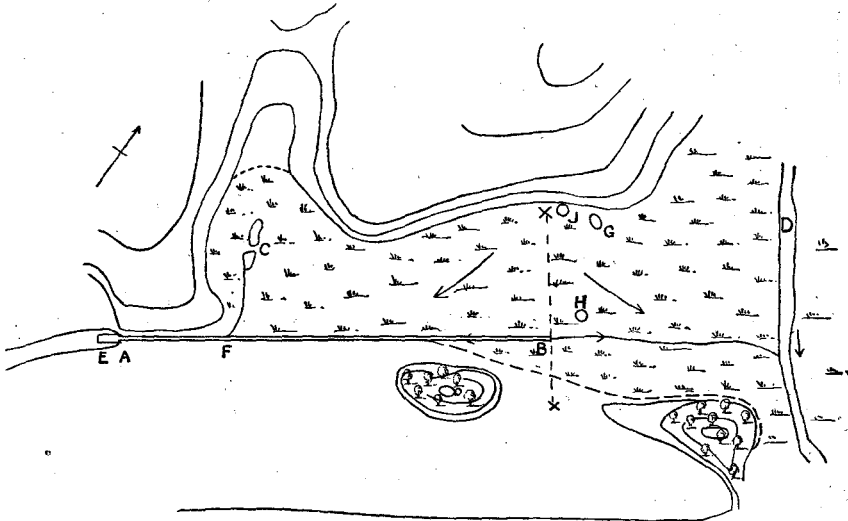


FIG. 1.

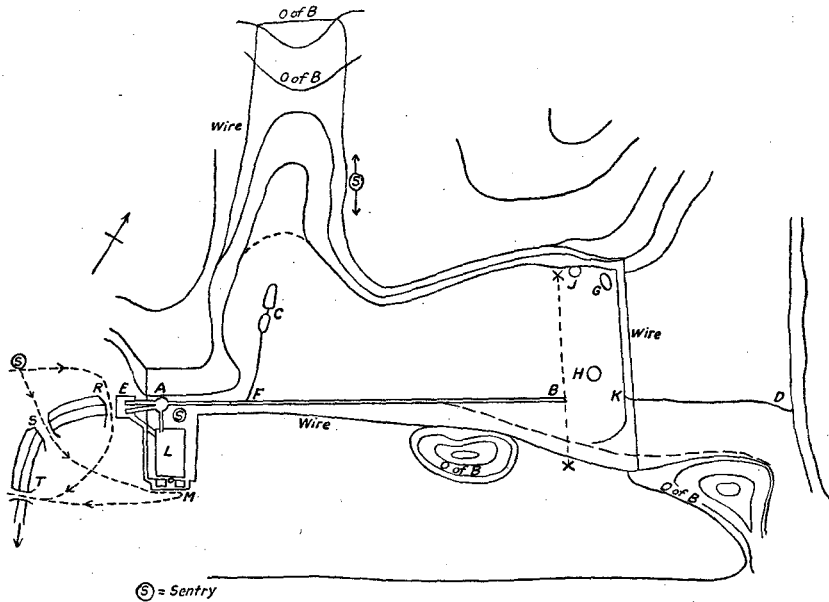


FIG. 2.

A dam was thrown across the marsh at K to the east of the watershed XX. The springs at J and G were opened up. In this way all the water between B and K filled up this area till it rose to the level of the water west of B and then flowed west instead of running to waste in an easterly direction. The dam was made of sods and puddled with clay on its west side.

The springs at C were cleared, and the channels CF and AB were cleared, graded and slightly deepened.

A small pit reservoir was made at A and from it there ran (1) two bamboos (E) which took the natural discharge of water, and (2) an iron pipe which was 4 in. lower than the bamboo outlets and was closed by a movable wooden plug in the pit. By these means (a) water was normally discharged from two spouts for the convenience of a *bhisti*; (b) when the plug in the iron pipe was removed, water discharged by means of the pipe without having to plug the bamboos.

A reservoir holding 3,000 gallons was constructed at L. This was made by digging a pit with sloping sides and lining it with large tarpaulins. The tarpaulins were sewn together by a double row of stitches. (Fig. 3.)

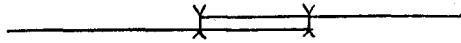


FIG. 3.

Two iron tanks, each capable of holding 800 gallons, were placed on trestles at M. A rotary pump was fixed on a stage between them and the reservoir. These tanks were sent to camp and painted inside and out with red lead paint which was wet and partially detached in places in large flakes; this was cleaned off by a Brahmin lance-naick of the Sanitary Section by rubbing with wood ashes. The tanks should have been fitted with two taps each instead of one, the taps being placed either on opposite sides of a corner, or at such a distance apart on one side that two *pakhals* could be filled at the same time. Stones were placed in a drainage trench under the taps. The drain communicated with the overflow drain from the reservoirs and ran into the stream. (Fig. 4.)

A wooden staging was made under the bamboo spouts at E. Bridges were built at R S and T, and traffic was directed as shown in fig. 2.

Fences were made between the bridges. The outlet stream was cleared, its edges cut, hollows filled, and any pools near the bank were filled or drained.

A barbed wire fence was placed round the whole area, and "Out of Bounds" notices were erected, stencilled in three languages.

By the above arrangements, the supply of water remained between 550 and 650 gallons per hour, although the supply was diminishing daily.

If further difficulty had been experienced, a well would have been

sunk near D, a rotary pump erected, and water pumped along a bamboo channel into the channel A B.

When but little water was being drawn (generally between 12 noon and 2 p.m.) the plug in the iron pipe to the reservoir was taken out and the reservoir allowed to fill, and overflow if necessary. All *bhistis* had to use the tanks, and the tanks were kept filled by a man at the pump. At night the plug was again removed and the tanks filled. In the morning the plug was reinserted. In this way there was every morning a reserve of 4,600 gallons in the reservoir and tanks, and a running supply of about 600 gallons per hour.

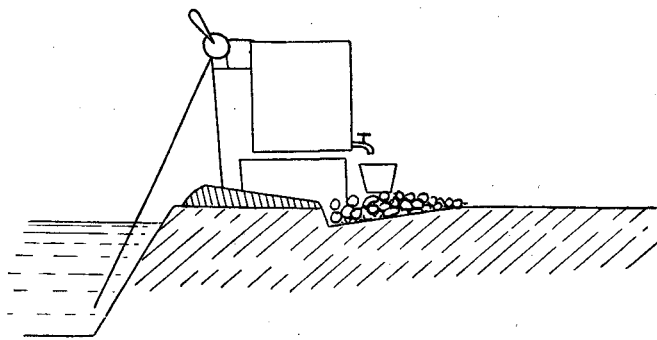


FIG. 4.

During the day, and especially in the morning and evening, there were "rushes" on the supply. At these times *bhistis* used the running water at E and the tanks, and the tanks were kept filled from the reservoir by a pumping party. At ordinary times the tanks were not allowed to be used.

The supervision of traffic, the plugging of the pipe, the supervision of the pumping party and the work at the tanks was done by a Brahmin of the Sanitary Section who was permanently on duty. The direction of traffic, pumping and policing of the area was done by men of the Sanitary Section, assisted, as far as the traffic was concerned, by Military Police.

(b) *Bath Water*.—Fig. 5, B. Bath water was drawn by *bhistis* from a well of good water, but which was liable to pollution. The possible pollution, however, was remote.

(c) *Animal Drinking Water*.—Fig. 5. At Cⁱ a surface drain was led off from a stream. At Cⁱⁱ troughs were made on the bank and filled by a rotary pump.

(d) *Bathing*.—Fig. 5. At Dⁱ a bathing pool was made to take the overflow from Cⁱ. At Dⁱⁱ, Dⁱⁱⁱ, and D^{iv} bathing pools were made along a stream.

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Directing sign boards were erected in numerous places, and were stencilled in three languages, English, Urdu, and Nagri.

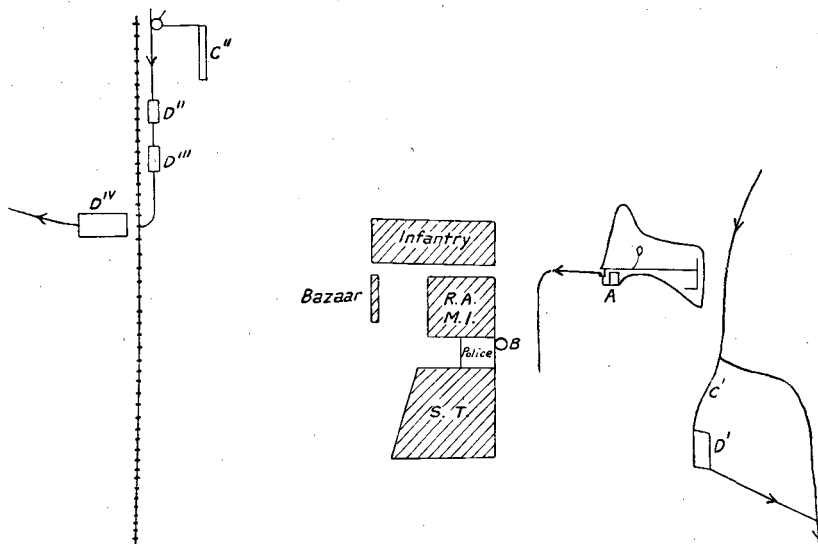


FIG. 5.

BAZAAR.

A camp bazaar was made. Stalls were allowed to be built only according to a standard pattern. A sweeper was employed by the stall holders. All holders were registered and wore badges.

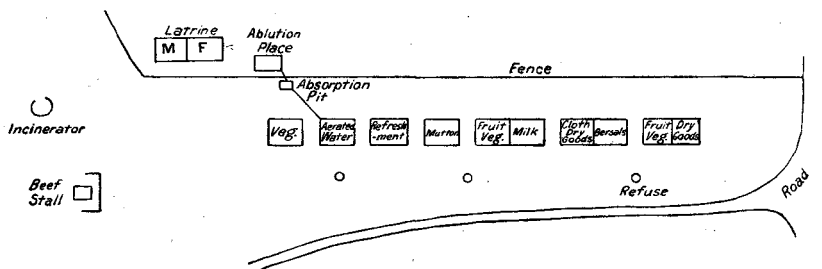


FIG. 6.

The stalls were made of bamboo and thatch, the floors were $1\frac{1}{2}$ ft. off the ground, they were erected in one line with the beef stall and the incinerator on a flank, refuse receptacles in front, and a latrine and ablution place behind.

Slaughtering places were defined, and a slaughter trench was dug daily. Cattle pens were allocated a short distance from the bazaar. Bazaar rates were fixed and did not exceed the local bazaar rates. The sanitation of the bazaar was supervised by the Sanitary Section. Aerated waters were manufactured in the bazaar from the camp drinking water-supply. Milk was inspected daily and boiled before sale; a special stall was kept for this.

RAILWAY STATION.

The station was used by fatigue parties in loading and unloading trucks. A latrine was made, and a drinking-water well was selected near by. The above places were marked by flags, and directing posts, in three languages, were erected. The station was visited daily by a fatigue party of the Sanitary Section.

COOK-HOUSES.

(A) Men.—Fig. 7, shows the arrangement of a Gurkha battalion, that is to say a regiment of one caste.

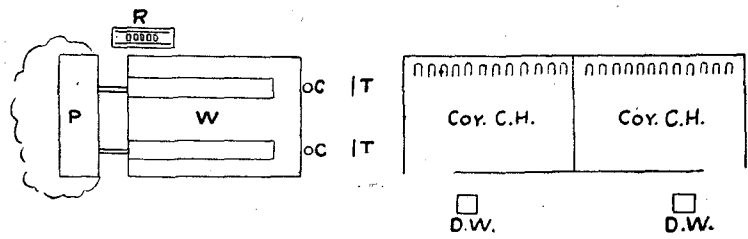


FIG. 7.

- Coy. C. H. = Company cook-house.
- D. W. = Drinking-water stand.
- T. = Trestle.
- W. = Washing-up place.
- C. = Charcoal (wood ashes).
- R. = Refuse.
- P. = Pit (absorption).

The Company cook-house consisted of a smoothed and levelled piece of ground surrounded by a grass or brushwood screen.

The drinking-water stand consisted of a raised table on which a *pakhal* was placed. It was covered with a grass thatch, and had a pit *refilled* with loosened earth beneath.

The washing-up place is described in detail as it was found very effective and free from flies.

A rectangular piece of ground was levelled, smoothed and rammed hard. Two triangular trenches were dug across the levelled ground,

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sloping slightly in the direction of the pit and joining the pit by means of narrow channels.

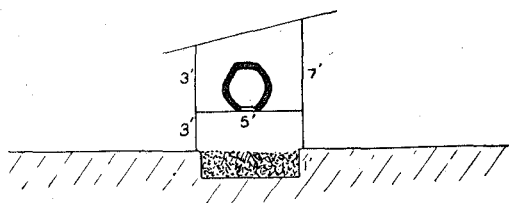


FIG. 8.

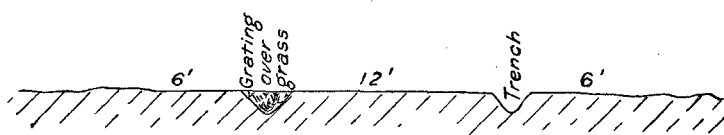


FIG. 9.

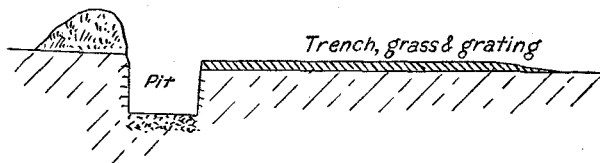


FIG. 10.

A pit was dug about 2 ft. away from the above piece of ground. It was 2 ft. deep, the same length as the washing place and 3 ft. to 6 ft. wide. The earth at the bottom of the pit was picked loose to a depth of about 1 ft., and holes were picked in the sides of the pit in numerous places.

Grass was placed in the trenches and covered by a grating. The grating was made of flat strips of bamboo, tied at each end to long bamboos the length of the trench. The grating was the same width or a trifle narrower than the trench so that when it was in position it rested on the grass and the sides of the trench; if it is wider than the trench, fouling of the ground takes place.

A trestle was made near each trench to support the grating and dry it after it had been washed.

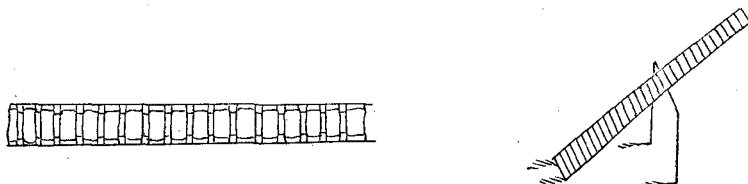


FIG. 11.

A small hole was made near each trench, and kept filled with wood ashes by the company cooks.

A refuse carrier was made of two bamboos 6 ft. long, with a closely plaited network of bamboo strips in between. The carrier was placed on two low trestles which supported the handles. The ground beneath was levelled, smoothed, and then sloped so as to drain into the pit.

The routine working of the washing-up place is highly important and must be strictly adhered to.

As soon as washing-up was finished the grating was removed and the fouled grass was put in the refuse carrier. Dry grass was put into the trench, and into the drain to the pit and over the soiled ground on either side of the trench. The dry grass was then burnt. The grating was washed and scrubbed (over the pit on both sides), it was then stood on end to dry against the trestle. The burnt grass and debris were swept into



FIG. 12.

the pit. The refuse carrier was taken to the incinerator and its contents burnt. The ground beneath the refuse carrier was covered with dry grass, which was burnt and swept into the pit. The carrier was washed and placed in position on its trestles and covered with grass. Care was taken to see that the trench, drain and surrounding ground were smooth, *perfectly dry* and clean, and a little loose earth was scattered over these places. Loose earth was put into the pit until it was dry. Sufficient dry grass was placed close to but not inside the trench. The wood-ash hole was seen to contain ash.

On requiring to use the washing place, the loose earth was swept into the pit; the dry grass was placed in the trench; the grating was placed over the grass and trench. Men squatted on either side of the trench and washed up on the grating. The fouled water strained through the grass and pieces of food were caught up. Water drained away into the absorption pit.

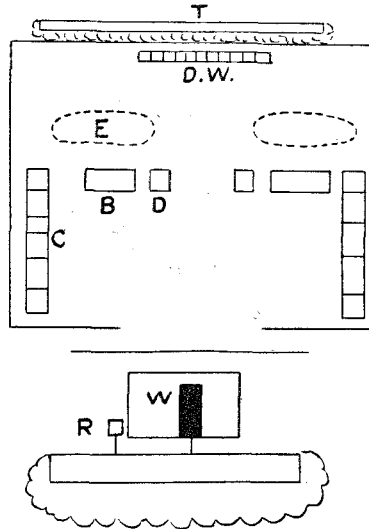
The above procedure is quite simple in practice. It must be carried out each time that a trench is used, which is generally twice a day.

Fig. 13 shows one of the cook-houses used by a Punjabi regiment. There were four cook-houses—one for Sikhs, one for Dogras, and two for Mohammedans.

D.W. = Drinking-water stand.

W. = Washing-up place.

- C. = Cooking place.
- B. = Baking place.
- D. = Boiling place.
- T. = Trench for washing hands and mouth.
- E. = Wood.
- R. = Refuse.



[FIG. 13.]

(b) *Officers' Mess.*—These cook-houses and washing-up places are, as a rule, badly made to start with, being left to the devices of the contractor instead of being made according to a specified plan. They are generally badly supervised, owing to a prevailing idea that the R.S.D. has no right to interfere, whereas the N.C.O. in charge of the R.S.D. should be held responsible for the cleanliness of these places as well as for every portion of the area in which the unit is encamped. They are usually the worst places for flies, owing to the above reasons, and to the pieces of foodstuff to be found in and behind boxes and other receptacles in the cook-house, and to the general want of cleanliness.

It is essential that there should be :—

- (1) A washing-up and drying bench.
- (2) A washing-up grating.
- (3) An absorption pit.
- (4) Refuse receptacles.

The washing-up and drying bench must be large enough for the mess men to work at, off the ground with nothing beneath, and drained into the pit. It must be washed, above and below, daily.

It is found that cups, saucers and other light articles are washed on this bench, but that it is absolutely necessary to have a washing-up grating for cleaning the pots, &c.

Washing-up Grating.—A convenient form is that described for the men and placed over the drain leading to the absorption pit. The portion of the drain which is covered with the grating must be filled with fresh grass twice a day.

Refuse Receptacles.—As a rule, two receptacles are required. They may be empty tins, or baskets half filled with grass. They must stand off the ground.

Fig. 14 shows an arrangement which works well, though many modifications will do equally well if the above essentials are complied with.

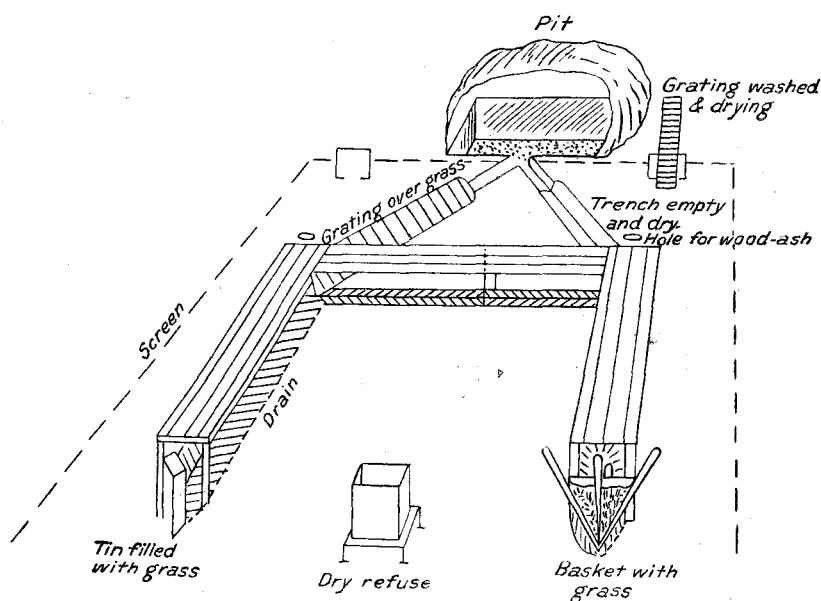


FIG. 14.

ABLUTION PLACE FOR NATIVE OFFICERS.

Fig. 15 shows an arrangement which was found satisfactory.

LATRINES.

Latrines were on the "shallow trench" system. They were 3 ft. long, 9 in. wide, and not less than 1 ft. deep.

Note.—Nine inches wide is more convenient for Indians than the usual 1 foot.

The latrines were very satisfactory with the exception of those in a small unit, which did not have a R.S.D. when it first arrived, in which

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trenches were not properly dug and the ground was badly fouled. It was a striking proof of the absolute necessity not only for the employment of a R.S.D. (Regimental Sanitary Detachment) in small units, but also for the training of these men during "peace" time.

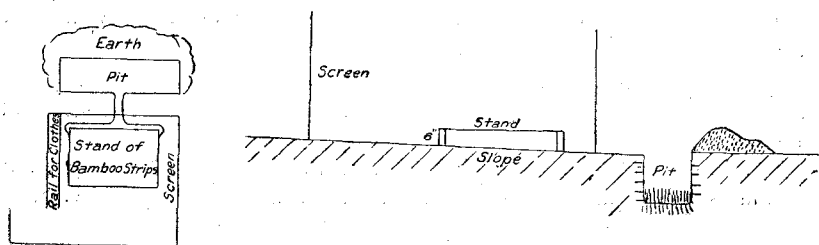


FIG. 15.

Position of Latrines.—The latrines were placed in rear of the camps, but as the slope of the ground was towards the camp, a shallow surface drain was cut below the latrines so as to divert any surface water into the main drains which ran down the roads between the units.

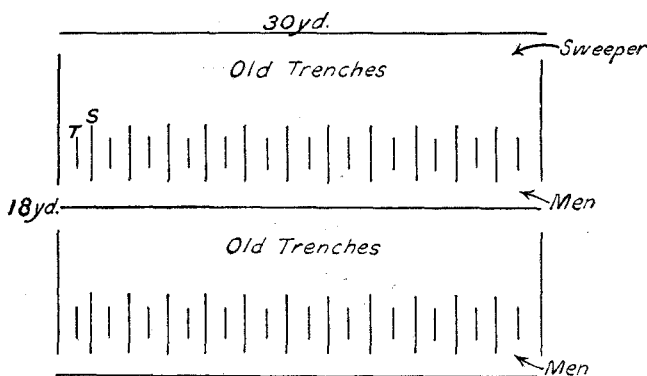


FIG. 16.—S=Screen. T=Trench.

It is a debatable question as to how far the latrines should be in rear of a camp. If ground is unlimited, one is inclined to place them very far back, but for training purposes I consider that shallow trenches should not be too far, because: (1) They are not so easily supervised; (2) on service they will frequently have to be close; and (3) if properly looked after they should neither be a nuisance nor a danger to health. One regiment had them 180 yds. in rear of the camp, which is too far. Another regiment had them 50 yds. in rear and found them quite satisfactory. It is true that the first regiment had its cook-houses in rear of

camp, whereas the second did not, and this raises the question of the position of the cook-houses, which is noticed under "laying out a camp."

Area of Ground Used.—The unit which worked its trenches the best was in camp for twenty-four days and used a piece of ground 30×18 yds. There were about 500 men and followers, besides N.C.Os., and twenty-four trenches in all were dug daily.

Fig. 16 shows the latrine at the end of twenty-four days.

One regiment of 650 men and followers had thirty trenches and used a piece of ground 40×32 yds. This was a needlessly large area, due to insufficient accuracy in making the trenches.

Latrine Screens.—The most convenient screens were found to be those made of grass, caught up between strips of bamboo. They are easily moved and last a long time.

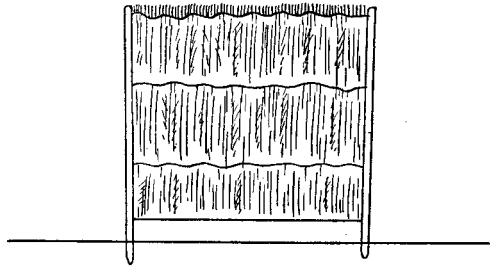


FIG. 17.

As an instance of how quickly these trenches can be dug: At the R.A. latrine and urinal, one sweeper was permanently employed and had no other duties. Every morning he closed the old trenches and dug fresh ones. There were ten trenches, and he finished this part of his work in two hours. In large units the old trenches should be filled by the sweepers, and the new trenches dug by the R.S.D.

Officers' Latrines.—Fig. 18 shows a latrine used by twelve officers for twenty-four days; it is easily enlarged, if required, by advancing the front screens. When seats are used, the excavated earth should be placed in front and to one side, but not behind. A cut large bamboo makes a convenient scoop. When commodes are used, a trench should be dug daily in a compartment next to the latrine, into which the sweeper places the contents and washings of the commodes.

Fig. 19 shows a comfortable and quickly made seat. The four uprights are of wood and the small pieces are bamboo. The width inside should not be less than 2 ft. The height in front should not exceed 20 in., and the height behind should be 24 in. Nails should be used in making the seat, as bamboo strips soon loosen. The thigh supports

must be smooth and placed at an angle of about 60° from the centre of the front rail. The legs should be joined all round, by cross pieces in order to strengthen them; they are omitted from the figure for the sake of clearness.

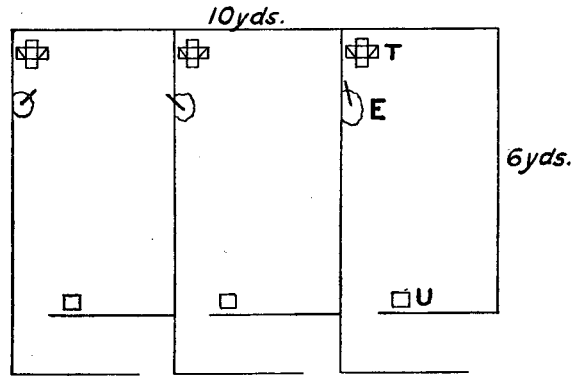


FIG. 18.—*T*=First trench. *E*=Earth and scoop. *U*=Kerosine oil tin urinal on stand

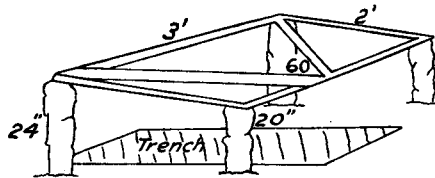


FIG. 19.—Latrine Seat.

URINALS.

Urinals were on the urine trench and absorption pit principle.

When absorption pits have to be made on the slope of a hill it is better to make a long narrow pit rather than the usual square one. The pit should lie across the direction of the slope. By this means absorption is greater.

For a single urinal, the usual double trench is sufficient (fig. 20).

For a multiple urinal, three trenches running into a long narrow pit make a good one (fig. 21).

The dotted line indicates the position of the next trench, which must be dug as soon as the first one becomes foul. When the squatting position is used, the trench should not exceed 9 in. in width, and men should squat across it. When the upright position is assumed the trench should not be less than 2 ft. in width and men should stand alongside.

The main point in these urinals is to keep the ground dry, in which case the trenches often last four to five days. After troops leave camp in the morning, the sweeper should cover the inside of the trench and the ground near by with dry earth, and sweep it all back into the pit.

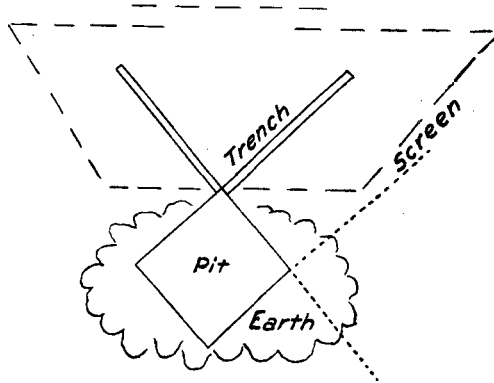


FIG. 20.

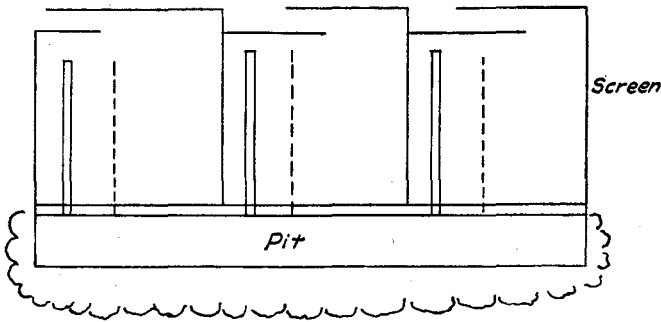


FIG. 21.

Then, again sprinkle the ground with dry earth as before, and leave it until just before the troops are expected to return, when the loose earth must be swept into the pit. A little earth must be put into the pit every morning and afternoon, and also at other times when urine can be seen standing in it. The screen should go across the trenches just where they join the pit, so that the latter is outside the screen. The trenches should be made quite straight and smooth, and should have a gentle but continuous slope towards the pit.

Night Urine Pit.—Always have a separate pit for emptying the night urine into, round which the receptacles stand during the day after they have been cleaned. A little dry earth is placed in the pit after the contents of the receptacles have been emptied into it.

NIGHT URINAL STAND.

Make the stand of the right height, so that the receptacle is raised sufficiently to be convenient to use. Make the *sides vertical* and the top the *same size as the receptacle*, otherwise men cannot stand close to it and will foul the ground. If lights are not available, place a white-washed post near by, and white-wash the sides of the stand if it can be made of stones or brick.

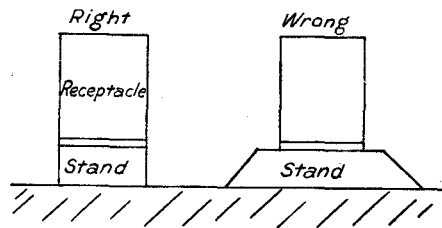


FIG. 22.

INCINERATORS.

As excreta were buried, incinerators were only required for rubbish and manure.

The ordinary horse-shoe shaped incinerator was used to destroy camp refuse and worked quite satisfactorily. *Refuse is burnt inside.* Care should be taken to dig out the earth for the wall from a place near the incinerator, so as to make a pit into which ashes can be put. Avoid hollowing the floor of the incinerator, as this increases the difficulty of cleaning as well as impeding the draught. In the event of the hole being too small for the ash, the latter may be placed in heaps and covered with a little earth. Keep the inner wall vertical. Heap the refuse, for burning, against the back wall, and do not pile it up in the centre of the floor.

MANURE AND LITTER.

A large horse-shoe shaped incinerator was employed, the wet litter being spread out inside on the floor to dry and then *burnt on the outside wall.* Ash was not removed. An internal space of 20 by 30 yds. was found necessary for the litter from 650 mules. It is important that a sweeper should be continuously on duty to keep the wet litter spread out thinly to dry, and to throw it, when dry, on to the fire which must be kept burning all round on the outside wall. The fire should never go out.

LAYING-OUT A CAMP.

Each Indian infantry regiment laid out its camp in a different manner. From a sanitarian's point of view this has objections, as it is difficult to get a uniform sanitary scheme, and latrines (say) of one unit are liable to be close to the cook-houses of another unit. It would simplify the previous sanitary preparations of a camping ground, as well as the subsequent working when units are in occupation, if some recognized plan were adhered to.

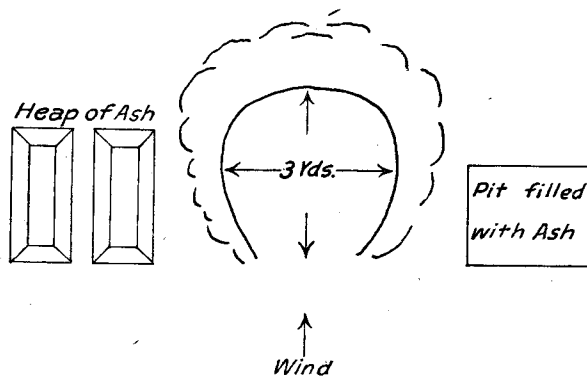


FIG. 23.

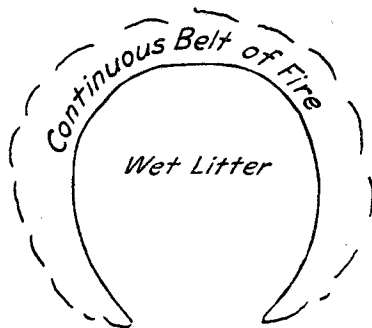


FIG. 24.

I have seen a suggested plan in a very old edition on encampments for Indian troops, but no recent or recognized one, such as exists for British troops in the "F. S. Pocket Book," and which differs greatly from the old one referred to. In the old plan, the officers are in rear of the men and close to their latrines; the cook-houses, too, are close to the latrines.

Most regiments take very much more ground than that laid down as

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the maximum camp area, which is 130 by 105 yds. or, for a contracted bivouac, 105 by 90 yds. ("F. S. Pocket Book"). They extend backwards, have their cook-houses outside, and their latrines and urinals another 100 yds. further back. It would appear probable that if these regiments

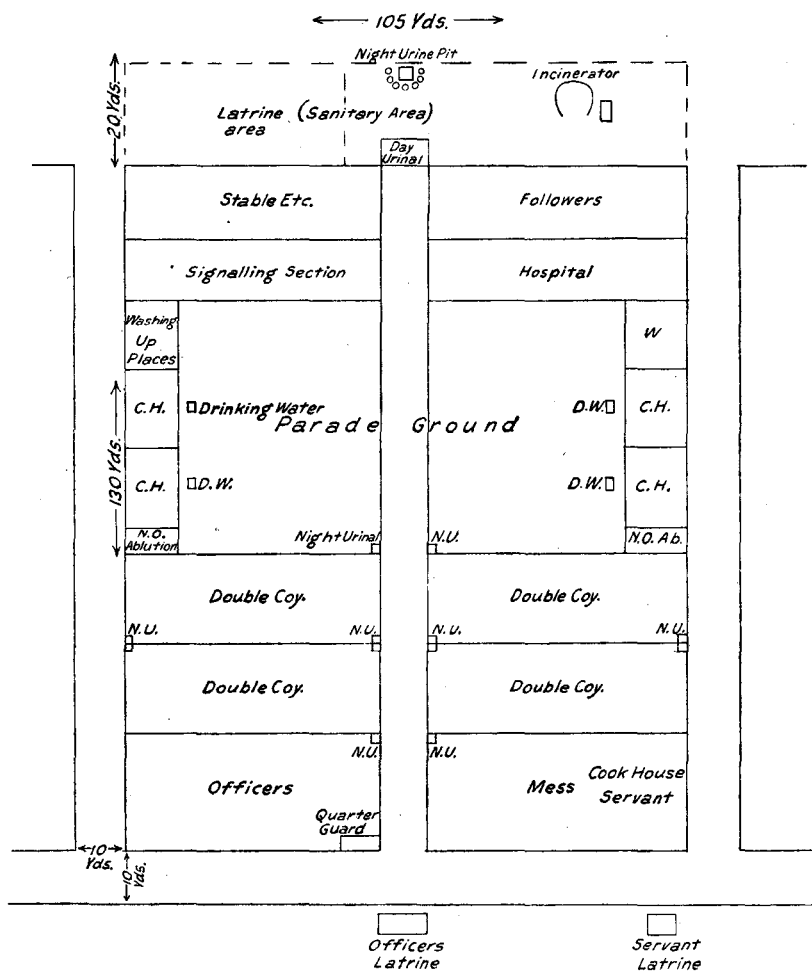


FIG. 25.

were restricted to, even, their maximum area, as would often occur on active service, they would find it difficult to make satisfactory sanitary arrangements.

Fig. 25 shows a method of laying out a camp as practised by one regiment. It was excellent from a sanitarian's point of view and the

maximum area was not exceeded, with the exception of the 20 yds. for the sanitary area. It is suggested that, if there is no regimental objection, it might be an improvement to have the parade ground, with cook-houses, &c., between two of the double companies instead of behind all four. This would give a greater distance between latrines and cook-houses.

SANITARY CONDITION OF THE CAMP.

The sanitary condition of the camp was extremely good. Though the camp was occupied for three weeks, and though flies were numerous in the adjacent village and the village bazaar, there was scarcely a fly to be seen in any part of the camp.

REGIMENTAL SANITARY DETACHMENTS.

There was a marked improvement this year in the work of Regimental Sanitary Detachments throughout the camp.

All the Infantry Battalions, the R.A. and the S. and T. had well trained N.C.O's. and men.

The Mounted Infantry (Indian) and the sappers and miners did not have a trained R.S.D. working at first and their camps were very insanitary, especially the M.I.; later on, however, this was remedied. It is important that small units, such as these, should train during peace and employ both during peace and on manoeuvres their R.S.D. as laid down in A.R. I. vol. ii, para. 893. One insanitary unit, though small, may originate disease throughout the camp, or be a breeding ground for innumerable flies.

The main criticism which I should like to make is, that there is a want of proper and systematic method of work in the R.S.Ds. The work is both executive and supervisory. The executive work is the digging of trenches, making drains, repairing screens, &c. The supervisory is over the sweepers at the latrines and urinals, at the incinerator, officers and men's cook-houses, and the whole of the area upon which its unit is encamped. The N.C.O. in charge R.S.D. should parade his men and the sweepers and give them definite orders. He should see that they do the executive work at specified times, and tell them off for specified supervisory duties. He himself should make a complete tour of the whole area at least once in the day, and if he finds any difficulty in getting defects remedied, he should report the matter to the proper authority. There should not be a single insanitary spot found in the camp, on inspection (say, by the M.O.) for which the onus could not be laid first on some definite person such as a particular sweeper, secondly on one of the R.S.D., and, thirdly, on the N.C.O. in charge R.S.D.

SANITARY SECTION.

This was the first time that a Sanitary Section had been mobilized in this Division.

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The Force consisted of about 2,500 men, without followers, but as only Indian units (except a few M.I.) were taking part, as expense was a great consideration and an Indian infantry battalion had recently arrived in the Division, the following personnel was mobilized :—

Two N.C.Os. British ; Two N.C.Os. and twelve men (Indian) from two of the Divisional Sanitary Sections, one N.C.O. and six men from the newly arrived Battalion, for instruction. Two sweepers and one *bhisti*.

The personnel was sufficient, with the exception of sweepers, of whom five were found to be required for a camp of this size.

The N.C.Os. and men worked hard, showed great keenness and were a great success. The way in which N.C.Os. and men of different castes worked together, and with the British N.C.Os. was very gratifying. They prepared the camp for the arrival of the troops as far as time permitted, but a full working week is required for a section to prepare a camp of this size. They supervised the sanitation of the camp and its surroundings, the drinking-water supply and the camp bazaar. They sent out a working party daily to do the executive work of isolated places, where there was no R.S.D., such as the camp of the L.G.C., the commandant, the directors, the railway station, &c. They kept a working party ready all day, to turn out and work in any part of the camp, or to assist any R.S.D.

Standing and Daily Orders were issued by the O.C. Section. Every N.C.O. and most of the men did a tour of duty as sergeant or N.C.O. for the day.

All the N.C.Os. received training in going out to some place, making a rough map and plan, and writing out the sanitary arrangements that would be required when opening up that place as a sanitary post.

They received practical instruction in opening up and conserving drinking-water under different and difficult conditions.

FIELD LABORATORY.

A small laboratory was taken by the O.C. Sanitary Section. It was found of considerable use, especially in the examination of blood films. The field water analysis case was used in the selection of water supplies.

HEALTH OF THE TROOPS.

The troops kept remarkably free from preventable diseases. There were a few cases of malaria, and one case of chicken-pox with sixteen contacts which were isolated in an infectious hospital, 200 yds. to leeward of the camp. All necessary precautions were taken and no other case occurred.

METEOROLOGICAL CONDITIONS.

The dry bulb thermometer (day) varied from 71 to 89, average 77.

The dry bulb thermometer (night) varied from 44 to 60, average 53.

The wet bulb thermometer (day) varied from 59 to 74, average 62.

The wet bulb thermometer (night) varied from 41 to 55, average 49.

The dew point (day) varied from 42 to 68, average 51.

The dew point (night) varied from 25 to 52, average 45.

The relative humidity (day) varied from 26 to 63, average 40.

The relative humidity (night) varied from 26 to 92, average 74.

The barometer varied from 26.45 to 26.67, average 26.57.

The weather was generally hot and dry during the day, and cool and damp during the night.

There was a smart shower for ten minutes one day, and a little light rain on two nights.

Echoes from the Past.

THE "DEATH MARCH" THROUGH THE KHYBER PASS IN THE AFGHAN CAMPAIGN, 1878-79.¹

BY SURGEON-MAJOR G. J. H. EVATT, M.D.

Medical Staff.

CHAPTER I.

INTRODUCTORY.

It is proposed in the following pages to place on record some experiences along the Khyber line and in Kabul during the Afghan campaigns of 1878-79-80, as it is probable that even the most trivial personal record may be of use to the future historian of that important campaign, for so far as one is aware the historian of that period has not as yet appeared.

Marking, as that campaign did, a great turning point in our relations to Central Asian questions, and in many ways forming a distinct starting point of Indian army reforms, it would be a great pity if no such history were written, as it would be full of interest and instruction in many ways.

One is not concerned to-day to enter in any way into the political causes of the campaign. The time has not yet arrived to deal in full with such questions. It is sufficient to say that throughout the year 1878 our relations with Afghanistan were evidently strained, and the reception by the then Amir Shere Ali of a Russian mission, and his refusal at the same time to receive an

¹ Reprinted from No. 82, vol. xix, *Journal of the United Service Institution of India*, 1890.