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THE WAR IN SOUTH AFRICA.

FROM BLOEMFONTEIN TO PRETORIA.

By SIR WILLIAM THOMSON,
Surgeon-in-Chief, Irish Hospital, South African Field Force.

FROM BLOEMFONTEIN TO KROONSTADT.

BLOEMFONTEIN was a vast improvement upon Naauwpoort, but I was glad to leave it, if only for a change. The position of the Irish Hospital, camped on the gentle slope of the principal kopje of the town, was all that was desirable. It commanded a view of a great plain, and of hills whose names are well-known at home—Leenberg, Bushman's Kop, Springfield and the great towering Thaba Nchu, round which fights soon began to wage, and we could hear the booming of guns and occasionally see the column of smoke of a burning farm. But for all that we were afflicted by a special curse in the shape of flies. The wintry chill of the evenings drove them into the tents, where they ranged themselves in armies and battalions to the number of hundreds of thousands. At lunch time, when the sun had given them a new fillip, they descended upon us from the tent ceiling, and assailed everything that was eatable. They challenged the right of anyone to food, and impudently wrestled with the morsel on its way to your mouth; rushed headlong into soup, or milk, or tea, and generally did their best to make the life of the invading stranger as miserable as possible. So, when the order came on Wednesday, May 9th, to move the ambulance portion of the hospital to the front, I had at least one joy to oppose to some regrets.

The equipment of our hospital included 15 ambulance waggons, and 10 large tortoise tents, with about 25 small square bell tents. I determined to take 10 ambulances, 6 small tents, and 4 large. These last were arranged so that the top bar of the waggon served as the central support, the sides being rolled up, and a little drill enabled us to pitch a tent to contain 14 patients in about eight minutes. I took with me Dr. Coleman, Dr. Pouden, Mr. Percy Stewart, and Mr. Douglas Thomson, with orderlies and drivers, leaving behind 60 occupied beds in charge of Dr. George Stoker, Dr. Friel, Mr. MacIlwaine, and Mr. Edwardes.

We left Bloemfontein on Thursday afternoon, May 10th, with 14 waggons and carts, and made our first halt about six miles out. Thence we passed through Glen, Karee Siding, Brandfort, Vet River, Smaldeel, Welgelegen, Zand River, Geneva Siding, on to Kroonstadt. For a day we were advised to march with a large column, as the enemy was reported to be ahead of us in force; but he did not appear, and as our progress was slow, we slipped away in the early morning, and made our own way thereafter, reaching the headquarters at Kroonstadt at 1 o'clock on Thursday, May 17th.

The country through which we passed, and over which the advancing army had already preceded us, was very different from Cape Colony or the Great Karoo. For a day or two the kopjes had been diminishing in numbers. Now and again we could trace the banks of some intermittent stream by the presence of thorn bushes. The plain was no longer sparsely grassed, but there was gradually increasing fodder as we got north. At last, at Theron, we left the last kopje behind us, and although we saw it for a long time, we saw no semblance of another in the three days that elapsed before our arrival at Kroonstadt. The plains seemed endless. Far as one could see there was nothing but grass. Day after day we went along meeting not more than two or three people, and seeing no signs of habitation but an occasional house or Kaffir's kraal, sometimes miles away from our track. The farms uniformly displayed a white flag. Some of them I visited, but the only occupants were women and children or very old men. The young men were in some commando, but their mothers and sisters at home only wished that the war was at an end. They asked anxiously if more troops were coming, for they had seen column after column pass in long streams, and the only answer was that they were coming like waves of the sea.

To those who see the veld in this region, and trek across it for the first time, there must be, I think, a powerful fascination. I had never seen plains so vast, so silent, and so void of human life. What we looked upon were called "farms," but they were really great cattle ranches. No hedgerow or wall broke the landscape. The immense plain, often flat as a

cricket field for miles, sometimes rolling away in far-stretching undulations, was only marked at great distances by the well-known barbed wire fences, which marked out the limits of the property. As to tillage, there was practically none, except a few patches of Kaffir corn or mealies; perhaps they were almost swallowed in the surrounding vastness of grass land, and were really more extensive than I thought.

Life from this week was a delight. Up at 4 o'clock, we breakfasted in the moonlight at 5, and were well on our way at 6 just as the day began to break. The mornings were very sharp—I have seen ice an inch thick here—but by 9 o'clock the greatcoat was abandoned, and for the rest of the day we had a really hot sun. Walking, riding, driving followed in turn, and then dinner at 6 in the moonlight again. The sense of freedom in this great solitude; the exhilarating air; the brisk, bracing cool of the evening were unspeakably attractive; and the unbroken sleep that followed such a day, even on the floor of a waggon, made me often declare that this was the real cure for insomnia.

On arriving at Kroonstadt I was informed by Colonel Stevenson, the P.M.O. in the field, that we were to be attached to the Guards Brigade in the Eleventh Division, under General Pole-Carew; but subsequently this was changed, and we were ordered to act as field hospital to the Royal Artillery, the Naval Brigade, the Royal Engineers, and generally to the divisional troops.

FROM KROONSTADT TO JOHANNESBURG.

The now famous march of Lord Roberts's army from Kroonstadt to Johannesburg, ending in the surrender of the latter town, began on Tuesday, May 22nd, and ended on the following Tuesday, when we reached Elandsfontein, a suburb, and seized the railway junction. It was a novel thing to have a civil hospital and ambulances in the field, and every man of us was proud to take a part in this great historical event. No other civilian hospital was thus honoured, but they were all doing their share of work at Bloemfontein and other places in the rear.

Each day we expected to fight. On Wednesday the news was that 6,000 Boers were entrenched across our path; but General French and Colonel Hutton, who were operating with cavalry and mounted infantry a long way in front, turned their flank and they fled. This was the daily course of events. We could hear the big guns thundering ahead of us for an hour or two; then followed silence, and we knew that the enemy had again retired. The interest of the day for us was in part centred in crossing fearful drifts or discussing the probabilities of what would happen at Johannesburg. We were without news of the outside world. We had no letters or newspapers; we did not know what was happening on our right or left, save through vague rumours, which always took the most exaggerated shape; and we rather envied the people at home who knew all about the stirring events that were happening.

The destruction of the railway line was remarkable. Splendid bridges at Kroonstadt and other places had been utterly ruined. There appeared to be a special malice in reducing high piers and buttresses to stone-heaps. Every culvert was gone, and as we approached the Vaal the line itself had been more frequently attacked. The plan was to place dynamite under the joinings of the rails, and blow them up. Freed from its holdings the steel sprang up in great curves, and as you looked along for miles you saw these weird arms extended into the air. It seemed impossible that the repairs could be quickly effected, but the Royal Engineers and the Railway Pioneers struggled with the wreck night and day, and the railhead was only two days behind us at some points.

The supply of a great army in the field with food is a difficulty which perhaps does not present itself to the average mind. In Europe there are plenty of railways; here there is one, and that a single line. The food for this army—a thousand miles up into Africa—had to be carried by ox waggons. Each of these uses about sixteen or twenty animals, and this may give an idea of what a huge cavalcade followed the troops. The supply of food has been a triumph of management, and Colonel Ward, C.B., and his staff have done marvels. A German officer who knows the country told me that even to Africans it was astonishing, and that no other

nation could have done what he had seen accomplished during this campaign.

We arrived at the Vaal River on Sunday, May 27th, and looked for the first time upon the Transvaal. We expected a stand here; but as usual the Boers were driven out on the day before, and we were free to cross. We rode through the river, and then we realised that we had already conquered one country and were entering upon the conquest of another.

On Monday, May 28th, we marched twenty-two miles to Klip River, and encamped, and next morning started at 6 for Johannesburg. It was a day to be remembered. We had not gone a mile before we learned that one of the big 7-ton 4.7 naval guns had gone through the bridge. I went on to see what had happened. I found a deep, sluggish stream about 20 feet wide, and over this a structure of tree trunks, the only road bridge I had seen since I left Capetown. The huge gun was lying on its side, one wheel touching the water, the other in the air. Fortunately the light guns and the infantry had got over, but for everything else in the shape of wheeled vehicles passage was impossible. The engineers put up a trestle bridge, but it broke down under a big telegraph waggon and then another had to be got up. In four hours by the aid of men and eighty oxen the gun was extricated. Then a drift had to be made, and finally after a delay of eight hours we were able to cross. We had still to march seventeen miles, and there remained only a couple of hours of daylight, but we hurried on. As the sun went down I saw on the left a ridge of low-lying hills, and there in the twilight half-a-dozen tall chimneys—one smoking—that told me I was looking upon Johannesburg. After this the journey was intricate and very tiring. The column made its way over stony hills full of ruts, littered with small boulders. The night was very dark and there was a piercing wind. Kaffirs shouted at their teams, mules gave out, oxen bellowed, and the waggons rumbled along, colliding with stones, rolling into waterways, until one wondered how long the fore carriages would stand. For hours we went on, looking eagerly for a camp fire, and then at 9 we reached our destination. We were at Elandsfontein and were overlooking Johannesburg. We had done a record march with really very little loss. For six days our ambulance waggons had carried on the sick and wounded because they could not be sent back by convoy, and although many were very ill we had lost none.

Next day we moved to a pleasant field sheltered by trees and pitched all our big tents, to accommodate 50 patients, beside the Guards' Hospital. Here more sick and several wounded were received. On Thursday morning, May 31st, at 10.30, in the middle of dressing work. I had orders from Colonel Magill, of the Guards, P.M.O. of the division—whose unflinching courtesy and zeal I wish to acknowledge—that we were to pack up at once and carry all our patients to Johannesburg, for the surrender had been made. In an hour and a half we were ready—all our sick and wounded packed into the waggons and tents struck. We joined a long convoy and started, passing through the overground works of gold mines whose names are famous—Simmer and Jack, Geldenhuis Deep, and others—along coal-dust roads, and under a sun that blistered one's face and lips. The line of waggons and troops extended for miles, and marked its advance by clouds of dust. The inevitable blocks occurred, but at last we came upon scattered residences, then into tree-lined suburbs, then gradually into streets of brick-built houses and shops. We were in Johannesburg.

It stirred my heart as I rode along to realise that I was taking part in this great triumphal procession. It was something new to enter a town prepared for siege. We had passed scores of skilfully laid trenches, on the outlying slopes, that had never been occupied. We were now looking upon the preparations of the town itself for an investment that never came. The streets were practically deserted by white people. The British had been turned out long ago; the burghers were off to the war; those that remained were in the main of other nations, with perhaps indifferent feelings; at least they were stolid as they gazed. The Kaffirs, scantily dressed, sat at the corners and stared eagerly at the "locust" army. Here and there some men and women looked from a balcony; and a few good Samaritans gave water or tea to the sick or

the marching men. But there was no sound save the tramp of men and the rattle of wheels and arms. I do not know what happened when the great chief himself entered at the head of his splendid troops; but at our part of the column there were no sounds of welcome. On the part of the soldiers there was apparently only aroused interest; there were no cheers or jibes; the men moved on in steady stream, only silently exultant that they were victors after long and fearful hardships.

The houses of business, almost without exception, were closed. Huge barricades of wood or corrugated iron covered the windows and doors. All showed what the stress of war can bring to a civil community.

I rode ahead along the long streets in order to reach the hospital. The Union Jack was flying in the great square opposite the public buildings, and half a dozen fluttered from as many houses. That was all the bunting I saw. The people whose sympathies were with the victors had been appealed to by the late official paper to curb any feeling of rejoicing in the hour of triumph, and they certainly did not offend.

I got to the hospital at 5 o'clock, and found the resident medical officer to be a Dublin man, Dr. Pearce. The building is really palatial, and splendidly equipped in every department. Nothing could be better than the operating theatre. There are 400 beds, and the income is about £40,000 a year. The patients were received and refreshed with great promptness. One of ours did not survive the tiresome march. The nuns were most kind, and the celerity with which the hundreds of sick and wounded were got into their comfortable beds was admirable. For ourselves, we had eaten nothing for nine hours, and even our needs were attended to.

We left at 8 o'clock for the camp. Our authority told us that the distance was two miles. I have noticed many times that distance is very elastic in South Africa. You are told that you have to go two miles; you march four and become bewildered; then you are told—this time truly—that you have still five miles to go. So it was now. We struggled on in the dark after others on the same errand as ourselves; but at 12 o'clock we could not find any sign of the division. We were told it was five miles off, so we outspanned till morning. We were all thoroughly tired out. We found next day that hundreds were in the same plight as ourselves, and the brigade hospitals were still behind us.

In this march we have admitted to hospital 159 patients, and many of these were sent back by convoy, but we carried 30 for several days. Most of the cases were enteric, and the wounded did not present any special feature to which I need allude. They all did well. We only lost one case of fever on the last day's march.

Of my 3 dressers, 2—Dr. Pouden and Mr. Percy Stewart—are in the town hospital with enteric. They, as well as nearly all the staff, had been inoculated. This makes 7 who have been attacked, but in no instance was the disease severe.

We have had two days' rest in a beautifully-wooded country, and we are ready for another march.

THE ENGAGEMENT OUTSIDE PRETORIA.

We left our camp on Sunday morning, June 3rd, and marched towards the six mile drift. The enemy were strongly entrenched there to contest the crossing. On Monday, June 4th, we were early afoot, but we reached the drift without opposition and got safely across. We heard that the Boers had been forced out by the mounted infantry brigade early in the morning. The road onwards led through sharply undulating country with steep ascents and descents, all the roads being exposed to commanding positions. But our flanks were widely extended. The small patches of trees were searched and we went on unmolested. About 11 o'clock I heard the boom of the first gun. It was just ahead of our line. Then came more firing, and we knew we were at last engaged seriously. A long climb brought us to the crest of a hill. Right in front about a mile away I saw a battery of our guns on the side of a hill. They were shelling a kopje about 2,000 yards in front of them, and the shells fell in showers upon it. The Guards moved off to the right; while the 18th Brigade moved in advance and to their left. Our road here turned sharp to the right, and the waggons moved steadily on. On

the sky line, a mile and a-half away, were the naval guns, and the 18th Brigade had moved in front of these and lain down on the burnt veld. Our orders were to bring the hospital on to the rear of the naval guard, but on the near side of the brow of the slope.

Accordingly we pitched one large tent in a few minutes, the others being drawn up at hand. The firing had now become very heavy. There was a chorus of pom-poms from both sides, punctuated by the loud booming of the naval and field guns, and we looked with intense interest at the tragic work that was going on before us. There was little smoke, and that only from the big guns and bursting shells, but the noise was deafening. All I could see at this time was the flash of cannon, a little smoke, our own troops, but no enemy. They were hidden behind stone breastworks, which had been prepared with deliberation for what was expected to be a fierce resistance.

THE HOSPITAL UNDER FIRE.

An ambulance returned bringing Commander de Horsey, of the *Monarch*, who had been hit on the left malleolus by a shell splinter while bringing his 4.7 gun into action. I was engaged in examining his wound when I heard the crackling shriek of a shell passing over the tent. I looked up and saw another burst forty yards away. Dr. Kendal Franks came in just then, and kindly assisted us in hurrying on the work. A shell now fell between our mules and our tent waggon. They were raining freely among the transport, and I saw the drivers turn and lash their mules and oxen in retreat. All over the place there were spurting columns of dust sent up by the bursting shells. Someone had given the order for the convoy to retire. Still the shells came. They were being fired at the naval guns, and missing these came plopping amongst us. Once I saw a shell drop behind one of our own waggons which was moving away. The mules jibbed and the waggon rolled and heaved. I was sure it had been struck, and I expected to see it fall to pieces, but it was only rolling through a watercourse, and it got away safely. Then a soldier was brought in wounded in the face by a shell. He had been standing outside the operation tent talking to one of our men, when a shell burst, and a fragment struck him badly in the face. There was a big rectangular wound penetrating to the mouth, and I stitched this up with Dr. Frank's assistance. Then Colonel Magill came in and ordered us to retire for a mile. The tent was taken down and packed, and we hurried back to a new position where we received other wounded.

It was a hot quarter of an hour altogether, but the only damage done was to the soldier. At the naval guns themselves only one officer was wounded, and two mules were killed.

The firing went on all day until night came. The big guns fired at the forts at Pretoria, and planted the shells unerringly. Then the railway station was assailed, and also the artillery barracks. Once or twice the guns turned upon a near kopje, and pounded it at 2,000 yards to keep down the rifle fire. Gradually the firing slowed, and as evening fell silence followed.

The casualties were slight, about 50 altogether. Our hospital received the Duke of Norfolk, who early in the day had his right hip dislocated by reason of his horse putting his foot in a hole. The reduction was effected on the field under chloroform, and he is doing very well.

A soldier was hit in the abdomen just below the last rib on the right side, the bullet emerging at the left side of the last lumbar vertebra. I had the advantage of consulting with Dr. Franks and Dr. Lowe, a civil surgeon, and we were unanimous in thinking that operation was not desirable. He died next day. In another case a man was wounded through the right knee-joint, the bullet coming out just below the patella. Beyond some effusion he has no trouble and the wound is healed.

In another case a bullet entered at the edge of Poupart's ligament $\frac{1}{2}$ inch from the anterior superior spine. I removed it from the right buttock, 2 inches from the anus. There were no symptoms. In the case of a West Australian the bullet entered the outer margin of the right sterno-mastoid. I removed it from a point just below the occipital protuberance. There were other cases of no special interest.

We remained by order on the field until Wednesday, the

troops having left on Tuesday. The only excitement was the arrival of a party of Boers on their way to surrender. One was a member of King's Inns. We gave them some lunch, and soon after we followed them into Pretoria with our sick and wounded.

Pretoria, June 8th.

THE COLONIAL DIVISION UNDER BRIGADIER-GENERAL BRABANT, C.M.G.

By SURGEON-LIEUTENANT-COLONEL HARTLEY, V.C.,
P.M.O. Cape Colonial Forces.

In the month of January it was considered advisable to form a division composed of mounted men, presumably accustomed to South African manners and customs, and led by Colonial officers. It is not my purpose to discuss questions outside the medical bearings of the work done by this particular body of troops which was massed at Queenstown, Cape Colony, and numbered some 3,000 mounted men.

ORGANISATION OF THE MEDICAL SERVICE.

The Imperial authorities having taken over the three volunteer bearer companies of the Cape Medical Staff Corps, one surgeon of the Cape Mounted Riflemen, and the majority of the rank and file of the Medical Staff (regulars) of that regiment there only remained a nucleus consisting of myself and one sergeant-major to develop a medical service for this Colonial Division. Kind friends had already subscribed a substantial sum for the purchase of ambulance wagons, medicines, and medical comforts, and it only remained to get them together and arrange them in some sort of order. The general officer commanding also took the liveliest interest in the arrangements for the comfort of the sick and wounded of his division, and was so good as to order his principal medical officer to spare no reasonable effort and expense towards the attainment of a happy result. It was considered advisable to depart from the established custom of a distinct bearer company and field hospital and to combine the two. It was thought from actual experience in the earlier months of the present war that much valuable time and material is wasted through men of the bearer companies being idle excepting when an action is taking place, or at times when patients are required to be moved from field hospitals to hospital trains or ambulance wagons. This is a subject which deserves the most earnest consideration of the War Office for future campaigns.

Recruits for Brabant's Ambulance were advertised for in various colonial towns. Some 80 men were collected in this way, and an extraordinary medley they were—refugees from Johannesburg, Germans, French, English, Americans, Jews, etc.—few, if any of them having any knowledge of ambulance work, drill, or discipline. But whatever their nationality or creed, they have done admirable work both under fire, in the field, and in the hospitals. There have naturally been some exceptions, but the bad ones were soon found out and discharged.

Then a more serious question arose. South Africa is a very free country, or, to be absolutely correct, considers itself so, and the medical profession is not behindhand in the estimation of its well-deserved freedom and resourcefulness in times of difficulty and emergency. Finally, a staff of 15 regularly qualified medical men were engaged, only one of them having seen active service previously, but all had been engaged in private practice in the Cape Colony, and were conversant with the general run of diseases of the country.

ACTION AT DORDRECHT.

The first engagements took place on February 16th and 17th close to the town of Dordrecht, 7 being killed and 9 wounded. A temporary hospital was formed at a deserted farmhouse some five miles from the town. So soon as the troops took possession the patients were moved into it, including one Boer wounded in the thigh, who had been deserted by his fellow patriots and left on the field to whatever fate might befall him. It was only necessary to perform two amputations, one through the upper third of the thigh, and the other through the humerus, both of which recovered without a bad symptom.

On the second day of the fight the ambulance waggons were moved three times in consequence of shells and bullets fall-

ing in close proximity. I am bound to affirm this did not appear to be intentional on the part of the enemy, but to be due rather to the fact that they were drawn up behind the guns, which naturally attracted much attention from the opposite side. The public school buildings afforded an excellent impromptu hospital, it being possible from the numerous classrooms to keep the medical and surgical cases quite distinct. Over one hundred patients were treated in this hospital until it was closed on March 14th, when they were transferred by rail, a distance of some sixty miles, to the civil hospital at Queenstown.

ACTIONS AT LABUSCHANE'S NEK AND THE ORANGE RIVER.

The next fight occurred at Labuschane's Nek, five miles from Dordrecht, with 14 killed and 26 wounded. The division next marched to Aliwal North without opposition, and a sharp engagement took place on March 11th on the banks of the Orange River, within a mile of the town; 5 killed and 18 wounded. Fortunately for all concerned there are very elaborate and extensive public school buildings in the town, and within two hours of the fight these were converted into an admirable hospital with the ready assistance and self-sacrificing aid of the ladies of the town. They not only placed beds and bedding at the disposal of the medical officers, but readily undertook the nursing day and night regardless of personal fatigue and inconvenience to themselves. The Colonial Division should ever feel grateful to these self-denying ladies, whose kindness and attention were most valuable.

About this time heavy rains took place, causing a good deal of fever, diarrhoea, and dysentery among the troops. The resources of hospital accommodation were, however, not unduly strained, communication by rail to the Colony being re-established, thus making it easy to send suitable cases to the civil hospital at Queenstown.

An interesting little episode occurred at Aliwal North Hospital, showing that the Boer is perhaps after all not so bad as he is usually painted. A Dutchman shot through the head causing hemiplegia was treated by us for some weeks, and finally his friends were allowed to take him home. Before leaving his father presented the hospital with twenty shillings and sixpence as a mark of gratitude for the son's treatment, which amount he wished expended for the benefit of our sick and wounded.

WEPENER.

In the early part of April some 1,700 men of the Colonial division marched to Wepener, where they were immediately surrounded by three or four times their number of the Boer army, who relentlessly plied them with shot and shell day and night for seventeen days. Our men made a most gallant defence, until they were relieved by Generals Brabant and Hart on April 25th. As might be expected, our losses were serious, 33 men being killed and 133 wounded. Six medical officers and a few rank and file of the ambulance corps under command of Surgeon-Major Faskally, Cape Mounted Riflemen, were with the beleaguered force, and worked fearlessly and well during the whole siege. A large private house (which was unfortunately in the direct line of fire, one wounded patient being killed in bed and another shot dead whilst sitting in the hospital verandah), and a farmhouse about a mile distant, formed admirable hospitals. The shutting in of this portion of the Colonial division being totally unexpected, the supply of dressings was wellnigh exhausted, and there was no possibility of replenishing them until the arrival of the relief column. The best endeavours were made to overcome deficiencies, and no particular harm occurred, as events turned out. I was with the relief column, which had two engagements during the march, 3 men being killed and 27 wounded, the principal sufferers being the infantry of H.M. Border Regiment, who with a battery of Royal Artillery and the Somersetshire Light Infantry had reinforced us. As the whole of the Orange Free State was at war with the British Government, our lines of communication with the Cape Colony were in an uncertain condition, and the railway some sixty miles distant, through country known to be occupied by the enemy, it was difficult to know how to dispose of our considerable number of wounded. The Resident Commissioner of Basutoland, Sir Godfrey Lagden, in the most handsome and generous manner, permitted them to be moved to Mafeteng and Maseru, placing churches, schools, dwelling-houses, medical officers, medical stores in these villages at the disposal of the General Officer Commanding Colonial Division, and the wounded have found a veritable haven of rest in this hospitable highland territory of Basutoland.

teng and Maseru, placing churches, schools, dwelling-houses, medical officers, medical stores in these villages at the disposal of the General Officer Commanding Colonial Division, and the wounded have found a veritable haven of rest in this hospitable highland territory of Basutoland.

TEMPORARY HOSPITALS AT THABANCHU, ROUXVILLE, AND FICKSBURG.

Since that time this division has been marching along the extreme eastern border of the Orange Free State, one or two affairs of picquets having taken place, in which 3 men have been killed and 8 wounded. I have formed small Colonial hospitals as occasion demanded at ThabaNchu, Rouxville, and Ficksburg. These, however, will be abandoned as soon as possible, being so far removed from railway communication with the colony and sea coast.

RELATIVE IMMUNITY FROM TYPHOID FEVER.

Very little disease has arisen among the Colonial troops, only four or five deaths from enteric having taken place. This is the more remarkable, as, with the exception of the permanent regiment of Cape Mounted Riflemen, the South African soldier troubles himself but little about clean camps, latrines, refuse pits, tidy tents, or general sanitation. It is not wise to hazard explanations of their remarkable immunity from disease at this stage of the war. Perhaps it is they have been well fed and clothed, have generally been under canvas, and are constantly moving from one camp to another. Others factors may be the Colonial man is mounted, and does not suffer so much from thirst and fatigue as does the foot soldier, who madly rushes to drink all and any kind of water, however muddy and uncertain it may look to wiser and more experienced eyes. The last, and perhaps best, explanation may be that the Colonial division is composed of men who have become inured to the climate through long residence in the country, or have been rovers in America, Australia, and other Colonies. Before closing these hasty notes it is interesting to remark that the irregular forces are singularly fond of taking medicines; some 70 or 80 of the division roll up daily when the "sick call" sounds. It may be to show their confidence in their medical officers, but more probably because they can get their attendance and medicine for nothing.

Camp of Colonial Division, Klip River Drift,
Orange Free State, June 11th.

RELIEF FOR SICK AND WOUNDED SOLDIERS, THEIR WIDOWS AND ORPHANS.

LIEUTENANT-COLONEL T. TULLY, Honorary Secretary of the Imperial War Fund, 20, Bucklersbury, E.C., in giving notice that the grants from this fund are compulsorily suspended from want of funds, states that over £8,000 has been paid to widows, orphans, and dependent relatives of men who have lost their lives in South Africa. The fund has received £5,000 from various sources, but has been compelled to sell out £3,000 of its original capital stock of £4,681.

Lieutenant-Colonel Tully adds the following information, which may be of use to our readers:

Widows, orphans, or relatives of deceased, sick, or wounded officers, may write with perfect confidence and privacy to the Marchioness of Lansdowne, Lansdowne House, London, W.

Applications on behalf of widows and orphans of soldiers or Colonial or Home Volunteers should be made to the Royal Commissioners of the Patriotic Fund, 53, Charing Cross, London, S.W., who will also receive applications from dependent relatives of soldiers who have lost their lives in the war. Immediate grant, £5 for widow and £1 for each child, and pension follows.

Applications on behalf of widows and orphans should also be made to the Manager, Widows' and Orphans' Fund, *Daily Telegraph*, Fleet Street, London, E.C. Immediate grant, £20, and £3 for each child.

Relatives of living soldiers, should apply to the nearest branch of the Soldiers' and Sailors' Families Association, to the mayors of boroughs, or the Officer Commanding the Regimental District to which the soldier belongs.

Disabled soldiers should apply to Secretary, Lloyds' Patriotic Fund, Brook House, Walbrook, London, E.C.; also to Royal Commissioners, Chelsea Hospital, London, S.W.

"Soldiers on sick furlough who require medical aid shall apply for it to the nearest military station. When this is impracticable they may apply to a civil practitioner, to whom they will show their furlough paper, and who will be allowed to charge for attendance at the rate laid down on Army Form O, 1667."

Cases which are urgent and in need of special help, and which are not

strictly inside regulations, should be referred to Manager, Kipling Fund, *Daily Mail* Office, Tallis Street, London, E.C.

Next-of-kin to dead soldiers should write direct to the Under-Secretary of State for War, War Office, London, S.W., for information as to any pay or effects, the property of the deceased.

PURIFICATION OF SEWAGE AT LEICESTER.

APPARENT FAILURE OF THE "SEPTIC SYSTEM."

IN a long, fully-illustrated, and highly-instructive report, Mr. Mawbey, M.I.C.E., Borough Engineer and Surveyor of Leicester, describes the difficulties and defects which exist in the sewage disposal of that city, and gives a detailed account of a very interesting series of experiments in the bacteriological purification of sewage, which were carried on from September 2nd, 1898, to October 13th, 1899.

EXISTING SYSTEM: BROAD IRRIGATION.

Hitherto the sewage of nearly the whole of the city has been treated, after passing through a settling tank of about 126,000 cubic feet capacity, by broad irrigation on about 1,355 acres of stiff clay land. Owing to the increase of population and other causes this land has become greatly overtaxed, and it has become imperative either to purchase a much larger quantity of land for the sewage farm, or to adopt some method of purification of the sewage before applying it to the land.

NATURE OF EXPERIMENTS.

It was decided to carry out a series of experiments in order to form a scheme by which the sewage might be sufficiently clarified before irrigation, with the minimum formation of sludge and the maximum clarification, and purification as gauged by the albuminoid ammonia and "oxygen absorbed" in the final effluent. The experimental works comprised:

A. A channel and weir chamber (20 feet by 4 feet) for delivering and measuring the crude sewage.

B. A detritus tank (8,681 gallons water capacity).

C. A large settling tank (125,962 gallons water capacity; used as a closed "septic tank" during the last four and a half-months of the experiments).

D. Four clarifying coarse "first contact" bacteria beds (total area, about 450 square yards; average working depth of material about 4½ feet).

E. Second and third contact fine bacteria beds.

F. Irrigation area of old pasture and rye grass (1,355 acres).

These experiments were "conducted on a large and thoroughly practical scale, about 62,000 to 429,000 gallons of fair average crude Leicester sewage per day, over a period of 13½ months, having been dealt with."

The processes of experiment were varied in seventeen different ways, the chief object being to test the relative efficacy (after passage through the detritus tank) of

(a) The coarse bacteria beds alone (single contact); (b) the coarse bacteria beds preceded by the large open settling tank; and (c) the coarse bacteria beds preceded by the large closed "septic tank" before applying the respective effluents obtained by these methods to the land; and (d) the coarse bacteria beds followed by fine bacteria beds (double and treble contact) without any application to the land.

These experiments distinctly show that the Leicester sewage when passed from the detritus tank through the coarse bacteria bed and finally over one plot of pasture land (that is, without any preliminary anaërobic treatment) produces a final effluent which compares favourably with all the effluents obtained by the other processes employed in the course of the investigation.

RESULTS AND CONCLUSIONS.

This process was carried on for about 7½ months. The analyses of the crude sewage and final effluent from the land during this period show the following averages in grains per gallon:

	Suspended Matter.	Albuminoid Ammonia.	Oxygen Absorbed at 70° F. in 4 hours.
Crude sewage	43 700	1.1823	7.4419
Final effluent	0 385	0.1565	0.6634
Percentage of purification...	99.12	86.76	91.08

This final effluent from the pasture land was perfectly

bright, clear, and free from smell, producing no discoloration or fouling of the grass and dykes through which it passed, and developing no after-putrefaction.

From a study of Mr. Mawbey's report it is evident that he is justified in forming the following conclusions:

1. That the process of purification of the Leicester sewage by bacteria beds previous to land irrigation would be far more efficient than large extension (at great cost) of the sewerage area.

2. That the "septic system" is not adapted "for clarification before direct application to old pasture land or rye grass."

The final effluent obtained by this process was not greatly inferior to the best; but the foulness of the effluent from the septic tank itself and the pollution of the land, grass, etc., which it caused was most offensive and intolerable. We are not aware, however, that the direct application of a septic tank effluent to land by irrigation has ever been advocated by the promoters of the "septic system."

3. That "the most efficient clarification combined with the greatest percentage purification in albuminoid ammonia and oxygen absorbed, and with the least production of sludge, has been achieved by a detritus tank and clarifying bacteria beds, and the effluent from this process has been found to be in a more ripe condition for rapid final nitrification than the more anaërobic preliminary processes included in the experiments."

So far as the Leicester sewage is concerned the "septic system" appears to have proved a failure. It is true that the effluent from the septic tank showed a very considerable reduction in the albuminoid ammonia and the "oxygen absorbed," (from about 40 up to more than 60 per cent.), but the effluent from the bacteria bed without the aid of any septic tank was practically as good as when the septic tank was used in addition.

Moreover, the amount of sludge deposited in the tank was excessive. It amounted to no less than 149.24 tons after 125 days use of the tank and was intolerably offensive. (This amount, according to calculation, is equivalent to 7.04 tons of sludge, with 90 per cent. of water, per million gallons of sewage.)

These results produced by the "septic system" at Leicester are of great interest and call for careful consideration. It will be well to compare them with results produced elsewhere under apparently similar conditions.

RESULTS OF EXPERIMENTS AT MANCHESTER.

In the report on the treatment of Manchester sewage issued at the end of last year, the experts, after their prolonged and careful experiments stated that the results obtained by the bacterial system of sewage purification exceeded their anticipations, and also that in order that a bacterial contact bed may exercise its full powers of purification a preliminary anaërobic or septic process is necessary.

They found that by the "septic system," constructed on the well-known Exeter model (closed septic tank followed by single contact bacteria beds), a highly satisfactory effluent was obtained, and a still purer effluent by the open septic tank, followed by double contact beds. No mention is made in their report of offensive effluvia; whilst great reduction in the amount of sludge by the septic tanks is recorded.

CAUSE OF APPARENT FAILURE OF "SEPTIC SYSTEM" AT LEICESTER.

The question of chief interest is why a system which has succeeded elsewhere has apparently failed at Leicester. The Leicester sewage, according to the analyses reported, is not an excessively strong one. It is not complicated by such a quantity of strong trade effluents as the Manchester sewage. For these reasons it might have been expected that the septic system would have answered as well at Leicester as at Manchester.

The explanation of this question is possibly to be found in the fact that at Leicester the "crude sewage" has undergone excessive anaërobic action before it reaches the septic tank. Scott Moncrieff has demonstrated that "excessive septic change" may be highly detrimental to the aerobic organisms and entirely prohibit the final oxidation of the organic ingredients of sewage.