SHANGHAI EMERGENCY, 1937.

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S.M.O., Shanghai Area.

INTRODUCTION.

A short account of the Shanghai emergency may be of some interest to readers of the Corps Journal because of the unusual conditions under which the British Forces had to operate; and also because several interesting sanitary problems presented themselves for solution during the emergency. The conditions prevailing at the commencement of the Sino-Japanese hostilities and the sequence of events insofar as it affected the medical services will first be described; and secondly, the more important sanitary measures which were adopted.

Modern war in and around a crowded city of over five million inhabitants must be an unpleasant affair at the best of times, but it is much more so when such a city is inundated with thousands of starving refugees, and when cholera and dysentery attain epidemic proportions.

Within a week the garrison was increased to three times its normal strength, and owing to the disposition of the defence sectors the troops were unavoidably in close contact with the poorest of the Chinese. This occurred at the height of the fly season and the risk of epidemic gastrointestinal disease was therefore very real.

The risk of disease was by no means the only one. Fierce fighting was taking place on the perimeter and at many points our troops were holding posts within ten yards of a full-blown modern battle. Casualties were more than likely. The safety of the troops guarding the Settlement and of the inhabitants really depended entirely on the accuracy of modern weapons of war and on the skill of the belligerents. That this was not at all times to be trusted was demonstrated in a terrible manner by the accidental bombing incidents and the many stray shells which took toll of life in the Settlement. Our troops were subjected to many of the risks of war without being at war.

In these circumstances it was difficult, if not impossible, to venture an accurate estimate of the hospital accommodation likely to be required. The number of battle casualties would depend on luck to a large extent, whereas the sick rate would be governed by the effectiveness of the sanitary measures adopted, and especially by the degree of protection it was possible to provide against fly-borne disease. It is sufficient to say that the extra staff and hospital accommodation asked for by the A.D.M.S.—Colonel H. H. Blake—proved to be entirely adequate without being excessive.
CONDITIONS AT THE COMMENCEMENT OF HOSTILITIES.

Tension in Shanghai had naturally increased since the outbreak of hostilities in North China, but until a few days before the event nobody seriously thought that this city would be involved in the fighting. The incident which touched off the explosive mixture occurred on the afternoon of August 9 when Sub-Lieutenant Isao Oyama and a Japanese sailor were shot dead on Monument Road by the Chinese Pao An Tui—Peace Preservation Corps!

From this moment events proceeded apace and by August 12 Shanghai was virtually surrounded by between 20,000 and 30,000 Chinese troops, and the perimeter of the Settlement was manned by the International Defence Forces, including the Shanghai Volunteer Corps. The following day, August 13, negotiations having failed, the first shots were fired and by evening artillery was in action on both sides.

The British Garrison consisted of the 2nd Battalion The Loyal Regiment which had to man a large part of the Sector, erect sand-bag posts, barbed wire defences and also provide the necessary guards and patrols. The British Military Hospital was equipped for sixty-two beds and was situated near the junction of Nanking Road and The Bund. The normal staff was 5 medical officers, 5 sisters and 42 other ranks. Actually there were only four medical officers as I was on leave in North China and was not recalled until August 15, and did not reach Shanghai until after the evacuation of the British Military Hospital.

The following day, August 14, came to be known as “Bloody Saturday.” On the afternoon of this never-to-be-forgotten day Chinese planes, whilst endeavouring to hit the Japanese flag-ship “Idzumo,” dropped bombs on two of the most crowded areas of the Settlement and caused the most appalling carnage. Two of the bombs fell on Avenue Edward VII and killed over 1,050 Chinese and Foreigners and wounded many more. Other bombs fell on the Palace Hotel and Nanking Road within a few hundred yards of the British Military Hospital. About 150 were killed and many more wounded. A number of the latter were dressed in the British Military Hospital.

These incidents caused a good deal of alarm and nobody really knew what would happen next. The Settlement could no longer be considered safe for foreign women and children and their evacuation to Hong Kong commenced a few days later.

EVACUATION OF THE BRITISH MILITARY HOSPITAL AND ARRIVAL OF RE-INFORCEMENTS.

There were rumours that the Chinese intended to try to come through the Settlement in order to take the Japanese in the rear. This would have meant that the British Military Hospital would probably have come
under direct shell-fire. On account of this the site of the hospital was considered to be unsafe and at midnight orders were received from British Military Headquarters to evacuate the hospital at once. Within two and a half hours all patients had been transferred to the Country Club, some two miles farther west.

The accommodation in the Country Club, which incidentally continued to function as a club, was unsatisfactory and could only be looked upon as a temporary shelter until a more suitable building could be found.

The loss of the permanent hospital right at the beginning of the emergency was a very great handicap, the effect of which was felt all through the hostilities. It enormously increased the difficulties of medical administration at a time when bed accommodation had to be rapidly increased to six times the normal.

The Garrison was soon to be trebled and owing to conditions already described it was estimated that 350 to 400 beds would be required. Possible buildings were few and far between owing to the tremendous influx of refugees and the arrival of re-inforcements for the International Forces. Accordingly we were lucky in obtaining the International Recreation Club building, which could accommodate about 140 to 200 beds and the staff; or 200 to 260 beds if the staff were billeted out. This would serve in the meantime, but a building for a further 100 beds would be necessary later.

On August 19 the venereal division and the hospital staff were transferred to the International Recreation Club, and the rest of the hospital followed on August 26. Only stores were left in the Country Club until such time as room could be found for them in the new building. During this period of transition two battalions arrived from Hong Kong, and also reinforcements in medical officers, nursing staff and other ranks, R.A.M.C. Stores for the expansion of the hospital were arriving almost daily and things were for the time being rather chaotic.

Two aerial torpedoes were dropped on the Settlement about 1 p.m. on August 23. The first on the U.S. Godown, just behind Hamilton House where the British Consulate General had taken up temporary quarters. Fortunately it failed to explode. The second fell a few moments later on the Sincere Co's Emporium in Nanking Road and exploded with great violence, damaging the Wing On Store opposite. The casualties were numerous—173 killed and 549 wounded. Most of the dead were blown into small pieces which were later carried away like butcher's meat on open lorries.

No more demonstrations were needed of the terrible effects of modern aerial bombs on a densely populated city. Although the number of persons killed and wounded in these bombing incidents was extremely high, yet the actual damage to buildings was not great. Had any of
these bombs chanced to land on billets or camps occupied by the troops our casualties must have been enormous; fortunately this did not happen. The effects of deliberate and systematic bombing of a city such as Shanghai would be too terrible to contemplate.

The 2nd Battn. The Royal Welch Fusiliers had arrived on August 17, and were quartered in the Grand Stand of the Race Club. They took over from the Shanghai Volunteer Corps the duty of defending “B” Sector. The sanitary conditions in this sector were appalling and a more detailed description is given later in this article. The sketch map shows the position of the defence sectors.

The 1st Battn. The Royal Ulster Rifles arrived the following day and were billeted in the Yu Yuen Road Schools. They took over the right half of “D” Sector along the Soochow Creek. The emergency British Force was now complete and numbered approximately 2,400.

The International Recreation Club building required a good deal of structural alteration to make it suitable as a hospital. Bath-houses, latrines, coal-sheds, etc., had to be erected in the very small yard available, and the R.E. had to exercise considerable ingenuity to fit them all in. One of the verandahs was converted into an excellent operating theatre with two tables, and for these two remarkably good operating lamps were
made of tinned iron sheet by the R.E. The sketch (fig. 2) shows the manner in which they were constructed. They did noble work and gave a shadowless light, almost up to "scialytic" standard. Should the necessity for improvising operating lamps ever arise in the future this design may be recommended. The cost was approximately six shillings each.

Although the International Recreation Club could accommodate up to 260 beds most of the wards were large and this rendered the segregation of different classes of case difficult. Normally our infectious cases were sent to the Civil Isolation Hospital, but this had been evacuated owing to the hostilities, and as the temporary civilian hospitals were full to overflowing we had to make provision for treating our own infectious cases.

![Improvised operating lamp](image)

**Fig. 2.—Improvised operating lamp.** Made of tinned iron sheet. Six 100-watt bulbs round the margin. One emergency light in centre, 12 volt, 26 watt. Four 1-inch ventilating holes round each lamp socket.

Cholera and dysentery were rapidly attaining epidemic proportions amongst the Chinese and as the fly season was at its height it was decided to increase the hospital accommodation by establishing a separate venereal and skin hospital of a hundred beds and to billet the R.A.M.C. personnel outside. This would give us a total of 360 to 400 beds. Accordingly, on September 4, a venereal and skin hospital of 100 beds was opened in the permanent huttaed camp at Jessfield and the personnel of the British Military Hospital were billeted in the Union Jack Club.

The Civil Disinfestation Station, where normally we sent blankets, kit, etc., for disinfection was now in the firing line and a temporary centre had to be established with the aid of an old Thresh and a few Lelean sacks.
On September 13, the first of a series of five cases of cholera occurred amongst the troops, as a result of eating ice-cream bought from a Chinese hawker in direct contravention of orders. The entire Garrison had been inoculated more than fourteen days before: in spite of this one of these cases died. The occurrence of these cases is illustrative of the fact that inoculation is not an absolute protection against a massive dose of cholera vibrios. About fifteen men in all had consumed the ice-cream, but none of the others developed the disease. This outbreak necessitated a block of the British Military Hospital being set aside for the exclusive treatment of cholera. A cholera segregation camp had also to be established at Jessfield, with separate cooks, cook-houses, latrines, etc.

Owing to the very bad sanitary condition of "B" sector and the surrounding Chinese slums in the first week or so, cases of diarrhoea and dysentery had been fairly numerous during August and September and for a time the hospital was working to capacity. The opening of the British Military Skin and Venereal Diseases Hospital had, however, relieved the congestion and the International Recreation Club building proved quite satisfactory as a general hospital. The total number of beds in a hospital is, however, but a poor index of its practical capacity which really depends on the facility it offers for the separation of different classes of case.

No. 1 Field Hygiene Section arrived from home on October 8. This unit would have been worth its weight of gold in the very early stages when the overworked R.E. and the units had to do a great deal of urgent sanitary constructional work. There still remained a great deal to do, however, and the unit proved of the very greatest value in the succeeding months. The offices and workshops were established at Mohawk Road barracks and the personnel were billeted at the Union Jack Club. The temporary Disinfestation Centre was moved here and placed under the control of the O.C. No. 1 Field Hygiene Section.

The Medical Services were now complete and their disposal was as follows:

<table>
<thead>
<tr>
<th>British Military Hospital</th>
<th>International Recreation Club</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officers and O.R.</td>
<td></td>
</tr>
<tr>
<td>S.M.O.</td>
<td>1</td>
</tr>
<tr>
<td>O.C.</td>
<td>1</td>
</tr>
<tr>
<td>Q.M.</td>
<td>1</td>
</tr>
<tr>
<td>M.O.</td>
<td>8 includes 3 R.M.O.</td>
</tr>
<tr>
<td>O.R.</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
</tr>
</tbody>
</table>

| Q.A.I.M.N.S.               |                              |
| Matron                    | 1                            |
| Sisters                   | 11                           |
| Total                     | 12                           |
### The Japanese Advance—Evacuation of British Military Skin Hospital

In October there was a marked drop in the incidence of gastro-intestinal disease owing to the strenuous sanitary campaign instituted in August and September, and the pressure on the British Military Hospital relaxed considerably. The British Military Skin Hospital at Jessfield was, however, fairly full, and, moreover, the accommodation in the old wooden huts was not of the best. For those reasons it had been decided, during the A.D.M.S.'s visit in September, to move the British Military Hospital back to its old site at Central Road whenever circumstances permitted, and then to move the British Military Skin Hospital to the International Recreation Club. This would have provided excellent accommodation for both the hospitals and would have been moderately easy to carry out; but owing to the rapid advance of the Japanese matters were once again taken out of our hands.

The intensity of the fighting in the Chapei district and along “B” sector had increased daily, and the North Station, within a few yards of our posts, suffered a severe daily bombardment by Japanese bombs and artillery. It is to the credit of both the belligerents that little damage was done to our defences, which literally were “just across the road” from the battle. The photograph (fig. 3) will give an idea of the sharpness of the line of demarcation between the war and the neutral zones. Although casualties were daily expected in this area actually there were none which were directly due to the hostilities, although there were many narrow escapes.

From the commencement of the emergency and throughout September and October Chinese air raids were an almost nightly occurrence and there were many civilian casualties in the Settlement as a result of the Japanese anti-aircraft. Several fragments fell in the British Military Hospital compound without doing any damage; one shell penetrated the roof of the Country Club ballroom.

### Table

<table>
<thead>
<tr>
<th>British Military Skin Hospital</th>
<th>Jessfield Camp.</th>
<th>No. 1 Field Hygiene Section</th>
<th>Mohawk Road Camp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.C.</td>
<td>...</td>
<td>O.C.</td>
<td>...</td>
</tr>
<tr>
<td>M.O.</td>
<td>...</td>
<td>O.R.</td>
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</tr>
<tr>
<td>O.R.</td>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No. 1 Field Hygiene Section</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>O.C.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O.R.</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Grand total</td>
<td>149</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
On October 23 the Japanese big push to dislodge the Chinese from Chapei and North Station began, and the areas along the Soochow Creek from "B" Sector to Jessfield were heavily bombed. The following day, Sunday, 24th, a Japanese plane flew, at low altitude, up and down Keswick Road which is inside the British defence Sector "D," and machine-gunned civilians on the road. The plane then dived and attacked the British "Q" Post and shot Rifleman McGowan of the Royal Ulster Rifles, who died almost immediately. This was the first British battle casualty. The incident aroused bitter resentment among the entire population of the Settlement.

The fighting now increased in intensity and bombing continued day and night for the next few days. On October 27 the Chinese, who had suffered severely, evacuated Chapei and withdrew westwards along the Soochow Creek towards the Jessfield district. It was now obvious that the fighting would follow the Creek to Jessfield and thence southwards along the Shanghai-Ningpoo Railway. As Jessfield camp was situated at the apex of the salient formed by the Creek and the railway it was
likely to become exceedingly unhealthy in the near future. In view of this orders were received to evacuate the British Military Skin Hospital at once.

As the hostilities had now receded from Chapei and the "B" Sector area it was decided to move the British Military Skin Hospital into the original British Military Hospital at Central Road and to effect the change over of the hospitals at a later date. The evacuation of the British Military Skin Hospital was completed by 6 p.m. that afternoon. It was well that the hospital was evacuated, for in the course of the next few days several shells landed in the camp and the hut that had been occupied by the R.A.M.C. personnel was hit. Moreover it was within a few yards of the evacuated hospital that the Royal Ulster Rifles suffered most of their casualties. The Chinese were also preparing to blow up the Jessfield Bridge no more than 100 yards distant.

**CHAPEI IN FLAMES—BRITISH POSTS AGAIN ATTACKED.**

Prior to evacuating Chapei the Chinese set fire to numerous buildings, and within a few hours the whole district was a raging inferno. I have never seen such an extensive conflagration, nor do I call to mind anything in the Great War which even approached it. That night the northern sky was one solid mass of flames almost two miles wide and reaching hundreds of feet in height. It was fortunate that the wind was in the right quarter or the fire might well have extended across the perimeter into the Settlement. Several houses did actually catch fire but these were promptly dealt with by the Fire Brigade.

During the day the British "D" Sector posts were again machine-gunned by Japanese planes and several bombs were dropped inside the perimeter near Great Western Road. There were, however, no Army casualties. In view of recent events it was thought that these posts might become isolated under heavy fire and arrangements were made to evacuate casualties in Shanghai Volunteer Corps armoured cars should the necessity arise. At no time, however, was this necessary.

Refugees from the surrounding villages continued to pour into the western district through the British defence lines. Chinese troops were now retreating across the Soochow Creek near Jessfield, and there was heavy bombing of this area. From the roof of our flat, which was only 400 yards from the perimeter, we had an excellent view of the battle. The next day there was a lull in the fighting; both sides were resting and consolidating their new positions.

**BRITISH CASUALTIES.**

October 29 was an ill-fated day for the Royal Ulster Rifles. The Japanese artillery opened fire in the evening and several shells landed in Jessfield camp; one fell near a sandbag post and killed two Riflemen and wounded
two others. One of the latter died the next morning. Another shell exploded near the gates of Jessfield Park and killed another Rifleman in a café on Yu Yuen Road.

On October 31 three Riflemen were wounded in the same sector by a stray shell.

Of the nine casualties in the Ulster Rifles four were killed outright, one died later in hospital, and four recovered. The mortality was high, possibly due to the fact that most of the wounds were multiple and penetrated deeply owing to the smallness of the shell fragments. The modern H.E. shell appears to break up into much smaller pieces than used to be the case.

**Recession of Hostilities from Shanghai.**

During the first week of November the fighting proceeded southwards along the perimeter on the Shanghai-Ningpoo Railway, and westwards along the Soochow Creek. Soon the noise of battle to which we had become so accustomed in the preceding three months ceased, and the immediate emergency, so far as Shanghai was concerned, was over. The perimeter had still to be manned; the severe Shanghai winter was at hand; and the Settlement was overcrowded with refugees. The emergency so far as the Medical Services were concerned was by no means over. The various problems connected with this period are described later.

**Return of British Military Hospital to Central Road—Reduction of Garrison.**

Central Road, where the British Military Skin Hospital had taken temporary refuge, was now being prepared by the R.E. for the return of the British Military Hospital. Originally the British Military Hospital had occupied the upper five floors of this eight-storied building, but with the increase in beds an extra floor had to be taken over as well as half the ground floor which had to be converted into medical, linen and pack stores. Bath and ablution rooms had to be improvised on the new second floor and many alterations and repairs had to be completed. This work was completed on November 8, and the next day a ward-by-ward move of the British Military Hospital commenced and the British Military Skin Hospital was transferred to the International Recreation Club. By the 11th the change-over of the hospitals was complete.

In a period of three months each hospital had moved three times, and although no doubt excellent practice in arranging and adapting various buildings for use as hospitals, this constant shuffling did not render the routine medical administration any the easier.

With the recession of the hostilities from Shanghai the probability of battle casualties had disappeared and it was estimated that 156 to 200
beds would be sufficient. Accordingly, on January 17, the British Military Skin Hospital at the International Recreation Club was closed down as a separate entity, and absorbed into the British Military Hospital at Central Road.

On February 1 the garrison was reduced by one battalion and as the perimeter was now being held with far fewer men the necessity for a complete Field Hygiene Section no longer existed. Accordingly this unit also took its departure on this date, leaving only one Staff-Sergeant to act as sanitary inspector, and one Corporal and one Other Rank to run the Disinestation Station.

The hospital staff was also reduced to:

<table>
<thead>
<tr>
<th>Officers</th>
<th>Q.A.I.M.N.S.</th>
<th>O.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>10</td>
<td>70</td>
</tr>
</tbody>
</table>

The bed accommodation of the British Military Hospital at Central Road was now 156, expandible to 200.

**PROBLEMS IN HYGIENE AND SANITATION.**

The Settlement was overcrowded with homeless refugees who squatted, in more than one sense, in and around the areas occupied by the troops. In many places the municipal sanitary services had ceased to function and these areas were foul and filthy. The fly season was at its height and it was almost inevitable that cholera, dysentery, etc., should take enormous toll of life amongst these ill-nourished people.

The propensity of the Chinaman for dumping his dead on the surface of the ground, anywhere and everywhere, did not help matters. Tens of thousands of corpses were dumped throughout the Settlement, and had to be collected and incinerated by the P.W.D. Hostilities and disease were responsible for numbers of corpses which floated up and down the Whangpoo River and the Soochow Creek with the tide. It is said that the waterworks had to detail a special "corpse pusher" to keep the intake from the Whangpoo free from bodies!

These then were the conditions against which we had to prepare our scheme of defence. Fortunately the Settlement has a modern and very efficient Public Health Department, which did wonderful work under the most difficult circumstances. It is also blessed with an excellent water supply: the water is sedimented, filtered, and finally chlorinated by Wallace-Tierney apparatus, and the resultant standard is extremely high. Water-borne disease was therefore unlikely. The main waterworks, however, was situated in the Japanese area and there was a possibility that it might be damaged and thrown out of action in the course of the hostilities. Accordingly a survey of artesian wells, of which there are many, was made and the swimming bath at the British Forces Recreation Club was
held as a reserve military supply to tide over any breakdown which might occur.

**FLY-BORNE DISEASE.**

For the reasons stated above protection against the fly-borne diseases was by far the most urgent problem during the period July-October. At short notice the British troops had to occupy the most insanitary areas in "B" and "D" Sectors. The civil sanitary services had completely ceased to function in "B" Sector, which is situated in the overcrowded slum areas north of the Soochow Creek. The narrow lanes of this rabbit-warren were littered with faeces, filth, and decaying organic matter, and flies were breeding in their millions. Under these appalling conditions our troops had to live and eat. The chances of avoiding a serious outbreak of gastro-intestinal disease appeared to be small.

A strenuous sanitary campaign was commenced immediately. Squads of Chinese coolies were engaged to clean up and remove the refuse daily. The lanes and alley-ways were washed down with fire hoses, and all the

![Image: Prevention of fly contamination. Six men dining at barracks table under mosquito net.](http://militaryhealth.bmj.com/)
usual anti-fly measures were instituted. These measures could only be applied in the immediate vicinity of the posts occupied by the troops and there still remained, near at hand, areas with which it was impossible to deal. It was obvious therefore that equal if not greater attention would have to be paid to the protection of food, because fly breeding could not be eliminated or even greatly reduced by anti-fly measures alone.

Permanent fly screening of block-houses and posts was impossible at this stage of the hostilities: most of the cook-houses were hastily constructed mat-sheds quite impossible to render fly-proof. In order to prevent fly contamination food was prepared and consumed under mosquito nets erected over barrack tables. The photograph (fig. 4) will indicate the method adopted. It will be seen that six men can easily feed at a six foot table protected by a net. This was merely a temporary expedient to tide over the initial period of emergency, but there is little doubt that it did in fact help to reduce the incidence of fly-borne disease.

Whenever circumstances permitted cooking was centralized in the permanent camps and no cooking was done in the sectors. Cooked meals in hot boxes were distributed by mechanical transport to the posts and
block-houses in the sectors. The effect of centralized cooking on the incidence of gastro-intestinal disease was very marked. The numbers admitted to hospital fell from 113 in September to 38 in October, although the civilian incidence remained substantially the same.

When the hostilities receded from Shanghai fly-proofed dining huts were provided for each hut in "D" Sector, and all the block-houses in "B" Sector were proofed (see photograph, fig. 5). Each had its own set of hot-boxes, which were only opened inside the post or block-house after it had been cleared of flies by spraying. This provided the ideal of complete protection of food from the cook-house to the mouth of the consumer. Plates, glasses, knives, forks, etc., were stored in a meat-safe inside the post. (There were no cases of fly-borne disease in 1937 up to the end of July.)

Too much emphasis cannot be laid on the importance of centralized cooking and the complete protection of food where the surrounding area is not under sanitary control. In Shanghai the very localized sanitary measures possible could have little effect on the fly population because the surrounding neighbourhood was so filthy.

The fly-sprays usually recommended did not prove to be very effective and were of little use as mosquitocides, and authority was obtained to purchase "K.C.P." fly-spray from the Shanghai Public Health Department. This spray, after much experiment, had been found to be very effective against both flies and mosquitoes. The formula is as follows:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrocide</td>
<td>25 oz.</td>
</tr>
<tr>
<td>Camphor oil (crude)</td>
<td>1 pint</td>
</tr>
<tr>
<td>Kerosene (first quality)</td>
<td>10 gallons</td>
</tr>
</tbody>
</table>

The cost worked out at about 1s. 6d. per gallon, and we found it to be most effective.

**THE CHOLERA OUTBREAK.**

Shanghai had been entirely free from cholera for four years, but on August 30 the first case was reported in the French Concession. The Concession was immediately put out of bounds, and inoculation of the entire garrison ordered. Orders supplementing the preventive measures detailed in Shanghai Area Standing Instructions were issued, and special emphasis was laid on the danger of consuming food and drink from unauthorized sources.

The epidemic soon spread to the Settlement and by September 11 fifty cases had been notified. On the 13th a case of cholera occurred amongst the British troops. On investigating the outbreak it was discovered that a number of men in a platoon of a certain battalion had bought and consumed ice-cream from a Chinese hawker in defiance of orders. The whole platoon was segregated and fortunately the five cases which followed all came from this platoon. All five had received one cubic
centimetre of cholera vaccine a fortnight before and therefore there was no question of the negative phase. One case died and one was very seriously ill and was eventually invalided home. The remaining cases were very mild and made uninterrupted recoveries.

The outbreak is illustrative of several points regarding inoculation: (1) Inoculation apparently does not protect against a massive dose. (2) Two of the cases might have been passed as severe diarrhoea had the stools not been examined for cholera. (3) About ten men who had eaten the ice-cream did not develop the disease, and their stools were all negative.

The epidemic continued until the middle of October when there was a sudden drop in the incidence; a few cases occurred each week until December when they ceased altogether. A total of over 3,500 had been notified in the Settlement alone; there were many more in the French and in Chinese territory, and probably many had not been notified.

MALARIA.

Malaria has been increasing in Shanghai in the past few years. Old residents, some of them doctors, declare that malaria did not exist here until it was introduced by the troops during the 1927 trouble. Whether this is true or not, the fact remains that 1936 was the worst year Shanghai had experienced. Under normal conditions there were 64 military cases in the period July-October of that year with a garrison of only 950. In 1937, with three times the garrison, and with many men exposed day and night in the most malarious areas of the Settlement at the worst season of the year, it was feared that malaria might attain serious proportions.

“D” Sector was by far the most dangerous area. Here there were numerous ponds, pools, and creeks where anophelines were known to breed, and although arrangements were made to have them oiled regularly there were many more just outside the barbed-wire perimeter which could not be treated. It was also exceedingly difficult to make protection by means of nets, etc., effective as the men were living in rather cramped sand-bag posts. During fine weather men not actually on duty slept under nets, slung from a wire stretched between posts driven into the ground outside the block-houses. Bamber oil was issued to each post and as far as possible veils were used; but for the reasons stated above the protection was far from perfect. In view of this it was decided to make use of prophylactic quinine.

It is not easy to assess the effects of quinine on the incidence of malaria, for although there was a marked drop compared with the previous year there was a proportionate drop in the civilian incidence, and it is thought that the very dry summer was largely responsible. The comparative figures were:

<table>
<thead>
<tr>
<th>Year</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1936</td>
<td>65.71 per 1,000</td>
</tr>
<tr>
<td>1937</td>
<td>36.45 per 1,000</td>
</tr>
</tbody>
</table>
Winter Accommodation in the Sectors.

With the approach of winter the problems in hygiene and sanitation underwent a change. The Shanghai winter brings perishingly cold winds, frost, rain and sometimes snow, and we had therefore to consider how the troops guarding the perimeter were to be housed. In “B” Sector the problem was comparatively simple as the concrete block-houses there could be heated by electric radiators, and were completely weather-proof.

In “D” Sector the problem was not so simple, as it is situated in open country and the only existing shelters were the hastily constructed sand-bag posts. These posts were by no means weatherproof and from the nature of their construction were cold and draughty. Overcrowding had to be considered as well as adequate protection and warmth. Huts of corrugated iron and wood to accommodate 10 men at 60 square feet of floor space for each post would have been exceedingly costly and hardly suitable for the “front line.” A compromise was reached, after much debate, in the decision to utilize E.P. tents fitted with a wooden floor and walls, and a brick fireplace. The photograph gives a good idea of the arrangement (fig. 6). The chimney and fire provided good ventilation, and they proved warm and comfortable in the coldest and windiest weather. During the hotter weather the wooden walls were removed and the “flies” adjusted to take full advantage of the breeze. In this respect...
they were more adaptable than wooden huts with fixed walls would have been.

**Lice-borne Disease.**

Typhus and relapsing fever are of common occurrence in Shanghai, and with the influx of refugees and their proximity to the military areas, there was a distinct risk of these diseases spreading to the troops. In this respect "B" Sector, situated in the slums of the Settlement, was by far the most dangerous.

As far as possible refugees were cleared from the immediate vicinity of the posts; it was not possible, however, to evict permanent residents and the danger of close contact could not be entirely eliminated. The following measures were therefore adopted. All men on relief from the sectors were medically examined, had a bath and change of underclothing, and their blankets and kit were sent to the disinfestation station. Block-houses and posts were regularly washed out with cresol on each relief. By these means infestation with the body louse was completely controlled. There were, however, a good many infestations with "crabs" derived from a different source, but fortunately of less medical significance.

It is rather ironical that the only military case of typhus was fatal, and occurred long after the emergency had ceased; that he had never been in the sectors and was entirely free from lice on admission to hospital. He had, in all probability, picked up a single infected louse in a ricksha.

**The Disinfestation Station.**

This was temporarily established at Jessfield and consisted of an ancient Thresh and a small battery of Lelean sacks. On the arrival of the Field Hygiene Section it was moved to Mohawk Road. An Aldershot box was now added and steam for this and the sacks was generated by the oil and water drip method with apparatus improvised by the Section. Waste oil from the sumps of motors was used and it proved very successful.

There are two practical points which should be mentioned. Many of the Lelean sacks had been in store for some time and were quite useless when unpacked. It is thought that the "dope" used in waterproofing them tends to harden and rot the canvas, and it is suggested that either a new "dope" be devised, or that the sacks be stored undoped. The "dope" could be stored in drums and only applied before use. Secondly, the Aldershot box was made of comparatively soft wood which could not stand up to continued use. These boxes should be made of hard seasoned wood and generously reinforced with steel corner pieces and fitted with very strong hinges.

At a later date a second Thresh arrived and the pair were well able to deal with all the work of the Garrison.
CONCLUSION.

The Shanghai Emergency has been an interesting and instructive experience for all of us, and more especially so for the very junior officers of the Corps who had never been on active service.

In spite of the occurrence of epidemics of cholera, dysentery, measles and typhus, and of cases of smallpox, cerebrospinal fever, diphtheria, etc., in considerable numbers in the Settlement, and the appalling state of overcrowding and filth the health of the troops was remarkably good. With the exception of the initial increase in the incidence of fly-borne disease and the five cases of cholera there was no notable increase over the normal numbers admitted to the hospital. In several instances there was an actual decrease.

The question of reinforcements of personnel and medical supplies has not been dealt with in detail because this article is merely intended to be an account of purely local events. To have done so, it is felt, would have rendered it too lengthy and rather difficult to follow.

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NOTE BY LATE A.D.M.S.

The General Officer Commanding, Shanghai, quickly realized that besides the actual trouble the real war was, as he expressed it to me, the one against disease. His whole-hearted co-operation and that of the battalion commanders and the constructional work done by the Royal Engineers, undoubtedly did an enormous amount to reduce disease.