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Authors alone are responsible for the statements made and the opinions expressed in their papers.



The Destruction of Wire Entanglements

THE DESTRUCTION OF WIRE ENTANGLEMENTS. A SUGGESTED METHOD.

By BT. MAJOR R. L. MCCLINTOCK, D.S.O., R.E.

SINCE attention was drawn by the Siege of Port Arthur to the great difficulty which the attack experiences in coping with the wire obstacles of the deliberate defence, and to the very small effect produced on these by even a protracted bombardment with high explosive shell, a good deal has been written both at home and abroad on the best methods of dealing with such entanglements.

Suggestions divide themselves into several classes, which are thus summarized in M.F.E., Section 48, viz. by :--

I. Building a roadway over the obstacle, with ladders, planks, hurdles, etc., etc.

II. Clearing a road *through* it, which may be done in various ways,

- (a). By dragging the whole, or a portion, away with grapnels.
- (b). By cutting the wires one by one with cutters, billhooks, axes, etc., etc. Also with bullets, the wires being caught singly in a special clip affixed to the rifle-muzzle and then cut one at a time by its repeated discharge.
- (c). By cutting the whole breadth of the obstacle *at once* by firing an elongated charge of explosive placed by hand on, in, or underneath it.

To compare these various methods, certain experiments have recently been carried out by the "(Q.V.O." Sappers & Miners at Bangalore, of which the following are the results. The obstacle attacked was the ordinary high barbed wire entanglement, 18 ft. in width, the posts being from 4 in. to 6 in. in diameter and of height varying from 5 to 8 ft., so as to render the upper surface of the entanglement uneven (M.F.E., Section 44).

1. Method I.—Forty men with grapnels failed to produce the slightest effect on the entanglement in a quarter of an hour, except breaking an odd wire or two. Barring an apocryphal case in the South African War, where the Boers were said to have dragged away the entanglement of a blockhouse with the aid of a span of 16 oxen, I have never heard of this method being successful. It is hard to see

how it could succeed, if the entanglement was at all properly anchored down.

2. Method II. (a) and (b).—Two parties, each composed of one officer and 20 men, were pitted against each other at the same entanglement. The one (a) was provided with ladders, planks, etc., etc., to build a road over it, and the other (b) with axes and wire cutters to clear a way through it.

In rather over ten minutes the first man of party (a) made a precarious descent on the enemy's side of the obstacle, the remainder then slowly straggling across the bridge, several falling into the wire on the way. The method seems little suited to prepare a path for assaulting columns in rear, without the bringing up of a quite prohibitive quantity of material.

The cutting party (b), on the other hand, made a clear road three bays (18 ft.) wide right through the entanglement in less than five minutes. This road, of course, remains open for troops in rear. These experiments were twice repeated with practically identical results. The method of cutting the wires with bullets (from rifles specially fitted with clips on the muzzles) was not tried, the requisite clips not being available. This would probably be still quicker; though a trifle dangerous to practise in peace time with more than one man at a time.

3. Method 11. (c).—As to the best conduct of this operation there are a number of varying opinions, regarding (a) the weight of charge necessary per foot run of the obstacle to be cut, (b) the total length of the charge with reference to the width of the entanglement, (c) the best method of making up the charge, and (d) its position in, on, or under the wires. As these are extraordinarily contradictory, I have summarized them in the table shown on next page.

To test these various conflicting views, the following experiments were carried out, the entanglement being of exactly the same type as that mentioned previously :---

4. Russian System (Z).—Jointed plank 18 ft. long, charged with 224 2-oz, dynamite cartridges; or about $1\frac{3}{4}$ lbs. of explosive to the foot run; placed on the ground beneath the entanglement; fired by fuze and detonator in near end. In spite of a perfect detonation the result was a complete failure. The sole effect was the cutting of *two* wires (out of some 36 composing the width of the entanglement) and the scooping in the ground of a furrow about 4 in. deep.

5. Russian System (Z) again.—Same length of charge, but composed of 36 halves of $1\frac{1}{2}$ -lb. slabs of wet guncotton; or about $1\frac{1}{2}$ lb. of explosive per foot run. Placed and fired exactly as before. Again a perfect detonation, and again a most disappointing result, though a little better than before in spite of the rather smaller charge. Eight wires were cut on this occasion, and the furrow in the ground was about 8 in. in depth.

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DESTRUCTION OF WIRE ENTANGLEMENTS WITH EXPLOSIVES.

Comparison of Previous Authorities.

R emarks.		" Best results by Jar" are obtained by placing charge on top of the wires and not underneath.	States that a charge placed on <i>life</i> <i>top</i> , produces only half the effect of one placed in ground underneath.	
Method of placing Charge.	Purked along the ground under the wires.	Thrown across the top of the wircs.	Draggad into posi- tion underneath the entanglement by men crawling under the wire.	The front plank luss small wheels and the whole charge is pushed along ground under the entangle in ent from near side.
Method of making up Charge.	Explosive lashed to a pole, or stuffed into canvas hose.		l'xplosive stuffed into canvas tubes, each 15 metres, long,	Explosive lashed to planks 6 ft, long, arranged to join end to end and so make charge of any required length.
Length of Charge with Reference to Width of Obstacle.	(Not stated).	Do,	Length of charge to be $IS^{"}_{strattr}$ than width to be cut.	Length of charge to be $3-4$ ft, <i>leas</i> than width of en- tanglement, to be cut.
Charge per foot run.	2 Ibs. foot run guncotton.	Do.	"Treble charge" melinite.	zh lbs. pyroxi- line per foot run.
Authority.	M.F.E., § 48 (ii) a	R. E. Journal, February, 1912 (Ideas on Field Works).	<i>R.E. Journal</i> , June, 1912 (Fiench Transculpt),	R.E. Yournal, August, 1912 (Russian Transcript).
Reference Letter.	Letter. W X		>	N

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The Russian system, therefore, in spite of the rather fascinating jointed plank with its wheeled head, must be considered a failure. In any case a defender who had the sense to dig a small trench all along the middle of his entanglement would utterly defeat any attempt to place the charge across its breadth in this manner. These two failures dispose also of the French system (Y), as in that also the charge is laid on the ground beneath the wires. Further, as in this case the charge is made up in canvas hose, it is subject to the additional disadvantage of having to be dragged into place by men crawling under the wires—not a very attractive manœuvre !

6. R.E. Journal, February, 1912 (X).—Charge of $1\frac{3}{4}$ lbs. of wet guncotton (a mixture of halves of 2-lb. and $1\frac{1}{2}$ -lb. slabs) tied along a spar and placed on the top of the entanglement. Charge of same length as width of obstacle—viz. : 18 ft. Result very fairly successful, all wires being cut except five, which were all low down by the ground.

7. Experiment for Length of Charge.—In all the preceding experiments the charge was made the same length as the width of the entanglement to be cut, and carefully placed with its extremities directly above (or below, as the case might be) the front and back edges of the obstacle. The last experiment was now repeated with a charge 1 ft. less in length than the width of the entanglement (*i.e.* 17 ft. as opposed to 18 ft.) to see if there was anything in the Russian theory that the length of explosive might be less than the width of entanglement to be destroyed. It was found that, although the ends of the charge were only 6 in, short of the front and back edges of the entanglement, ment, the four horizontal wires in each of these escaped.

From these results it may be deduced, I think, that the charge must be *at least* as long as the width of obstacle to be cut.

8. The results of a charge placed on the top of the wires having thus been so satisfactory, it might be thought that further experiments were unnecessary. This would be so were entanglements never made of greater width than 6 or 12 ft., as the loaded spar can fairly easily be thrown across this width. But with increasing breadth of obstacle, this manceuvre becomes more and more difficult, till it is pretty well out of the question for anything over 18 ft. wide. The operation of carrying up (probably under fire) an 18-ft. pole loaded with 36 lbs. of explosive, and then hurling it so that it will fall accurately across an 18-ft. wide obstacle might alarm even an expert tosser of the caber.

Also it is evident that a charge placed entirely above or entirely below its work must waste half its energy on the air or the ground, as the case may be. Why not, then, place the explosive *through the middle of the entanglement*, where it can get at its work in every direction? This should at least make for efficiency, and the idea of rainning the charge head first through the side of the entanglement about half way up suggests itself. Unfortunately, in the case of a rough pole covered with guncotton slabs or dynamite cartridges lashed on with twine or wire, the whole affair is bound to be brought up all standing, long ere it is across, by barbs and wires catching in its various crannies and protuberances. Also this lashing on of the explosive is at best a very tedious and unsatisfactory arrangement. Portions of high explosive require to be in close contact to ensure detonation, and however carefully this may have been arranged when the charge was first made up, it is more than probable that several gaps will have appeared by the time the long spar has been lugged across the fire-swept zone and hurled across the obstacle. Also, the mere lashing on of such a charge takes a considerable time.

The problem, then, is how to make up a charge, which :--

- (a). Can be made up quickly in portable sections, which can be put together instantly to any required length at the site of the demolition.
- (b). Will have so smooth an outer surface all over that it can be rammed head first into the middle of the entanglement, and slide over the wires without catching on them.
- (c). Will not shake apart, whatever rough usage the sections get when in transit.

9. Preliminary Experiment.—To fulfil these conditions the use of an 18-ft. length of galvanized water pipe (which happened to be lying near the site of the experiments) suggested itself. True, it would not fulfil condition (a), but this could be arranged later. It promised to meet conditions (b) and (c) admirably.

Accordingly this pipe was plugged up at one end and 2-oz. dynamite cartridges dropped down it in packets of four at a time, being rammed at intervals with a bamboo, until it was full. It took 60 of these packets, or 30 lbs. of dynamite, which work out to about $1\frac{3}{4}$ lbs. to the foot run. (Note that this is the same charge which proved a complete failure with the Russian system). The loaded pipe was brought up by four men and rammed right through the middle of the entanglement with the greatest ease, being rested on the wires and slid across them. The charge was then fired by fuze and detonator fixed in the rear end.

A most violent explosion resulted, every wire in the three bays crossed by the pipe being destroyed, as well as about two-thirds of those in the bays adjoining on either side. Several of the 6-in. diameter posts were snapped off at the ground level, and others splintered. This part of the entanglement, in fact, was an entire wreck.

Satisfactory as this experiment was as regards the demolition, yet the pipe was rather too heavy and unwieldy for use in service conditions. Also, after the explosion the air was full of jagged bits of iron for quite a long time, some of them falling over a quarter of a mile away. Although this would not matter much in war, as these would be no more dangerous than the rifle bullets (of which there would probably also be a good many in the air during these operations), yet it is rather to be deprecated in peace time practice. So the following apparatus was designed to meet these two objections.

10. The "Bangalore 'Torpedo.'"—From the drawings (vide Plate) it will be seen that this is made in sections, the unit being a tin tube 6 ft. 6 in. in length, and of $2\frac{1}{2}$ -in. diameter; all the units are absolutely interchangeable. One end of this tube is closed with a flat bottom (S), like that of a jam tin. The other end (T) is open and fitted with an external sleeve or socket projecting another 8 in., into which (if desired) the closed (S) end of a similar tube can fit closely (vide Fig. 1). A number of such unit tubes can thus be fitted together to any required length (vide Fig. 2).

If dynamite cartridges (made up in packets of four abreast) are dropped into such a tube (which can be done very quickly), it will take 23 packets, or rather over $1\frac{3}{4}$ lbs. to the foot run. Its explosive length is now 6 ft. 6 in., and this can be increased to 13 ft., 19 ft. 6 in., and so on by fitting together as many of these unit tubes as may be required. The closed end (S) of each tube butts tightly up against the explosive at the open end (T) of its predecessor. If the system is then fired from the last end left open, the whole will detonate as the tin bottoms of the tubes offer no obstacle.

Obviously, such a "torpedo," composed of as many unit tubes as may be necessary to give the required length, having nothing on its smooth outer surface to catch on the barbed wire, can be run in any direction through the thickest and widest entanglement, sliding on and supported by the wires themselves.

11. Ignition, etc.-It has been stated that the 6-ft. 6-in. tin tube is the unit of the system. To each unit, however, two other accessories are provided, to facilitate transport, placing and firing. These are "The Live Handle" (C, Figs. 1 and 5), and "The Nose" (B, Figs. 1 and 3). The former is provided, firstly to close the open end (T) of the tube during movement and prevent the explosive falling out; and secondly, to contain the means of ignition of the charge. (For reasons which will be evident later, every unit tube is provided with independent means of ignition). This handle is just a rough piece of dealwood, about a foot long, and of diameter sufficient to fit fairly closely into the sleeve or socket on the (T) end of the tube. In one end of it a recess is hollowed out with a chisel (Figs. 4 and 5), large enough to contain a single dynamite cartridge, with fuze and detonator in place, the latter being carried to the outside through a groove in the wood. The other end of this cartridge, therefore, when the handle is in place, will press against the top of the explosive in the tube, and so serve to detonate it when itself fired by the fuze. A removable safety pin (large nail, or stiff piece of wire) which runs crosswise through the handle and socket, prevents the former from falling out during movement.



The "Nose" (Fig. 3) is a cone-shaped piece of wood fixed in the end of a tin socket a few inches in length, and just wide enough to fit over the (S) end of a unit tube. When thus fitted, the "Nose" enables the front end of the "torpedo" to force its way through the intricacies of a thick entanglement with greater ease than would the flat end of the unit tube. It can be pulled off and discarded in a moment. The weight of one unit tube (empty) with handle and nose is about $\$\frac{1}{2}$ lbs., when made of block tin.

12. Method of Placing the "Torpedo" (Photo 1).-Each man of the demolition party sets out armed with one unit tube, with the live handle fixed in one end, and the nose fitted over the other. The total weight of such an unit tube (loaded with 12 lbs. dynamite per foot run) is just over 21 lbs., an easy burden. On arriving at the obstacle its width will be seen; it is unlikely to be ascertained previously by any form of reconnaissance. Should it be no more than (say) 6 ft. wide, all that is necessary is to ram as many unit tubes as possible individually through it, light the fuzes and await results; each tube is complete in itself with its own means of ignition ready for use. If, however, the entanglement proves to be (say) 18 ft. in width, the first man up rests the nose of his tube on the wires at a convenient height and rams it in up to the socket, pulls out his handle and discards it. The next man pulls off and discards his "nose," fits the (S) end of his tube into the socket of No. 1, pushes forward the (now) 13 ft. long torpedo into the entanglement again up to the socket, and likewise discards his handle. Similarly, No. 3 throws away his "nose," inserts his tube into the socket of No. 2, and shoves the (now) 19 ft. 6 in. of torpedo right through the obstacle (vide Photo 2). The head of this last tube is left in, the fuze ignited, and the whole torpedo thereby detonated.

13. Result.—The accompanying Photo No. 1 shows the three unit tubes separately; No. 2, the complete torpedo formed by them in position in the middle of an 18 ft. wide entanglement; and No. 3, the result of firing it. As can be seen, this was entirely successful, every wire across the whole width of the obstacle being cut, and an absolutely clear passage left. The tin envelope was apparently pulverized by the explosion, and no pieces of any sort were thrown about. The assaulting party might have waited in perfect safety within 100 yards of the explosion.

14. Conclusions.—From the foregoing experiments the following conclusions may be drawn :—

- (1). That $1\frac{3}{4}$ lbs. of explosive per foot run, placed *under* the wires on the Russian or French systems, is a failure.
- (2). That the same charge laid on the top of the wires on the English system is considerably better, but very difficult to make up, carry, and place for wide entanglements.

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- (3). That the same charge when run through the centre of the entanglement is most effective, and when made up on the "Bangalore Torpedo" system is both quick to load, and easy to carry up and place.
- (4). Whatever system is adopted, the length of the charge must not be less than the width of entanglement to be cut.

15. Materials Required for the "Bangalore Torpedo."—The tin used to make the tubes should be preferably block-tin sheets, if procurable, as such tubes will stand a lot of rough handling. Failing this, however, the ordinary kerosene oil tin, the ration biscuit tin, or the S.A.A. box lining will do very well. Three kerosene oil tins are required for each unit tube, and an ordinary tinsmith can turn them out with ease and celerity. In the above experiments the tubes were made of kerosene oil tins. Table B gives, from actual experiment, full details of time, labour, cost, and material in the production of these tubes.

16. Use of Other Explosives.—The unit tubes are made $2\frac{1}{2}$ in. in diameter as it is found that this size will take either four 2-oz. dynamite cartridges abreast (about $1\frac{3}{4}$ lbs. to the foot run), or exactly 2 lbs. to the foot run of wet guacotton slabs crumbled up and rammed into the tube. When guacotton is used, a 1-oz. dry primer should replace the dynamite cartridge forming the means of ignition in the handle.

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DETAILS OF TIME AND MATERIAL REQUIRE	Detaik.	Carpenters' Hork. Making handles, and cutting same to receive detonator cartridge and fuze and fitting to take with	Ataking puses. Making noses. Material [Deatwood for handles, 3	Tinsmiths' Work. Tinsmiths' Work. Adaking tube, one end closed, and fixing connecting socket other end. Fixing socket to nose for end. Fixing socket to nose for making wire pins for securing handle to tube.	('l'inslicets, double, 20"×14", for tube, etc.Solder for tube, etc.Solder for tube, etc.Tacks for fixing nose to in hand.Wire for pins securing handles to tube.

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THE DISPOSAL OF SEWAGE FROM BARRACKS AND CANTONMENTS.

By CAPT. M. G. TAYLOR, R.E.

INTRODUCTION.

THE question of the disposal of the sewage of barracks is one which crops up periodically and becomes very serious when new barracks are built in the open country. Usually in such a case a civil sewer system is not within reach, and some method suited to the exigencies of the case must be adopted to dispose of the sewage. An attempt has therefore been made, in this paper, to summarize the various methods which have been adopted by towns to deal with their sewage, and to deduce from the varying success attending their efforts, how modern practice can be applied to the special case of barracks.

The theoretical aspect of bacteriology, as far as it concerns this subject, has perhaps monopolized rather a large proportion of this paper. It is, however, considered that, as the making of a suitable design of sewage works depends so largely on the application of first principles to every individual case, too important a place can hardly be given to bacteriology, which is the backbone of the whole subject.

Statistics have been as far as possible avoided. Figures are available for nearly all points which must be considered, but they are proverbially misleading, and as a rule convey but little real information. Some practical hints for the design of works are given. These are the essence of the experience of many practical civil engineers, who have given years to the satisfactory solution of the problem of the disposal of sewage, and good results can hardly fail to be obtained if they are applied to our special case of barracks.

The aim of this paper is to prove that sewage can be disposed or effectively and cheaply nearly everywhere, but that a method which gives good results in one place is not suitable in another.

"Sewage" may be taken to comprise a certain portion of the refuse of a community. "Refuse" generally consists of a large number and variety of articles of which the following are representative :—ashes, cinders, breeze, rubbish, soil, filth of all sorts, refuse from trades and

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factories, dust, mud, road scrapings, ice and snow from streets; all these things have been found in the refuse of one single town, and those of them which are carried through sewers by water form "sewage."

An analysis of such sewage, which is an average town sewage, would give approximately the following figures :---

Out of every 100,000 parts of raw sewage

Solids in suspension	• • •	•••	•••	•••	44.0	
Solids in solution			•••	•••	72.3	
Total solids	•••	•••	•••		-	116.0
Chlorine		· • • •			10.0	ŕ
Ammonia (free or in s	alts)				6.7	
Organic or "albument	oid " a	ummonia			1.8	

By far the most noxious of the constituents are the organic matters, both in suspension (forming half the total), and in solution. If sewage containing organic impurities in considerable proportions be discharged direct into a stream or river, pollution of that stream is a certainty, and such pollution would be a grave source of danger to all animal forms of life near or in the stream. Since, however, it is clear that the sewage of a community must be got rid of, it follows that before ultimate disposal it must be purified to such a degree that the danger of pollution is minimized. Compare the following figures taken from a fair sample of effluent after treatment with those given above for raw sewage :—

Out of every 100,000 parts of effluent

Total solids			- • •	•••	•••	88.3
Chlorine	•••	•••	•••			10.2
Ammonia (fre	ee or i	n salts)	•••			1.2
Organic amm	onia		•••			.15

It is evident that nearly all the organic matter has disappeared, and that therefore the impurities which are objectionable have mostly gone. This effluent would be practically safe to discharge into any moderately-sized water course unless it contains some poison in inorganic chemical form; as this form of impurity is always due to the discharge from chemical works and certain trades, which are not likely to be present in barracks, it need not be considered here.

If the sewage of barracks or cantonments can be purified to the extent shown by these figures without too great a cost, it is well worth while, in the interests of the health of troops, trying to adapt some method and to deal with the matter on a small scale, even as the large towns are now dealing with it on a large scale to improve the health of their populations.

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Whatever may be the particular method adopted, the underlying principle of the disposal of all sewage is the action of bacteria. Certain other agencies, higher forms of life than bacteria, such as worms and "podura," have also their particular functions in the destruction of putrescent matter, but the chief and final agencies are bacteria. In order to understand how these agencies effect their work, it must first be explained that bacteria are of infinite variety. They are minute living organisms multiplying at an enormous rate in favourable conditions, dying at an equally high death rate under adverse circumstances. Some are disease germs, others not only harmless but absolutely necessary and beneficent to higher forms of life, and these latter form by far the greater number now known. Bacteriology is still in a very imperfect state, but it is already made fairly evident that many reactions of an organic nature, which a few vears ago were considered to be purely chemical, are in reality due to bacteria. Bacteria are exceedingly minute. From observations it has been computed that somewhere about 7,000,000 exist in one cubic centimetre of London sewage collected at Barking. This same sewage after treatment is found to contain less than 1,000th part of that number, and of those still present very few are harmful. As far as sewage disposal is concerned, the bacteria engaged in the task of purification divide themselves apparently into two main classes, to which the name of "Anaerobes" and "Aerobes" have been given. "Anaerobes" exist without air, and work best where air has no free access. "Aerobes" on the contrary require air and die if deprived too long of it. Anaerobes and aerobes can work together under identical conditions for a time, but as the natural conditions for each class are so antagonistic, one class will eventually survive to the exclusion of most of the other, and the result will not be satisfactory. Both aerobes and anaerobes exist everywhere, and it is not only in sewage but throughout the whole surface of the land that the effect of their work is visible, as, for example, the destruction and assimilation with the soil every autumn of fallen leaves.

Anaerobes work by putrefaction, aerobes by oxidation of the products of anaerobes, but there are again other bacteria which are neither anaerobes nor yet aerobes, but are midway between. The action of these continues whether there be air available or not, and they possess to a slight degree in themselves, both the power of putrefaction and that of oxidation. These "Facultative Bacteria," as they are called, are not very numerous, and do not carry out a large proportion of the work to be done. Their existence is interesting, however, mainly as explaining how nature arranges for the disposal of sewage under conditions which on the face of it appear unsuited to the continued existence of either aerobes or anaerobes.

Practically all organic matter is composed of hydrogen, carbon,

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oxygen, and nitrogen, and the work of bacteria in disposing of sewage has been summed up as follows :—" The nitrogenous matters are resolved with either the production of amnonia, the oxides of nitrogen, or possibly the evolution of uncombined nitrogen. The oxygen and hydrogen . . . are recombined into water and the carbon becomes carbon dioxide . . ." This explains how it is that the sewage after bacterial treatment is so harmless, consisting as it does of merely inorganic compounds and elements.

Anaerobic action has the great power of clarification by liquefying the solid organic impurities which are held in suspension. Thus if the sewage be treated by anaerobes alone after the inorganic solids in suspension have been removed by some mechanical means, the resulting effluent is quite clear; but since anaerobes work by putrefaction, the effluent is highly obnoxious. Further treatment by aerobes oxidizes the obnoxious matter, and hence the effluent resulting from the double treatment is, to a large degree, pure and harmless.

The methods in use at the present day, which are practical applications of the bacterial theory, are :---

	(a). C	Marifica	tion.
Mechanical Process			Screening. Sedimentation. Precipitation.
Anaerobic Process			Liquefying or Septic Tank.
	(b).	Oxidal	ion.
Aerobic Processes			Broad Irrigation. Land Filtration. Contact Beds. Percolating Filters.

Each of the two main stages, viz.: Clarification and Oxidation may be effected by any of the four distinct processes in each stage, but it is usually found that the best results are attained by works which contain a combination of processes best suited to local requirements. For example, it used to be considered that where towns were situated on the coast, the mere discharge of the raw sewage into the sea at a sufficient distance from the foreshore was all that was required, and this is still done at Aberdeen where circumstances are more favourable than usual. It was found however in most such cases that, while parts of the sewage floated and other parts sank, the former, by reason of the tide, fouled the foreshore, and the latter formed mud banks, which when uncovered at low tide became offensive. Fish, too, abandoned the locality,

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spoiling the livelihood of local fishermen. The idea therefore of discharging raw sewage into the sea must as a rule be abandoned. This is especially the case for coast barracks where the men are in the habit after work, of wandering on the beach and picking up shell fish. Similarly, riparian owners soon object to the discharge of raw sewage into rivers, and this, as a matter of fact, is now made illegal. The question assumes a very serious aspect when neither sea nor large rivers are available, and where resort must be had to soakage into the land.

Of the clarifying process enumerated :-

Screening consists in passing the sewage through a strainer formed by iron bars, woven wire screens, or perforated metal in order to remove all coarse floating débris. Screens must be continually raked clean and the débris burnt or treated with the ordinary refuse.

Sedimentation consists in allowing sewage to stand in a tank undisturbed. The heavier solids in suspension will sink by reason of their greater specific gravity, and can be eventually cleared away from the tank bottom. The specific gravity of the majority of these solids is nearly equal to that of the sewage, hence the process is very slow and is now generally only used to remove road débris. The mud which forms is chiefly inorganic and therefore is not very offensive.

Precipitation consists in adding to the sewage, collected in a tank, chemicals which form a heavy precipitate with water, such as limewater and persulphate of iron. The precipitate falling to the bottom entangles and carries with it most of the finely divided particles of solids held in suspension. Precipitation will clarify to a greater degree than plain sedimentation, and it acts faster, but the process has the disadvantage of increasing the bulk of mud, or "sludge" as it is called, by the large amount of precipitate formed. The disposal of the sludge can usually be effected by burying, or it can be used as manure for which it has a certain value.

Liquefying or Septic Treatment is now generally accepted to be the best of the clarifying processes, and consists in the anaerobic treatment of sewage in a tank, whereby the organic solids in suspension and also in solution are broken down by the action of anaerobes. A quantity of gas is liberated by this action, which, rising to the surface, stirs up the sludge and puts an end to sedimentation. The effluent from a septic tank is offensive, but the sludge is practically *nil*, and what there is, is entirely inorganic and presents no difficulty as to disposal.

The following are the oxidation processes, which are applied to the effluent under treatment by one or other of the clarifying processes :---

Broad Irrigation, sometimes called Surface Irrigation, which consists

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in applying the effluent sewage to the surface of suitable land upon which crops of rye or roots are grown simultaneously with the applications of the sewage. The idea being that the aerobes in the surface soil oxidize the sewage, which is thereby rendered suitable for assimilation by the crops. The land for this system of treatment requires a good deal of preparation, and since it is only possible to discharge the sewage whilst the crops are actually growing, the process can only be carried on during a limited portion of the year. A light alluvial soil, which is fairly porous, is the best land for broad irrigation, and in order to drain the subsoil water away so that the sewage may thoroughly soak in, and so that the aerobes may get plenty of air, a rather complete system of underdraining by agricultural pipes is usually necessary. The cost of this system, combined with the fact that a large area of land per head of the community drained is required, makes it rarely possible to use this system for barracks.

Land Filtration is a system whereby an area of light sandy land is flooded intermittently with the effluent, which soaks through and is oxidized in the process, being drained away as a final effluent by a system of underdrains. The essential difference between "Filtration" and "Irrigation" lies in the growing of crops, and in the fact that the former may be used on land which is too light to support vegetable life. If the soil is very light and porous, and the sewage dose be well distributed, the land will usually be able to receive a dose every two days, and it is allowed to dry and become aerated between each dose. This necessity of quick drying makes it imperative to be able to carry off the final effluent quickly, so that a more complete system of underdrainage is required for filtration than for irrigation, with a proportionate increase in cost per unit of area, though the total area required for a given quantity of effluent is not so great. Like irrigation, this is a system that can rarely be applied to barracks, although local considerations may make it a possible solution.

Contact Beds are artificial bacterial beds. The process is, in principle, that of land filtration, but a medium is provided and conditions generally arranged to encourage the multiplication of aerobes. The bed is formed into a tank, and the effluent is quickly run in and allowed to rest for a period long enough for the aerobes to do their work of oxidation. It is then quickly run off, and while it drains away through the media it draws air in to aerate the bed. When empty the bed is allowed to stand so for as long as possible, to complete the work of aeration. It will be noted that while a dose of sewage is being treated, and the tank is full, the aerobe is actually working under anaerobic conditions. For a limited space of time the aerobe does not seem to object to this, but it is most essential to thoroughly aerate the bed after a treatment, otherwise the aerobes would most certainly suffer. It is found that if a tank rests full for about four hours, the work of purification will then be complete, and it is usual to arrange contact beds in such a manner that they will receive one dose of four hours duration per diem, and that aeration shall continue for the remainder of the twenty-four hours (after deducting the time occupied in filling and emptying, which is practically time wasted). It is not advantageous to give a longer period of aeration than this, for the reason that food is as essential to the aerobe as air, and lack of sewage means starvation, with a consequent deterioration in the efficiency of the contact bed.

Percolating Filters are similar in most respects to contact beds, but differ in the methods of operation. They consist essentially of a tank filled with a medium and arranged with an underdrainage system to take away the final effluent. The sewage is slowly and most carefully distributed over the whole surface of the filter, and is allowed to percolate past the media continuously, and drawn off as it collects in the underdrains. In this way the filter is constantly aerated, so that the aerobes are working under conditions more favourable to them than is the case in contact beds. The distribution is. however, very important to their efficient working, and many mechanical devices are on the market to ensure this. Some of these distributors are worked by the fall of the sewage itself, either as a "Barker's Mill," or water wheel, and some by exterior power. For large filters, the choice of distributor presents difficulties, but for small tanks distribution is adequately secured by means of some such device as the "Stoddart" distributor. This consists of corrugated iron sheets covering the media, perforated in the upper edge of the corrugations, and having nails let in at the bottom edge at equal intervals from the points of which the sewage can drip. In connection with this problem of distribution, it has been found that the path of a liquid, percolating through a fine medium-like sand, is not vertically down from the point of application, but follows a parabolic path and so tends to distribute itself laterally as it falls. In small tanks, such as those for a barracks, efficient distribution would therefore be secured by running the sewage on to the media by means of distribution shoots, taking care that not more than two-thirds of the surface of the filter is covered at one time. The media must be fine for a depth of a few inches from the surface. Even better results may be secured if the sewage is shot on in small intermittent flushes. by means of an automatic tipping bucket, or by syphons like those in the usual flushing cistern of a water closet.

As regards the medium itself, the following considerations govern the choice of material most suitable for use. As the aerobic conditions require plentiful aeration, and as the effluent treated is only that portion in contact with aerobic organisms, and further as the growth and strength of the aerobic colonies depend on the quality and area of the surface of the medium, it follows that medium must:--

- (1). Have plentiful interstices for the admission of air.
- (2). Present a roughish surface for aerobic foothold.
- (3). Present as large a surface as possible.

Media must therefore be of some strong hard insoluble material, not liable to disintegration into dust, nor liable to "pack" into a solid mass. The individual pieces should approximate to a cube in shape. The following materials have been used with varying success, and many other similar materials are available in various parts of the world, which would doubtless give equally good results.

- (1). Burnt clay—not very good.
- (2). Coal—rather dusty but has the curious property of producing a good effluent from the commencement of action, while all other media require maturing. It is usually too soft.
- (3). Coke-too light, and is liable to shift by flotation. This movement causes grinding, and dust in formed.
- (4). Gravel-well washed and screened gives fair results, but is rather smooth of surface.
- (5). Slag—if carefully selected gives good results, but no traces of sulphur or lime must be present, or the material soon disintegrates.
- (6). Sandstones-are too soft and dusty.
- (7). Granite--carefully washed free from clay and dust is excellent. Flat dressings from large blocks are not good.
- (8). Furnace clinker—excellent, if of the hardest quality. It should not weigh much under 18 cwt. per yard cube. Lighter clinker is too soft.
- (9). Saggars, or broken crocks-very hard, and give excellent results.

In filling contact beds and filters, care must be taken to grade the media so that the largest material is at the bottom and the finest at the top. As a rule good effluents are obtained from media $\frac{1}{2}$ in. to I in, cubes at the bottom, and grading to $\frac{1}{5}$ in. to $\frac{1}{2}$ in. at the top.

Having considered the various methods in use at the present day, the next matter is to run through the principles which govern the size of any proposed sewage disposal works.

The most important factors are the volume and composition of the sewage. As to the volume, the whole matter depends on :---

- (a). Whether storm water is discharged into the sewer system, or by separate sewers.
- (b). Whether there is an unlimited water supply to the area drained.
- (c). The number of the population served.

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In towns, storm water is as a rule discharged into the sewers, because the matter brought down from back yards, roofs, streets where there is much horse traffic, cabstands, and so forth, is usually as foul as ordinary sewage during the early stages of rainfall. Besides this, a certain section of the population is not cleanly in its habits. In barracks, however, cleanly habits in yards and cookhouses are enforced, and there is little horse traffic, so that the storm water is not so foul. Where the disposal of barrack sewage is to be a matter for the military authorities to undertake, it would appear advisable to have a separate system of sewers for storm water, and to treat the discharge from these at the outfall as being pure. It is evident that if this course be not adopted, the quantity of sewage which must be treated at the disposal works will be greatly increased, and to cope with the possibility of heavy rainfall, the works must be much larger and consequently more costly. It is, as a matter of fact, calculated that a rainfall of $\frac{1}{30}$ in. per hour will, if the population is of average density, multiply the usual sewage flow by 5. It is easy therefore to see what heavy work the sewage works are subjected to by a bad rainstorm. Now since sewage is brought down by water, it will in volume bear some relation to the water consumption, as practically all water used eventually goes to the sewer outfall. In barracks this will probably be from 15 to 25 gallons per head, and from this the approximate quantity of sewage to be expected is readily calculable, and a figure is arrived at which is called the "dry weather flow." Now this figure is the unit upon which all the calculations as to size for the disposal works must be based, and it is usual to allow for twice the dry weather flow. If it is proposed to use existing sewers, which may be old and leaky, the dry weather flow may be increased by as much as 50 per cent. by the leakage into the sewers of the subsoil water, and allowance for this extra volume must be duly made.

As to the composition of the sewage, a small number of gallons per head means a strong sewage, and short sewers mean fresh sewage, so that it may be assumed that barrack sewage will be strong and fresh, and consequently very offensive. This will affect the choice of site, but not necessarily the choice of method.

The choice of method to be adopted, for any particular barracks, is so affected by local considerations, that it is quite impossible to definitely say which would give the best results. If the barracks are by the sea, or by a large and rapid river, it may be sufficient to clarify by sedimentation, or possibly by septic treatment, and then to run the effluent without further treatment into the sea or river, having first made careful observations of the currents, but this will depend on whether the foreshore or banks are thickly populated. It is never good to discharge a foul effluent on the flood tide, but a storage tank should be provided and the whole discharged between first and half ebb. Land treatment may be possible abroad, where large areas of thinly populated land of a suitable character are handy, while if the level of subsoil water be of a good depth and there is no danger of well pollution, it may not even be necessary to underdrain. Undoubtedly the most complete and satisfactory way, where existing sewer systems are not available and where barracks are badly situated for land treatment or sea disposal, is by a septic tank and percolating filter, provided good media can be obtained locally. After treatment in this way the effluent is quite harmless, and can be discharged into any small water course, or even by mere soakage in the open country. The following formula and rules should be observed when designing the works :—

(i.). Allow 16 hours tank treatment for all sewage in septic tanks.

(ii.). Draw off the septic effluent a few inches below the surface by means of a floating arm arrangement, so as to leave undisturbed the scum which forms.

(iii.). Arrange baffle plates to check the flow through the septic tanks.

(iv.). The floor of the septic tank must have a fall to a sump pit to collect the sludge.

(v.). Divide the septic tank into longitudinal compartments to facilitate cleaning.

(vi.). For percolating filters allow 1 yard cube per head of population. Pay great attention to distribution.

(vii.). Make filters shallow, from 6 ft. to 7 ft., if the area is available, in order to ensure thorough aeration.

(viii.). Divide the whole area of filter required into several small filters so as to allow all filters to be worked at a uniform rate, and to make provision for resting an overworked filter.

(ix.). If possible subdivide each filter in order to admit of screening and washing the media of any section, if it becomes clogged.

(x.). Always provide a small detritus tank where the raw sewage may be screened, and the heavier materials in suspension may be deposited.

(xi.). Provide ground where the sludge from the detritus and septic tanks may be buried in shallow trenches. Deep trenches are useless as aerobic action in ordinary soil usually ceases at a greater depth than 4 it. 6 in.

The whole subject is of so vast a scope, and covers so much ground that it is impossible to give more than the general principles, which in every case must be applied in the manner best suited to local requirements. Types could of course be given, but to give a type of sewage works with the idea of reduplicating wherever required is quite useless. Many bacterial works are now in existence, and much could be learnt by visiting them, but no good can come of slavishly copying them on a smaller scale for barracks, and, if this course were attempted, failure would be the result in the majority of cases. However a diagram plan and section is attached (see next page), showing works similar to those that might be required for a barracks for two battalions, and which were actually constructed at the Naval Barracks, Shotley, Essex, for a garrison of 2,000. The diagram is not given as a type, but it shows a convenient arrangement of a septic tank and percolating filter installation, on a small scale. The works in question have given every satisfaction.

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THE DIARY OF TWO NOVICES IN NYASALAND. (Concluded).

By LIBUT. J. BENSKIN, R.E.

Saturday, 1st October.—A long long day was spent walking after the old spearman's spoor, which when picked up turned out to be quite 30 hours old. With the usual native politeness, the immediate desire to give pleasure had induced the old fellow to consistently lie. We lunched somewhere near Chelinda, wandered on to somewhere close to our first day's adventures with elephant, and only reached camp in the dark, completely done up; however, on finding that the boys had in our absence built us two neat little grass shelters as a bath room and a kitchen we cheered up again, and began to organize proper search parties amongst the boys for the next day's work.

Sunday and Monday, 2nd and 3rd October.—Fish was still fit to go on for another walk and went off with his own boys, but I was badly in need of a rest and spent a lazy day making the Tenga-Tenga clean up our gear and cut our hippo hide into decent whips. I also had the tails of the few beasts which we had killed mounted on hard wood handles, and spent a happy hour or two in my pyjamas and bath slippers directing Littlejohn in his efforts to catch me butterflies. Littlejohn had improved, and no longer used to bring me a handful of wingless butterfly corpses and then stand waiting to see me eat them, and by then knew that I was merely a madman who would only keep a butterfly if it were pretty. Even a butterfly had been to his mind only another form of Nyama—game, meat or flesh.

Just before Fish returned at mid-day we had a visitor, the nearest chieftain and rather a famous person, being the son of that Makanjira who had given so much trouble in the rebellion days. He seemed a gloomy man and actually refrained from bringing a present on that his first visit to us, but having an eye for the future he offered to send out his best boys to definitely locate any big elephants in the district.

Fish had just cleaned himself and was also feeling comfortable in his pyjamas when another visitor arrived—a runner in hot haste this time. At a village named Ligwena, close to Chelinda, three big bulls had spent the previous night trampling down the native lands. Undoubtedly they were still there, said the messenger, for the chief had heard of our presence and had forbidden anyone to remove the elephants. Within 10 minutes we had our gun bearers and water carriers with John and the old man cantering off to Ligwena, and were ourselves soon following on the jingas, our hearts bursting with renewed hope. Ligwena's chieftain was unlike the son of Makanjira; for he proved to be a fat and cheery old gentleman, courteous and wreathed in smiles; "Of course the elephant still were there" and then we gradually understood how at six o'clock the previous night three bulls had indeed been in the village mealie lands—the spoor proved it—and also how the entire village had shrieked, waved torches and beaten tom toms at one edge of those crops for many hours of the night. No one had seen the elephants depart, and needless to say no one had been into that thick bush on the other side to see—of course they were still there.

As usual we followed the spoor. By 5.30 Fish, who had been out all that morning, was finished, leaving me to carry on alone, for I instinctively felt that the elephant would be caught up somewhere. After going back to Ligwena for his bicycle, he only succeeded, as I subsequently heard, in reaching camp at all by the aid of burning torches.

As the dusk fell we halted and got ready to spend the night upon the trail. Wood was collected to make a fire, and the four boys and myself lay round it in a circle ate a little food and were ready for sleep. That night alone under the trees and away from even the civilization of a tent can never be forgotten. For hours one heard the soft murmur of the natives' voices, until only a gentle rustle or the strange cry of some creature broke the silence, and for the first time came the real call of the bush of great solitary Africa where only a black man can be companion. With nothing on but a cotton shirt and cut-down khaki trousers and a short British warm coat wrapped round one it was very cold, but somehow it did not matter and a sympathetic understanding taught one to gaze silently like a native for endless time into the flickering light of the wood fire.

At early dawn we were on the move after a run round to make the body fit, and after being led for about an hour towards the lake found the old spoor crossed by the same bulls' tracks fresh from their wanderings of that very morning. Elephant almost always rest during the midday heat and we felt certain of catching them up, but the meeting came earlier than was expected for at 8 o'clock we came upon quite warm dung and once more heard and smelt the animals. John was made to carry my little gun and the two of us began to creep up to where the bulls were hidden, leaving Simbota and the old man nearly weeping with distress behind.

Then John went completely mad; the wretched nigger began to shake with frenzy and rapidly crawling forward with a silence which I could not hope to copy, quickly left me quite 8 yards behind. I did not dare to speak and was inwardly bursting with rage when he





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suddenly swung to his right and pointed with my shaking rifle right up into the tree branches. It was indeed a frightening sight when I got beside him, for less than 20 yards off and down a widening broken-down patch, but 6 ft. wide at its entrance stood a huge bull motionless with upraised trunk directly facing and looking straight at John. His tusks were worn and yellow and very thick, of weight well over 50 lbs., quite a big elephant in fact for little Nyasaland where one does not get the heavy ivory of countries further north. Just behind the bull there was a big baobab and under it still leisurely fanning themselves were two other smaller bulls one of which I noticed had only one tusk.

John was positively shuddering with excitement, and could just hiss at me to "Shoot, Bwana, shoot. He charge !" But I did not dare to, felt unsure of the frontal shot, and fearing that every second the native might fire I very very slowly seized his right arm and dragged him after me to behind the bushes and crept a few yards to the right from where I hoped to get a certain side shot at the brain. In a few seconds a good spot had been reached, and the rifle was just being raised, when the bull made a half charge and I snapped at his brain. With a crash he fell sideways and was up again bolting away; again I fired straight at his tail and again he fell forwards, rose and disappeared into the trees.

Then there took place one of those incidents which always seem to occur with every sportsman at any critical moment, the rifle jammed and in no way could the breach be closed. The moment did seem rather critical as the other two bulls made a complete circle all round us smashing through the small trees and I expected them on top of us every moment. What need to say that John had emptied the Mannlicher, at the one-tusked bull he afterwards said and because he mistrusted its single tusk, but more probably into the air. Whilst still trying to close the breach—some sand must have got between the bore and the rim of the cartridge, the rifle never failed at any other time, I found the old man leisurely offering me the two empty brass cartridges, and Simbota came up delighted because the one-tusked bull had "looked" at him from 5 yards off.

On pacing the distances to where the brute had fallen it showed that the shots had been fired at 16 and 22 yards range. If only John—but regrets were no use, and his excitement was soon very satisfactorily sobered.

The spoor was easy enough to follow this time, with spurts of blood on the branches above our heads, and in several places the poor beast's droppings, stained a dark red. We expected to find him at every turn, and twice did we come upon clear proof of the tales that elephant will help each other. The wounded bull had started off alone, and in two different places several miles apart one could see where he had lain down in the shade of a tree and in some sand

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upon his side, and where his two companions had joined him, helped him up, and then the three trails went off together side by side, the outer bulls supporting their wounded comrade. Until late in the evening we followed, encouraged by the boys' assurance that he must be found in time, and luckily the three beasts altered their course and bore north bringing me close again to camp which I reached just as the sun was setting. Fish had been quite near to me in the morning when he heard the shots being fired, and had unsuccessfully tried to find our party in the bush.

Tuesday and Wednesday, 4th and 5th October.—At daylight we were on the spoor again together and twice got to within three hours of the elephant, when we had to stop, first of all to send for water and later on in the evening when it grew dark. Another night was spent on the trail, this time with the comforting companionship of Fish, for some elephant came quite near to us in the night, and some leopards were within a few yards of the fires.

With the dawn we were once more after him until the spoor became lost in that of a herd, which we got close to and found to only consist of cows and young. At times our bull was accompanied by one of his two companions, and by then our boys were beginning to get suspicious of his energy. They had been convinced that he would die on the first day when wounded, and their perplexity at not having already caught him up made them think that there must be some underhand work going on. Why did one at times see the spoor of one bull, and then the spoor of two bulls ?-- Undoubtedly the bull was Mfiti-bewitched. He had been travelling in a huge ring, and we reasoned that he was avoiding the Portuguese country, and might even return to the place where he had been shot. Late in the evening when close to home we again found the spoor on a path just west of the camp, where he seemed to have wished to cross the Chelinda road, but had doubtless been scared by some travelling native.

Thursday, 6th October.—In the night he doubled on his tracks twice for long distances after which he seemed to be still travelling in a circle, so we tried to cut him off, and whilst I followed the spoor, Fish went straight along the Chelinda Road—where we met—with the elephant still walking 12 hours ahead.

I again followed on and Fish cut across the imaginary circle, and again we met on finding each other's spoor close to where I had first hit him, and still the elephant was 12 hours ahead. It had become ludicrous and we were nearly dead when we got to bed.

Friday, 7th October.—We couldn't do any more without a rest but the old spearman was still game, and had stayed out on the trail alone all the night. After staying in camp for the day we got bored and broke every rule by going after kudu in the evening when we saw several cows but never a bull. Long after sunset the old man crawled

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into camp to give us definite news. Not only did he know where the elephant was but far far away he had even seen him--standing still and swaying his body, looking very sick and thirsty. Another chance had been lost—and before sleeping I solemnly vowed that I would go out the next morning and not rest in camp again until I had killed and sat upon an elephant.

Saturday, 8th October .- Camp was quitted at 3.30 in the morning or rather night. The old man led the way walking due north, whilst John regaled me with tales of elephant shooting, and tried to justify the apparent nervousness he had shown when we had first met the three bulls. With soft tones he whispered about the last Bwana whom he had accompanied on such a trip, and of how the Njobvu had charged and managed to catch the Bwana-and how he, John, had found the Bwana and had then "put back the Bwana's face and covered him up with some clean white limbo and made him nice." After that delicate operation John had taken the Bwana's gun and "I mine-selluf I kill-ed the Njobvu. Oh Bwana! We had plenty nyama and plenty fat that night." In fact John was a beast, who seemed to delight in trying to betray our valour of ignorance. Yet one liked him better when he talked of the boys and told one that James and George were rascals, Simbota and Kokwana the very best and truest of natives, and so on with such a lack of self-interest and genuine concern for our welfare that he always won our hearts. Of himself he knew but little, he said he was a Yao, but far too "intelligible" to belong to any tribe or religion in practice, and like every native had no idea of his age.

The old man was still leading when at 8 in the morning I smelt either elephant or else fresh dung, and to the boys' surprise insisted upon a cast around being made to see what it was due to. We immediately came upon fresh spoor of the bulls and soon afterwards the dung; and it was an example of how much keener the European's powers of smelling can be than those of a native. By 10 o'clock we arrived at a kind of kloof with a big curved valley beyond, and on entering it to our delight we heard in the distance the trumpeting of an elephant—in the boys' opinion an infallible good omen.

Soon afterwards we saw a bull. The country was not so thick as usual, and we could vaguely make him out under a tree some 50 yards away; and the old man said that he had also momentarily seen the other bulls with him, one of which was my big one. Stealthily we crept to a bush and an ant heap which gave cover 20 yards off them. Hed and as we were after the wounded one it was only fair. The bull who was nearest was then quite visible and standing sideways on; the wind was imperceptible. John, who was calm for once had crawled to my left and whispered that from where he was crouching he could see the big elephant also, so I tried to take his place, when with a crash the nearest elephant charged sideways, and I fired. The

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first shot killed him. But a furious volley from Fish, myself, and John, who this time did excellent shooting although he would not have been trusted with the little gun had we not been thinking of our faces and of nice white limbo, made trebly sure of him. He was not a big elephant, with only about 30 lbs. of ivory per tusk, but that was worth \pounds_{30} in cash and so quite worth getting. My shot had hit him in the brain and he had merely collapsed down on to his stomach, doubling up his legs so that he still appeared alive. Then began the song of triumph, when all the boys danced on his back and posed to have their portraits taken, and John sang his soft-toned song of "Nyama," "Nyaaama" in a cruel falsetto and broke out into more fearful tales of native life. This time he talked about the excitement of cutting up an elephant and the pleasures of getting inside an elephant, and he told of the boys inside having a hand cut off or being killed by mistake by the boys outside, when all were hacking and sawing together. Indeed Nyama is the open sesame to the heart of savage Africa.

Only the faintest glimpse of the other two bulls had been obtained, when they had plunged across our front, and the big wounded one was still running free. We followed at once taking the old man to track for us, and left behind a happy John beaming with joy at the prospect of enjoying himself unseen and inside the elephant. For hours we walked, lost the spoor, picked it up again, wandered on to the west till we reached a spot 5 miles north of Fort Maguire and on the edge of the lake.

A bathe refreshed us a little, but our food porter had strayed, and we had not had anything to eat since 3.30 in the morning, so we made for the village whilst the old man stayed behind to do his best alone. Fort Maguire was reached just as the sun was setting, and there to our relief we found our food which John had sent on with a native's instinct to the right place. In an open shelter by the edge of the lake and on two native hide beds we spent the night, worn to a shred, but at last the slayers of one bull elephant.

Sunday, 9th October.—At early dawn the trusty Kokwana and Simbota jogged back to camp, only 10 miles off, to get our bicycles. We were both feeling rather queer and Fish had a touch of dysentry so the jingas were welcome, but my bicycle seemed to have suddenly become very strangely wrong in the tyres, and I finally had to ride it in on the rim. We rested all day; and in the evening after trying to mend the jinga tubes I gave up all hope and stuffed them with grass instead of air. John came in at nightfall with the ivory, and plenty of nyama to cheer the boys. Our camp was getting foul, and we felt nervous for our health so we decided to move away half a mile, and to only drink Nyasa water, a precaution which should have been taken some good time earlier.

James was responsible in part for our apprehension. Fish would

always trust the rascal for some strange reason and made him

responsible for the filtering and cleanliness of our water. Even the production of the last filter candle broken beyond hope of repair did not destroy that faith, and he continued to irritate John by consulting James on points of importance.

Monday, 10th October.-Nearly every day the local chieftain had sent us news of elephant being close to camp, and he had always proved to be a liar. His news that two big bulls had passed close by in the night seemed doubtful, but sure enough the spoor of one at least was found, and this was followed until 2 p.m. when it crossed the Chelinda road and where it seemed to be obviously looking for its mate. A rest was badly needed, so we sat by the track and speculated on the advisability of sticking to the chase when suddenly we heard the tinkle of a bicycle bell upon the road and that tra-la-la-la native singing which could only mean some traveller was coming by. Then round the trees came a jinga, and on it-James, the faithful mission boy, singing with pride from the proud height of Fish's bicycle, whilst two Tenga-Tenga ran by his side. With a shriek at sight of us James dashed into the bush and into a tree; down he fell and then disappeared. With a hue and cry the hunting party gave chase and after to minutes they all returned, not with James, he had bolted home too fast for anyone, but with only a badly broken bike. So the mystery of my own worn tyres was also explained. John was magnificent. With all the arrogance of a justly righteous capitao in whom implicit faith had not been placed, he lectured us. For long he had been jealous of the trust we had placed in those servants, and now at last he had his chance, and we had to listen to a terrible list of evil-doings. How bicycles had been daily ridden, how handkerchiefs had been worn as waistbands and clothes tried on and even beds laid upon when we had been shooting. "Oh, Bwana, why did you give your keys to James and George ? How could you do it ? Better if you had given them to Littlejohn, for Littlejohn he love you even as I John love you. Why did you give your keys? James and George are no servants who love their masters. What was George ? A Chinde thief ! And what is James ? A Mission boy !"

In any case it was a serious offence and one not to be overlooked, for it struck at the very heart of our hold on the boys. That night we made our servants prisoners. With a small piece of string we tied James' right hand to George's left hand—the other hands were free—and with a few harsh words as to their disgrace expelled them from the companionship of camp to sit alone 100 yards away under a lonely tree until we chose to court-martial them in the morning. And all that evening big John and little John waited on us and tended our smallest wants with a care which had never been equalled, whilst Mother Wilfred popped in and out of the tent bowing and smiling like an anxious Café Royal chef, with on the salver—not some
caneton sauvage or *truite saumonée*—but two fat slices of elephant trunk that stared mournfully at us with four blank holes as eyes. Poor James and George !

Tuesday, 11th October .-- Fort Maguire owned one protector and representative of law and British rule. A single black policeman with a red fez reigned supreme in the district, and before dealing with our culprits we demanded that this dread personage should stand by and add to the solemnity of the court-martial. At 10 o'clock he marched into camp followed at a respectful distance by the village children, stood to attention and saluted. Our followers had never been so tense with interest and excitement during the whole of our Verily I believe that the strength and backbone of our journey. British rule in Africa are centred on the native love for the show and authority of a boma law court. No matter how trivial the case may be, the nigger demands and revels in the full importance of a magistrate's questions, questions which once obtained must be evaded at any cost. The Portuguese have failed to realize this, and so the native ignores them. Litigation of a sort with plenty of talk must of necessity take place somewhere; if the white man fails to play up then their own chief supplies the want to a smaller degree, and rule is undermined.

James and George were still seated under their tree with heads bowed in shame; sheepishly they were led up by the policeman to face us and the inquiry began. Not a particle of evidence could be obtained from a single boy; John stood mute, Littlejohn vanished in search of butterflies, Simbota failed to understand, and Mother Wilfred salved his conscience by shrieking till we turned him out. Something had to be done, for although evidence was not forthcoming all knew of the misdeeds; deliberately we hardened our hearts, asked for our keys and dismissed our servants. The policeman, as one who knew the hearts of every man, was ordered to find two more boys from Fort Maguire before the day was finished.

In the afternoon we went out to shoot and aimed at anything. Something was wrong with both of us, for Fish repeatedly fired his rifle at lumps of earth which he maintained to be wart hogs, and my own efforts though directed at living creatures were all yards from the mark. And we both felt very tired, something was so wrong that temperatures were taken and both were high, mine reaching 101'5.

At sunset the two new servants arrived, men of a very different stamp to our former retainers, both perfect savages but well dressed in long coloured night shirts, quiet and of a dignity which promised well. The old man also came home from his solitary searchings of the previous two days. Again he had seen my wounded bull and again would lead us out to him on the morrow. Before sleeping we had to face a dance and sing-song which our followers had got up in our honour. Some 20 women had been collected and for hours they wriggled and stamped and sang, and our Tenga-Tenga would leap up and bending forward with a hand on each knee moan out some wailing dirge about Njobvu and Nyama straight into our faces, till we "choka'd" them off to their beds. The slayers of an elephant were mighty men.

Wednesday, 12th October.—The hope of killing that big bull alone drew me from my bed, for I started with a temperature of 100. It was a coldish morning with misty clouds overhead and it soon began to drizzle with rain. Everything was unpleasant—but exasperation reached the limit when we found out that the old man had been deceiving us, and when he pretended that he was lost and politely suggested that he had been mistaken in seeing that big wounded bull and only thought he had seen it, we decided to waste no more time after elephant in those parts and to cross the lake to Angoniland.

By 2 o'clock I was back in bed. Fever had begun in proper earnest and my diary was finished.

From Thursday, 13th October, to 16th December.—My own recollections after that day are rather confused, and only a few things stand out prominent. I never felt really ill, but only uncomfortable and very angry at wasting my time. Afterwards there was rather a satisfaction at having gone the whole hog and at having thus sampled a dose of fever, although this illness was only some silly kind of tick fever mixed up with malaria. It made the experiences complete. At one time sleeping sickness was suggested, but that was unreasonable for sleeping sickness was never our way and had not at that time even reached Fort Johnston. One thing is certain and that is that without the constant care which Fish took of me I should never have got home at all, and Fish also had a small go of fever when first looking after me. For five days he dosed me and sweated me and then grew anxious and decided to make a hurried return to Malindi Mission Station, and thence to Fort Johnston where a doctor could be found. First of all a machila was made, but the jog jog jog of the untrained boys grew desperate and at Saidi Mazungu he tried to take me down the lake by night in a dug-out canoe. I can remember that, and also remember that I realized that when once wriggled sideways into the canoe with my head just above the bent-in sides, there was no getting out again. For the first few minutes all went well. It was a clear moonlight evening and one could see a few long crocodile shouts above the water. Then all of a sudden a huge spurt of water, 10 ft. long shot past the bows of the boat at a terrific pace. It was the first scared hippo who had been sitting on shore, and a succession of these torpedoes came so fast that the boys refused to go further by boat.

And I can indeed remember the behaviour of that new servant of mine, Saidi. His doglike care and devotion were perfectly wonderful;

he had never seen me before and knew nothing about me, save that I was his master and sick, and with the first clear proof that I was indeed ill he made his bed on the ground beside my trestle and there lay watching me. Never once did I even stir and not see Saidi leap to his feet, waiting to see what he could get. His wife used to follow our camp from village to village and send us little cakes of native flour, which Saidi proudly produced and which we had to pretend to eat.

On the 20th Fish got me to the hospital at Fort Johnston, where I lay on my back for four weeks and after a hazardous journey alone down to Blantyre, for I could scarcely stand, I went back down to Chinde and home by Delagoa Bay to Pretoria.

Fish hung around Fort Johnston for some days, but nothing more could be done by him so he paid off my boys and went off to M'sanji-20 miles south-whence he sent me daily letters and there fell into some splendid luck. It was well deserved, for up till then his bag through no fault of his had been very small. Lion, rhino, kudu, water buck, impala, wart hog and several smaller buck and servals fell to his rifle within 10 days. Fish, unlike the writer, is not a talkative person (except when speaking Chinyanja) but his tale of his lion was nice. "I was lying down aiming at a wart hog. The beast was 150 vards off at the end of a narrow glade in the bush. Just as I was going to press the trigger a lion and a lioness jumped out of the bush and knocked over the wart hog for me. So I put the bullet into the lion instead. The lion fell down, got up again and both the brutes began to quietly walk towards me. So I plugged again and left him kicking close to the pig, and the lioness then skipped away into the bush. After making sure of the lion I also quietly walked up, when hanged if the lioness didn't jump out again to join her mate, think better of it, bag the wart hog and disappear with it ! Just like a woman wasn't it ?" And then he drowsily finished "I never saw her again." Between us we had done what we wanted to do, and had killed one fair head of nearly all the beasts of those parts. Original plans of trekking across Rhodesia to Broken Hill and of going by train to the Zambezi Falls were useless then, so after making final arrangements for me Fish pushed off to Chinde as fast as he could, and returned vid Beira, Salisbury and the Falls to Potchefstroom which he reached on December 6th. Without that man's help I should never have gone to, nor have left Nyasaland. Let me now thank him.

At the Fort Johnston Hospital I was as well looked after as if I had been in England, and incessant kindness was showered on me from every direction. Boma men, settlers, and missionaries who lived alone many miles off sent books to read, men whom I have never seen sent birds and delicacies to be eaten, the Government promptly despatched a white nurse from Blantyre, and that lady travelled the 90 miles in two days alone, and with only black boys through country where lion may be heard and met on any night. The Acting Governor even cabled that Fish and I might each kill an elephant in the sacred Angoniland Reserve. All these people and many others had merely heard that some fellow who was out for a day or two had had bad luck, and instinctively wished to help him. That magic word "Luck i" Nyasaland taught one, if it taught nothing else, how much could be meant by the casual "Good luck to you" of the passer-by who wished us well on our trip.

And of the boys as well there was much to remember; with all their childish cunning and begging and fearsome greed and coarseness, they taught one many a lesson of simple faith and of nature at its best. Somehow Fish managed to extract from his jinga boy our native names. His own was splendid in its direct and homely thrust. "Chipolonga," what need to say its meaning "Plenty plenty sleep." My own was rather dull and evidently due to John overhearing Fish, but it was yet strange to find oneself called by the same old nickname, even by Nyasaland natives. "Chekopa." "Skin."

James I never saw again, but those two servants hovered about our camps and were seen in the nearest villages for days after their dismissal. And I can dimly remember how one night when lying on my back at Fort Johnston I was told by Saidi that a boy wished to see me. When I looked up there was poor George standing by my bed with a bowed head and outstretched hands. What more touching appeal for mercy can be read than this letter from James to Fish.

LUNGWENA, October 14th.

DEAR SIR,

Many kind regards to you our Sir. Please excuse us to receive our letter. Yes Sir we besseech you about your wheel. Yes we understand that we make wrong thing to ride up at your wheel, but now we coax you Sir to spare us; and the wheel did not ride George, but I ride-me only-till Chelinda. And when you meet us on road you did not scold us. . . I know that John told you these words, but he is very liar. We cannot to employ your dress to put on, we cannot to sleep on your bed; but we know its cause, because when you were going to hunting, when chief Kululanga was coming when you were called me to explain you well, Capitao John when was hearing these words was very grumble about me, for that cause he hated us. And when we asked the caravan porters they refused indeed that we cannot to sleep at your bed or to put on your things. Howbeit now we know that George and me our Country are very far, and we believed that we have our Masters who can to help us when we shall get affair at law; we were hoping so, because we motherless we fatherless here, our Fathers and our Mothers and Master are you, and now please excuse us to recall at your work ; we understand that if a man has miss you can spare them; everybody no one can not do wrong; and please we emblase your feet, we lie down at your feet to recall us at your work. We lie down our pencil.

GEORGE AND JAMES.

But James was a rascal, though Fish won't admit it, and I believe that those two still write letters to each other.

Of course I saw John again. He was one of the first sights of Blantyre, dressed in a new suit of clothes with a huge white collar round his neck and riding the remnants of Fish's bicycle. He met me with every protestation of delight and promptly began to beg for a souvenir of my existence and to trick me in every conceivable manner. Even Fish agrees that John was a rascal.

The meeting with Simbota was quite dramatic. That journey alone from Fort Johnston to Blantyre with new and quite dull boys was rather an undertaking. They had never seen the Bwana before, and knew that their only job was to carry his machila for the 90 odd miles as far as Blantyre, and not having the character of a Saidi they gave incessant trouble the whole way. That made me eager to get through quick and I tried to do too much. The usual route is via Zomba, slightly longer than the short cut which I attempted to do in four days through Mpimbi and Lirangwe where water is scarce.

On the 4th day the trouble was getting serious and when 15 miles out of Blantyre the boys were refusing to go on, who should appear coming towards us but Simbota. In front of him he had a small picanin carrying a little bag of flour, and the good fellow whose home was 30 miles south of Blantyre was casually walking the 120 miles to pay me a call at Fort Johnston, and doubtless to extract presentis. He quickly summed up the situation and we were soon under way again. But trouble was not quite over, for it rapidly grew dark and the first severe rains I had seen in Nyasaland commenced. Then night really fell and we could not see a yard ahead of us; the track twisted in and out of trees, bundles of grass were lit but the rain put them out and the machila had to stop. Without Simbota I should never have got on at all, for he and one other boy carried me under the arms for 3 miles and plumped me on the floor of a startled settler who had just finished dinner.

During that journey Saidi had been unable to help me by day, for he was left in charge of the few odd porters who carried my kit, as distinct from the machila boys who travelled fast, but those Tenga-Tenga were never late. And when in the hospital at Fort Johnston the doctor had been hardly able to allow the native to sleep in my room, but he let him sleep on the door mat, and although that hospital had a trained boy to look after me there was no real personal work that Saidi would ever let the stranger do. However he had his small reward in the end for a good master took him over from me; and as Saidi gave one last push at the boat on the Chinde sand, a lady, also travelling home after several years up country, turned to me and said "Who is that boy who seems so sorry to see you off ? I never saw such a charming-looking native in all my life." And Saidi understood.

AN ENGINEER OFFICER UNDER WELLINGTON IN THE PENINSULA.

(Concluded).

(Edited by Commander the Hon. HENRY N. SHORE, R.N., RETIRED).

NOTE.—The following sketch of Wellington's most trusted and daring Intelligence Officer, Capt. Colquhoun Grant, mentioned above, was published anonymously, some time ago :—

It is much to be regretted that the Duke of Wellington never condescended to write the history of his intercourse with Capt. Colquhoun Grant. A volume on that subject written by such an accurate and unimaginative chronicler as the Duke of Wellington would have been a classic for all time. On such a theme, the baldest and most prosaic recital of the hero's deeds would have been more thrilling than a novel. That he acted habitually under the guidance of the Duke of Wellington, and held communication with no other English officer, is well known; but it was also his invariable practice to wear his uniform wherever he went and never to assume any disguise. Of course, his usual method of entering the enemy's lines was in the character of a deserter from the British army; and the excuses which he invented to account for his desertion were as inexhaustible as they were ingenious. Sometimes he posed as a cavalry trooper, and sometimes as a private in an infantry regiment who had stolen a thoroughbred horse from some Staff officer on which to make his escape with salutary speed. He was generally attended by a Spanish peasant named Leon, upon whose quickness of apprehension, fidelity, and vigilance he placed, after some experience of his good qualities, the most absolute reliance.

Hanging on the flank of Marmont's army until it passed the Coa, the indomitable Colquhoun Grant soon discovered that the French had left their scaling-ladders behind them, and, therefore, had no real intention to attempt the recapture of Ciudad Rodrigo. Being anxious to ascertain by what route Marmont would proceed to Coimbra, whither his head was pointed, Colquhoun Grant and Leon (the latter on foot) hid themselves on a low ridge, covered with dwarf oaks, at the foot of which lay a pass which the French army seemed likely to traverse. Unfortunately, some French sharpshooters, posted on a higher ridge, descried the two companions as they withdrew from the road below and plunged into the forest. In a few minutes a cry of "The French I the French I" issued from Leon's lips, and the foe, represented by a dozen mounted dragoons, was upon them. Exhausted by running, poor Leon fell, and was instantly transfixed and killed by a French spear. Striving in vain to protect his fallen friend, Grant was captured and carried before Marmont. The latter, who was one of the few gentlemen to be found among Napoleon's Marshals, treated his prisoner kindly and invited him to dinner. As usual, his uniform saved his life; but after they had left Marmont's headquarters, under an escort charged to convey him from Spain to France, Grant found to his surprise, on arriving at Bayonne, that Marmont had written to the commandant of that town and garrison explaining that Grant was a very dangerous and daring spy, who had done the French armies in Spain no end of harm, and that he was to be put in irons and sent to Paris.

They had to reckon, however, with no ordinary man in Colquhoun Grant. Divining the contents of Marmont's letter, by that intuitive instinct which, like a cat's whiskers, guided him in the dark, he contrived to escape from Bayonne by night, scrambling down into a deep fosse upon his trusty thoroughbred, from whom he had never parted company, and climbing up the almost perpendicular slope on the other side. By some kind of freemasonry, known only to bold spirits, he introduced himself on the road to General Souham, who was on his way back to Paris, and craved permission to join his party. Describing himself under a false name as a paroled British officer, Grant delighted his companions with his versatility, and by his description of moving adventures which he invented for their amusement. On arriving in Paris, he made himself known to another English spy, who had long been a member of the French police, and in constant communication with English agents, who carried his secret reports verbally to London, which they reached through Spain, Antwerp, or Rotterdam. His Parisian colleague told him that a passport had just been made out in favour of Jonathan Buck, an American, who had died suddenly on the day when the passport ought to have been Boldly demanding this passport, which carried him safely claimed. through every obstruction, Grant rode his faithful steed down to Nantes, where he intended to embark on an American ship. Her departure was, however, delayed, and with his accustomed courage, he told the American captain his story, and sought his advice. With kindly sympathy the American skipper bade him assume the character of a discontented sailor, and supplying him with a rough nautical dress and with forty dollars, told him to lodge the money in the American Consul's hands, upon which he would receive a certificate authorising him as a discharged seaman to proceed from port to port in search of a ship.

August 30, 1811. Accompanied Genl. Craufurd by the left of the Pass of El Fortin. The Guerillas of Don Juan Sanchez daucing, etc., by moonlight with the inhabitants. Sunday, Aug. 31. Rode with the General along the ridge of the Sierra towards Torredecilla, till we could overlook Cadalso. Came back to Robledilla to dinner in the evening by way of the Convent of N, S. de los Angelos, where we were very hospitably treated. Returned next morning to Martiago. NOTE.—From Sept. 1st onwards, Jones was employed daily in examining the country, either with Genl. Craufurd or alone, or riding over to Lord Wellington's Head Qrs. at Guinaldo, where, on Sept. 12, he found orders for him to return to England. (By Genl. Mann, dated Aug. 16).

Sept. 18. Genl. Craufurd went with Wood towards Tamanes, to ascertain the movements of the enemy, who show an evident intention to relieve Ciudad Rodrigo. Rode with Ross to Las Agallas, to the position where his guns are to be posted ; returned in the evening.

General Craufurd remained at the front till the 21st, when a body of the enemy's cavalry entering Tamanes obliged him to retire to Martiago again. Scpt. 23. The Light Division took post along the Vadilla, and bivouaced. The head of the enemy's columns showed themselves in the plain before Ciudad Rodrigo. Scpt. 24. The plain of Ciudad Rodrigo appeared filled with troops of the enemy, and a string of mules, etc., for many miles in extent entering the place. The enemy occupied Atalaga close to our front with two battalions of infantry and a regt. of cavalry.

NOTE.—The above operations are thus explained by Napier :— Ciudad Rodrigo wanted food, and Marmont arranged a combined operation for its succour, with the result that, on the 21st Sept. he had assembled 60,000 men, 6,000 being cavalry. On the 23rd, the French encamped to the north-east of the fortress, and a strong detachment, entering the plain, communicated with the garrison, examined the position of the Light Division, and returned. Next day, the whole of the French cavalry, and 4 divisions of infantry crossed the hills in two columns, and placing some troops in observation on the Vadillo introduced the convoy. Next day, (25th) the French advanced against the allies, and there ensued the combat of El Boden.

Reverting to the Diary :--Sept. 25. Soon after daylight a cannonade commenced upon our left towards Pastores, and continued till noon, when it became much warmer. Observed several movements of troops between El Boden and Pastores, on the other side of the Agueda. The firing appearing to advance towards the heights in front of Guinaldo, it was decided that our Division should withdraw from our position which appears hazardous. At 3 p.m., soon after orders had been given for that purpose, directions arrived from General Murray to the same effect. The rear of the division broke up at sunset, marched the greater part of the night, and bivouaced near this village (Cespedosa) being too much fatigued to reach Robleda as intended.

Sept. 26. Marched at daylight to Robleda ;--the ford of Canos, understood to be in the enemy's possession; the Light Division crossed the Agueda at the ford of Penaparda, and moved into its post before Guinaldo by midday; the enemy about a mile from our advanced posts in three large bodies, said to consist of 60,000 infantry and 5,000 cavalry; 22 battalions of the Imperial Guard were conspicuous amongst the crowd.

NOTE.—And yet, Napier states that—" the Light Division should have marched by Robledo to Guinaldo; Craufurd received the order at 3 o'clock, heard the cannonade, and might have reached Guinaldo before midnight; but fearing a night march he only moved to Cespedosa." And that, next day, the Light Division, " compelled to make a circuit, did not arrive till after 3 o'clock in the evening."

Sept. 27. So soon as it became dark last night, the army began to retreat, leaving the Light Division in Guinaldo until midnight, when we also retired; but the road was so crowded with baggage, etc., that it was daylight before we passed through Cossilas de Flores; continued our march to Furcalhas where we halted, our Division being ordered to take post there; but not finding any tenable ground, we moved into the position behind Aldea da Ponte, having the 4th Division upon our left, who were pushed by the enemy at dusk, which obliged us to stand to our arms several times, though we were not attacked.

Sept. 28. At 2 o'clock this morning retired from our position near the Convent of Sacapata through Alfayates, and bivouaced in the Chesnut wood close behind the village of Soita; drizzling rain all day. The French retired from Aldea da Ponte towards Ciudad Rodrigo, not choosing to attack us in this position.

NOTE.—Napier, commenting on the perilous situation of the Light Division during the night and morning of Sept. 25, and 26th, on the march to Guinaldo, states that, when Marmont heard of the escape of the Division, he—in allusion to Napoleon's fortune, prophetically exclaimed,—"And Wellington's star also is bright!"

The French having retired, the Light Division, reinforced by some cavalry, resumed the nominal blockade of Ciudad Rodrigo in concert with Julian Sanchez, and the rest of the army was cantoned on both sides of the Coa, head-quarters being fixed at Frenada.

October 2. The Light Division moved into the Cantonment assigned to it, viz., Cossilos de Flores, Puebla da Azava, Castillego, and Fuente Guinaldo where Genl. Craufurd established his Head Qrs. I got the quarter formerly occupied by Col. Fletcher in the Marketplace. Head Qrs. said to be at Frenada over the Coa. Oct. 6. Riding over the scene of the action near El Boden with Genl. Craufurd, we started 2 hares, killed one and brought it home with us. Oct. 8. Coursed with the Genl. near El Boden, killed a young wolf or fox, and a hare. Oct. 14. The Governor of Ciudad Rodrigo taken and carried off by the Guerillas. Oct. 30. The Tragedy of Zanga performed by the officers of our Division in the Theatre, made in the Chapel near the town.

FUENTE GUINALDO, Oct. 9, 1811.

My DEAR FATHER,

. . . The Gazette will, long before you receive this, have made you acquainted with their (the enemy's) success in relieving Ciudad Rodrigo, and obliging us to retire from a position near this town, on the night of the 26th Ult., to another on the banks of the Coa, where it would seem we were to have awaited the enemy's attack, but where however they (having effected their object) did not choose to attack us. On the 25th they made a strong reconnaissance with their cavalry near El Boden, and were gallantly received by part of Genl, Picton's Div. and our Dragoons and Hussars, in consequence of whose rapid retreat our Division, 4 or 5 leagues in front and on the enemy's side of the Agueda, were for a short time completely cut off from the rest of the Army. Marching that night nevertheless enabled us to rejoin the Army in front of this town on the 26th; and on the night of the 26th, or rather, early on the 27th we formed the rear guard of the Army upon its retreat. Ĭn the evening they (enemy) came up to us, and attacking with great superiority of force, carried the hill upon which the Fusiliers (the 7th and 23rd) were posted; though, if I am not mistaken, they paid its full price before they occupied it. The next morning we took up a position near Saita, but there, as I said before, they did not care to follow. Accordingly in a day or two we advanced again, and have reoccupied this and the neighbouring places; Head Qrs. are at Frenedas, not far from Almeida.

I am rather surprised that Capt. Ellicombe has not yet reached Lisbon; everything appears so quiet, at least for several months, that I care not how soon he relieves me. As soon as we hear of his arrival I shall set out for Lisbon; but you cannot expect me in England in less than a month, or five weeks afterwards . . . yet it cannot be very long if we live, before I have the pleasure of seeing you, and of presenting to you *verba voce*, what I can only now do in writing; with assurances of my most dutiful love . . .

> Your very loving son, RICE JONES.

FUENTE GUINALDO, October 23, 1811.

My dear Father,

My only inducement to write to you at this time, is to let you know that I am still waiting the arrival of Capt. Ellicombe at Lisbon, which surely cannot be delayed much longer. We continue precisely in the same state as when I wrote last. I am in as good, if not better health (Thank God) than I ever have been in this country; and was it not for the unpleasant state of suspense, that must of course continue until I set out for England, should be more comfortable also; for nothing can exceed the civility and attention of General Craufurd. . . I am totally in the dark as to what is likely to be my future destination. There can be little doubt of my returning in a Packet, and consequently landing at Falmouth. I calculated in a former letter that it would take about a month for me to reach England from the time of my quitting the army here.

You have, I daresay, already heard of General Reynaud, the French Governor of Ciudad Rodrigo, and a quantity of their cattle, being taken by Don Julian Sanchez's Spanish Guerillas; it has afforded us a good deal of amusement.

Nov. 3rd and 4th. Spent both days with Genl. Craufurd forming schemes to cut off the cattle the enemy send to graze daily; for which purpose we approached the place, often very near, upon all its sides. Nov. 11. General Craufurd still wishing to cut off the cattle from Ciudad Rodrigo, took me with him again to the hill near Pastores. Found their place of pasturage changed to the opposite bank of the Agueda. Nov. 12. Accompanied the Genl. in a minute reconnaissance of the ground from the road from La Caridade to that from Salamanca to Rodrigo, with a view to the execution of his scheme for intercepting the cattle when sent out to graze, returning to Fuente Guinaldo in the night.

Nov. 21. Col. Fletcher, Capt. J. T. Jones, Burgoyne and Mulcaster came to see Henry the 4th performed at our Theatre. They dined with me, and slept in my quarters.

NOTE.—And here, a short extract from Gleig's Life of the Duke of Wellington, may fitly find a place :—"Of toil and suffering, and danger too, the troops had from time to time enough; but every season of repose, and especially the winter, brought great enjoyment in its train, into which no one entered more heartily than the Duke of Wellington himself. . . . If Lord Wellington favoured one of the Divisions of the army more than the rest, it was the Light Division . . . the regiments composing it were models of all that good infantry ought to be; the men well drilled, the officers punctiliously attentive to the minutest details of duty, yet full withal of life and spirits. Among other accomplishments several of these young men possessed a decided talent for acting, and this winter they brought it into play."

Dec. 13. Accompanied Col. Fletcher to Almeida, which is repairing under Capt. MacCulloch's superintendence.

FUENTE GUINALDO, Nov. 20, 1811.

My DEAR FATHER,

I have delayed writing until the last moment in hopes of hearing of Capt. Ellicombe's arrival at Lisbon. A Mail, with letters to the 16th Oct, arrived here yesterday; another day would have completed 8 full weeks without our getting either a letter or paper from England. The winds which caused this unparalleled blank in our communications has doubtless prevented the sailing of the vessel in which my expected relief is embarked; but if the fine, North-Easterly gale which has prevailed the last week or ten days will last a day or two longer, I think I shall hear of his arrival, in another week at the most; and may then, if I get a favourable passage, have the pleasure of eating my Christmas Dinner with my dear Father. We have not a word of news; things have as quiet an appearance as ever. My health, thank God, continues excellent. I wish much I could hear how you all are; but I fear you have, in the expectation of my more speedy return, given up writing to me altogether.

FUENTE GUINALDO, Dec. 4, 1811.

My DEAR FATHER,

I was yesterday favoured with your letter of the 9th Ult. from Bristol. . . The delay attending Capt. Ellicombe's reaching Lisbon is extraordinary; I believe he was ordered in the middle of August last—nearly 4 months ago, and the voyage does not commonly exceed a fortnight, but as yet we have not heard a syllable of him. I see by the Papers (which we have received to the 12th Oct. only) that several outward-bound convoys were at that time in Cowes Roads awaiting a favourable wind . . . and I conclude are at this moment at anchor in the Tagus. . . . Yet I must give up the idea I entertained when I last wrote, of being in England on Christmas Day—at least, reckoned by the New Style—by the old one, it is still possible. . . . We advanced, a few days ago, across the Agueda, to intercept a Convoy which was said to be on the point of entering Ciudad Rodrigo; but it did not appear at all, and we accordingly returned to our Cantonments here.

NOTE.—For some time past, Wellington's preparations for the Siege of Ciudad Rodrigo had been carried on unknown to the French; and Almeida was now being repaired to afford security for the siege stores and battering-train, which had been introduced, under pretence of being an armament for the new works. At the same time, a trestlebridge to throw over the Agueda had been prepared secretly in the arsenal of Almeida. "Thus the preparatious for the attack"—says Napier, "advanced while the English general seemed to be only intent upon defending his own positions." And he declares that not even the engineers employed in the preparations knew more than that a siege or the simulation of a siege was in contemplation; but when it was to be attempted, or that it would be attempted at all, none knew;—even the quarter-master general, Murray, was suffered to go home on leave with the full persuasion that no operation would take place before spring."

Reverting to the Diary :--

Fuente Guinaldo, Dec. 18. Received orders to prepare Fascines, etc., at the several quarters occupied by the Light Division. Dec. 20. Lord Wellington inspected the Division. Martiago, Dec. 23. Came here, after setting the parties of the 43rd to work at fascine-making. Dec. 24. Gave directions to the 52nd, at Martiago and the neighbourhood, to make fascines and gabions, and returned at night to Fuente Guinaldo. Dec. 25 (Xmas day). General Craufurd, Wood, and myself met General Stewart to course near Fuente de Onora, and dined with him. Martiago, Dec. 29. Inspected the parties of General Vandeleur's Brigade employed making fascines at Martiago, and slept there.

1812. January 2. Heavy snow this morning caused much inconvenience, and the subsequent postponement of the movements ordered for investing Ciudad Rodrigo. Went to Las Agallas to expedite the transport and collection of the fascines and gabions made by the Light Division.

LAS AGALLAS, Jan., 1812.

My dear Father,

After such an extraordinary delay of my return to England, I fear the prospect is still rather distant; for although Capt. Ellicombe must undoubtedly have joined the Army before now, I have not as yet heard of his arrival; and the siege of Ciudad Rodrigo which it seems certain we shall now undertake, has, I doubt not, induced Lord Wellington to postpone my leaving the army until its termination, which will account for my not having heard from Col. Fletcher on the subject lately.

The armies of Marmont and D'Orsenne are said to be much separated and very distant; yet I fear they will advance and unite long before the completion of our labours, and oblige us to raise the siege—perhaps to recross the Coa. Our experience last summer at Badajoz has made me much less sanguine than I should otherwise feel at the prospect of a siege; but as we are now to be engaged in it, it is certainly much better that I should remain and see it out, than leave my brother officers in the midst of it. Let what will be the result, I have the satisfaction of knowing that my long procrastinated stay in this country, so far from being my own wish, has been quite contrary to my inclination; and I therefore most steadfastly rely upon the Providence which has hitherto attended my steps ordaining it all for the best.

We have for the last ten days been making Fascines and Gabions for the siege, and have this morning begun to move them to our Park before the place. It is some days since I have seen or heard from any of our officers, and I am therefore not aware when we break ground—I have heard to-morrow night, or the night after. I am afraid we shall experience very bad weather; we had a good deal of snow yesterday; but it is now fine again. . . . Adieu—and God bless you.

> Your very loving son, Rice Joxes.

NOTE.—Once more, we must turn to the Historian for explanations:—"The favourable moment for action so long watched for by

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Wellington came at last. . . . The Imperial Guards, 17,000 strong, being required by Napoleon for the Russian campaign, marched in December to France. All the Polish battalions, and several thousand choice men destined to fill the ranks of the old guard were drafted; so that not less than 40,000 of the best soldiers were withdrawn, and the maimed and worn-out men being sent to France at the same time, the force in the Peninsula was diminished by 60,000 men. . . . Marmont also, deceived by the seeming careless winter attitude of the allies left Rodrigo unprotected and Wellington instantly jumped with both feet on the devoted fortress."

Fan. 8. About noon, Ciudad Rodrigo was invested by the Light Division; during the afternoon 269 cars arrived with tools, etc., from Gallegos, having crossed the Agueda by a bridge on trestles made by the Staff Corps. A Park formed near the road, about 1,800 yds. from the place. Soon after 8 o'clock in the evening Lieut. Thomson led a party commanded by Col. Colborne, to storm the new Redoubts, which was soon carried, and a party of 700 men set to work immediately—300 to form a lodgement in the Redoubt, and 400 to open a communication to it. The enemy fired upon the redoubt all night.

NOTE.—Discussing Lord Wellington's extraordinary resourcefulness in emergencies, Mr. Larpent, the Judge Advocate-General of the army under his Lordship's command, writes in his Journal of the war :— "I heard an anecdote about the siege of Rodrigo which shows the man. On a sudden the army was in front of it. A new work had to be taken on the instant; scaling ladders were necessary; the Engineers had none,—being quite ignorant of the plans; an inconvenience which has often arisen in different departments, from Lord W.'s great secrecy—though the general result, assisted by his genius has been so good. Lord W. on being informed of this—" Well," said he, " You have brought up your ammunition and stores, never mind the waggons; cut them all up directly, they will make excellent ladders there, you see, each side-piece is already cut." This was done, and the work scaled forthwith.

Major Dickson, (better known as Sir A. Dickson) an officer after Lord Wellington's own heart, wrote in his Diary, at the first siege of Badajoz, where he was entrusted by his Chief with the control of the artillery arrangements,—" I have transacted business with many generals, but never such a one as Lord Wellington, both for general knowledge, and attention to reason and suggestion."

 $\mathcal{J}an.$ 9. 400 men were employed all day to complete the work opened last night. At night, the working parties consisted of 1,200, and the covering party of 500; the parallel was opened to its whole length, about 600 yds.; and three batteries for 11 guns each were also begun. Ross was killed early in the morning, near Battery No. 1, reckoning from the left, by a shot from the Convent of San Francisco. (Brother of Ross of the Horse Artillery).

NOTE.—Details of this remarkable siege being fully given in Sir J. T. Jones' work, we will pass on to the assault, in which exploit Rice Jones took a prominent part :—

Jan. 19. The breaches appearing practicable, a storm is determined upon. A few minutes before 7 this evening the troops moved to the assault. Joined the Light Division, and by order of Genl. Craufurd accompanied the advance under Major Napier. After carrying the breach, a French officer conducted me to the Governor's house, General Barrié, who was soon after brought in himself. Having taken possession of his Papers, etc., I left my orderly, Private Roger O'Niel, to take care of them and the inhabitants of the house, and returned to the Engineer Depôt.

NOTE.—We are fortunately enabled to supplement the Diarist's all-too-brief account of the storming of Ciudad Rodrigo, by a somewhat more detailed narrative of that dashing exploit contained in a letter to his Father, written on the following day :—

CAMP BEFORE CIUDAD RODRIGO,

201h Jan., 1812.

MY DEAR FATHER,

I have barely sufficient time to acquaint you with the happy termination of our labours at the siege of Ciudad Rodrigo, by our carrying it by assault yesterday evening. The day after I wrote to you last from Las Agallas we invested the place, took the new Redoubt of San Francisco and opened our First Parallel on the following days, we were so highly favored by weather, and other circumstances, as to get possession of the Suburbs and Convents, erect our Batteries and effect a practicable breach yesterday evening. In doing this we have met with considerable loss; amongst others my good friend George Ross was killed with a splinter of a shell on his head; soon after our commencement;-no man ever fell more universally regretted. In storming the town last night I fear our loss was great;-and I am sorry to say my friend and General (R. Craufurd) was dangerously wounded, yet I am happy to say we are not without hope of his recovery. I had the good fortune to lead the 52nd and 43rd Regts, to a small breach, to the left of the large one which General Picton entered, with little loss except Major Napier whom I accompanied and who lost his arm. We were together in the second or third file, and were at first repulsed and driven headlong down the breach ;--but shortly after tried again and gained it. Thanks to the providence of that God upon whom I have always relied, I escaped this rough treatment with a slight scratch of a bayonet on my thigh, and a contusion on my breast, when I was pushed down the Breach :-- which I however feel not the slightest inconvenience from at present. I shall be very busy the next 3 or 4 days dismantling our batteries, and repairing

the breach :-- after which I expect to set out on my return to England :-- when I hope for the pleasure of finding you all in good health.

From your very loving son,

RICE JONES.

The death of his friend is thus referred to by Southey, in his History of the War:—" Capt. Ross of the Engineers was brother of that excellent officer who afterwards fell at Baltimore, and was himself a man of great professional promise, uniting with military talents, a suavity of manners, and a gentleness of disposition. His friend and comrade, Lt. Skelton, was killed at the same time and buried with him in the same grave, in a little retired valley not far from the spot where they fell. Capt. Jones (the Historian of the war) placed a small pedestal with an inscription to mark the grave, and with prudent as well as Christian feeling, surmounted it with a cross. That humble monument has, because of its Christian symbol, been respected; Spaniards have been seen kneeling there, and none pass it without uncovering their heads."

 $\mathcal{F}an.$ 20. The 5th Division under Genl. Leith occupied Ciudad Rodrigo, and proceeded with all speed to fill up our works and trenches; after which, Lord Wellington gave Col. Fletcher permission to send me to England, agreeably to orders. General Craufurd buried with all possible honour at the foot of the breach.

NOTE.—The extreme severity of the conditions under which this siege was conducted, will be understood when it is stated that--" the period of the year was the commencement of January, when there is more dark than daylight,"-I quote from the remarks of Sir J. T. Jones, Royal Engineers, who was present as Brigade Major. "Secondly, the weather was bitterly cold at night, and the ground frozen. Thirdly, the men employed to raise the batteries were on the march, or on duty, for thirty hours consecutively; and the troops, having to march every morning from their different cantonments, six or eight miles distant from the trenches, were fatigued before they began to work." And what made it all the more trying was that many of the troops had to cross the river nearly up to their shoulders, and remain in this wet state until they returned to their quarters. It is not surprising, therefore, that " as whilst they remained on duty they could not take any rest from the extreme cold, they became worn out and incapable of any exertion long before the expiration of their tour of 24 hours' work, which materially impeded the progress of the work." In spite of all these drawbacks, Sir J. T. Jones tells us that every man felt confident of success, and acted accordingly. Patient and indefatigable at work, impetuous and daring in the assault, they shone throughout this siege in their proper light, and gave strong proofs of possessing superior qualities for such undertakings."

MARCH

CIUDAD RODRIGO, Jan. 28, 1812.

My DEAR FATHER,

At length everything is settled so as to allow of my returning to England, and to-morrow morning I intend setting out for Lisbon, where I expect to arrive about the 8th Feby. I shall not be able to leave Lisbon in less than a week, which will make it the 16th before I can probably embark, and with the blessing of God and a fair wind, I may have the pleasure of landing in England a fortnight afterwards; I continue, thank God, in excellent health and spirits, and if we are favoured with more of the beautifully fine weather we have had of late, the march to Lisbon will be by no means disagreeable. But I have such an aversion to the sea that I cannot say I look with so much satisfaction at the prospect of the voyage—short, even as it is.

Since I wrote last week, we have been busily employed, levelling the works we had raised against the place; re-forming and enlarging the Redoubts we stormed the first night; and repairing the two breaches in the main wall, all of which is now completed, or very nearly, at least, so as to place this city in a state of security from assault.

The French army which Marmont had assembled at Salamanca, for the relief of this place, after pushing some small corps about 6 or 7 leagues from hence, have, it is said, retired again behind the Tormes.

Poor General Craufurd, after severe suffering from his wounds, expired on the 24th Inst. In him I have lost a warm and valuable friend, and the Army one of its bravest, and most scientific officers. Few had the opportunity of forming a just estimate of his real worth, except those who lived at his hospitable table, and saw him in his quiet and domestic moments.

> Your very affectionate son, RICE JONES.

Jan. 30. Bade farewell to the army I have served with so long, and proceeded on my way to Lisbon.

Feb. 16. Embarked in the Lady Arabella, Packet, Capt. Porteous; got under weigh about 7 o'clock next morning; blowing tempestuously which soon carried us out of sight of the coast. Came to anchor in Falmouth at 11 o'clock at night, on the 24th. Set off at 2 a.m., next morning in the Mail from Falmouth; breakfasted at Truro, dined at Launcestowu, and slept at Exeter. Disagreeable weather;—wind and sleet; very cold on the Downs. There being no place to be had inside the Mail at Exeter, I rode on the outside as far as Salisbury, where I took the place of another passenger and travelled all night. Fcb. 27. Arrived in London greatly fatigued and exhausted by my journey. March 25. Commenced to do duty at Woolwich.

NOTE.—The rest of the Diary being chiefly concerned with matters of family interest, need not detain us.

A TARDY RECOGNITION.

On the 17th July, 1847, an official communication, addressed to "Colonel R. Jones, The Commanding Royal Engineer, Gibraltar," to the following effect, was received :--

"Colonel Rice Jones is requested to forward to this Office the statement herein required, addressed to the Secretary of the Board of General officers, specifying the Battles or Actions for which he has received a medal."

GENERAL ORDER. No. 582.

Horse Guards, 1st June, 1847.

28th June, 1847.

Her MAJESTY having been graciously pleased to command that a Medal should be struck to record the Services of Her Fleets and Armies during the Wars commencing in 1793, and ending in 1814, and that one should be conferred upon every Officer, Non-Commissioned Officer, and Soldier of the Army, who was present in any Battle or Siege, to commorate which Medals had been struck by command of Her Majesty's Royal Predecessors, and had been distributed to the General, or Superior, Officers of the several Armies and Corps of Troops engaged, in conformity with the Regulations of the Service at that time in force;-General and other Officers, Non-Commissioned Officers, and Soldiers, who consider that they have claims to receive this Mark of their Sovereign's gracious recollection of their Services, and of Her desire to record the same, are each to apply to the Secretary of the Board of General Officers, Whitehall, London, and to send in writing to the same Officer, a statement of his claim, for what action at what period of time, and the Names of the persons, or the title of the Documents by which the claim can be proved.

(Here follow instruction with reference to the submission of claims).

The occasions, for which Medals have been granted by the Sovereign, are specified in the annexed page for general information and guidance, as at page 73 of the *Annual Army List*.

By Command of Field Marshal, THE DUKE OF WELLINGTON, Commander-in-chiet.

> JOHN MACDONALD, Adjutant-General.

Honorary Distinctions have been granted to officers in Commemoration of their Services in the following Battles or Actions :---

		1 1 0 . /			2 X 1 X
Maida		4 July, 1806	Badaioz		f 17 March 1812
Roleia		17 August, 1808	1)dudgvø	• • •	$\{ 6 \text{ April} \}^{1012}$
Vimiera		21 August, 1808	Salamanca	•••	22 July, 1812
C 1		(Dec, 1808	Fort Detroit, A	\me	rica August, 1812
Sanagun, Ben	ever	ite (Jan., 1809	Vittoria	•••	21 June, 1813
Corunna		16 Jany., 1809	Duronous		(28 July) en
Martinique		Feby., 1809	Tyrences	•••	{ to 2 Aug. } 1013
Talavera		27, 28 July, 1809	St. Sebastian		Aug., Sept., 1813
Guadaloupe		Jany., Feb., 1810	Chateau Guay,	Am	erica 260ct., 1813
Busaco	• • • •	27 Sept., 1810	Nivelle	· • ·	10 Nov., 1813
Barrosa		5 March, 1St1	Chrystler's Fa	ırm,	America
Fuentes d'One)r	5 May, 1811			11 Nov., 1813
Albuhera		16 May, 1811	Nive	9) to 13 Dec., 1813
Java	Aug	g. and Sept., 1811	Orthes		27 Feb., 1814
Ciudad Rodri	go	January, 1812	Toulouse		10 April, 1814

The following reply was forwarded, in response to the above GENERAL ORDER :-

"Statement of the several Battles and Sieges enumerated in the Genl. Order, dated, H. Gds., t June, 1847, No. 582, at which Colonel Rice Jones was present, and for which a medal is claimed :--

Talavera... 27 and 28 July, 1809Busaco... 27 Sept., 1810Albuhera... 16 May, 1811Ciudad Rodrigo... January, 1812

R.J.

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REVIEW.

WITH THE VICTORIOUS BULGARIANS.

By LIEUT. H. WAGNER, War Correspondent of the Raichpost. (Constable & Co., Ltd.).

Lieut. Wagner's book, published an incredibly short time after the events it chronicles, does not profess to be a history of the Balkan War. Indeed, in the chapters dealing with the actual fighting he gives little more detail than was given in his famous despatches during the war. The interest of the book chiefly lies in the picture it gives of Bulgaria at this critical stage of its national existence. Since the modification by the Powers of the treaty of San Stefano in 1878 left a large portion of the territory the Bulgarians had regarded as their due, together with some thousands of their compatriots, under the Turkish yoke, war with Turkey has only been a question of time. To this end has the Bulgarian Army been trained, "for the attack only."

The Bulgarian plan of campaign was, roughly, to make for Constantinople with the largest possible force in the shortest possible time. The force available was reduced, firstly, by the necessity of investing Adrianople, secondly, by political reasons which rendered it advisable to send a considerable force further Westward into Macedonia to occupy the territory Bulgaria hoped to obtain for herself on the conclusion of peace. The 1st and 3rd armies on the East received no serious check until they arrived before the Chatalja lines, which were never attacked in force before the armistice was concluded at the end of November.

The possible breakdown of the peace negotiations does not seem to have occurred to Lieut. Wagner, who throughout his book appears to regard the war as at an end. He gives however an interesting forecast of the Bulgarian plans to force the Chatalja lines, by sending a force into the Gallipoli Peninsula to take the Dardanelles forts in rear and so open the strait to the Greek Navy, which might by gaining command of the Sea of Marmora render the southern flank of the Chatalja lines untenable and so enable the Bulgarians to obtain a lodgement there.

The book has the greatest possible interest at the present time, and bears singularly little trace of the haste with which it must have been prepared. This last remark unfortunately does not apply to the maps as they do not aid the reader much to follow the course of the campaign.

C.R.S.

NOTICES OF MAGAZINES.

MILITÄR WOCHENBLATT.

BOMB-DROPPING FROM AIR CRAFT.

In the number for the 6th December, 1912, Capt. Stockhausen, staff officer of the Berlin Command, contributes a short article on the throwing of explosives from air craft. He draws attention to the report that although the Italians in the Italo-Turkish War achieved some good results in bomb-dropping at first, this success did not continue, and would therefore seem to have been due to luck. The official trials in Germany, Count Zeppelin's experiments, and trials in France have, however, distinctly shown that very accurate dropping is possible. Of course some practice is necessary and the Italians may not have had it; but this alone would not account for the Italian failures; the reason must be sought elsewhere. It may be taken for granted that, the Italians only flew by day and threw against living targets only.

A bomb dropped from an altitude of 500 metres (1,640 ft.) takes about 12 seconds to reach the earth. This would give an enemy who was on the look-out time to get out of the way. At first the Arabs did not understand bombs, but they soon learnt. In peace, of course, the inanimate targets used cannot move.

A bomb thrown from 1,640 ft. has a terminal velocity of about 100 metres (328 ft.) per second. The lateral effect of the fragments of the bomb is much reduced by this, for the proportion of their horizontal velocity to their vertical velocity is made very small. If the charge is increased to give more lateral effect, the bomb is merely blown into useless tiny fragments. It must further be noted that shells with percussion fuze that strike sand, water and deep snow either do not burst or have very little effect. It would therefore appear that human targets have little to fear by day from percussion bombs thrown from the air.

The use of shrapnel shell with time fuze would increase the chance of success but presents several serious difficulties. With a velocity of 328 ft. per second, acquired by a fall from 1,640 ft. altitude, the bullets would descend practically perpendicularly and the force of the explosion would hardly divert them from their vertical path. The bullet-swept zone must moreover always be a small one, and the nearer to the earth that the bomb bursts, the smaller it will be. Shrapnel can only be effective when its path is oblique to the surface of the earth and when it has been carefully tonged. Both conditions are impossible with shrapnel thrown from the air. Even an airship cannot remain over the same spot and throw bombs until the correct length of fuze is obtained. Shrapnel with time fuze cannot therefore be seriously considered.

The above considerations show why it was that the Italians effected so little with their bombs. The following several deductions can be drawn:—The best arrangements for bomb-throwing are little better than worthless: even by day effective practice can be made against human targets only under the most favourable circumstances: night at present is no friend of aeroplanes, but is more favourable than day to airships: the anxiety felt about French aeroplanes, so far as harming human targets, is exaggerated. Every soldier should be taught that bombs thrown from airships can be easily dodged.

No experiences as regards homb-dropping on inanimate objects in the Italo-Turkish War are yet available. No effect can be expected, however, unless charges of from 160 to 220 lbs. of explosive are dropped. Aeroplanes are at once out of court, and nothing, whether it is of the rigid or semi-rigid type, can compete with the Zeppelin cruiser.

The article closes with paragraphs laudatory of the Zeppelin airship and an appeal to German patriotism to furnish the Count with more funds.

In the number of 19th December Capt. Stockhausen adds some remarks to his article of earlier date. He points out, that if airships are to attack live targets at all, they should select such as are not dangerous to themselves; for instance ammunition columns and trains. Amongst these they could at least cause panic.

As regards bomb-throwing on inanimate targets, he reiterates that it is only worth doing it from airships. He asserts that accurate dropping is possible and that a Zeppelin airship has actually thrown a charge of 600 k.g. (1,322 lbs.) from 1,000 metres (3,280 ft.), without the slightest harm to itself. This effectually disposes of any argument that it was impossible to drop big charges without shipwreck. He holds that against magazines, wharfs, troopships, pontoon bridges, etc., a charge of 75 to 100 k.g. (165 to 220 lbs.) will be ample.

Apparently unconvinced himself of the truth of the assertion that a charge of 1,322 lbs, has been thrown, he argues theoretically that there is no danger to the ship. If, he says, an ordinary balloon, filled with hydrogen, of 600 c.b.m. (784 cubic yards) contents drops a sack of ballast weighing 15 lbs., it rises about 100 metres (328 ft.) and the proportion of 15 to 600 is 1 to 40. But if an airship of 18,000 c.b.m. (23,544 cubic yards) drops 400 lbs., the proportion is only 400 to 18,000 or 1 to 45. The shock of the discharge is also less in comparison with the balloon, and becomes smaller as the capacity of the airship increases. Moreover an airship is unsuited to military purposes unless it can stand sudden variations of pressure. Of course the Zeppelin pattern can do so, even a wind of 10 metre-seconds (about $22\frac{1}{2}$ miles an hour) is nothing to them.

The writer admits that airships are easier to hit than aeroplanes, but does not think that they should be given up on that account. They must avoid the danger by speed. He thinks unless a shell is exploded before it reaches the airship that it will do but little real harm, and that the greatest danger is from armed aircraft. However in this respect the Zeppelins can carry a heavier armament than any other type. Zeppelins, it is true, require enormous quantities of hydrogen, but German industry will have no difficulty in providing this at the right price and time. By paying a few halfpence more for coal gas in peace, Germany would enable the private firms which make gas to extend their plant to manufacture hydrogen! The article like the former one concludes with a puff of the Zeppelin airships.

AIRPLANES versus AIRSHIPS.

In the number for the 7th December, 1912, special attention is drawn to the article "France and Germany: Our Aeroplanes—their Airships," which appeared in *France Militaire*, No. 8707, of 10th/11th November, 1912. In this M. Veillat, a member of the Aviation Committee of the Chamber of Deputies, pointed out that although France had an advantage as regards aeroplanes, yet these could not compete with the Zeppelins in flying by night, in radius of action, or in power of carrying explosives. Airships could bombard towns and fortresses, destroy railway bridges and troop trains, and fight warships. Therefore means of combating them must be devised.

GERMAN NATIONAL AVIATION FUND.

It is stated in the 1st January number that $7\frac{1}{4}$ million marks (£362,500) have been subscribed to the National Aviation Fund by the German public. The Committee propose to spend £53,000 on the purchase of military air craft, which are to bear the names of the subscribing towns and provinces; and £28,850 for experimental purposes (the Reichstag recently refused a credit of £10,000 for the purpose). The balance, some £280,000, is to be used for training and insuring airmen.

" E."

REVUE MILITAIRE SUISSE. December, 1912. MILITARY AVIATION.

Some account of recent developments in various countries.

France.--A national subscription was opened and applied to various purposes, including landing places in the North and East. 70 pilots have been trained, 55 more are required, also 30 more stations. A short description of the conditions and results at the meeting at Rheims in October, 1911, is given, also of the Act of 29th March, 1912, fixing the organization of the Military Flying Corps. The strength of the corps at the end of 1912 is given, and the stations of the various groups and schools. Some remarks are made on the tactical employment of aeroplanes.

Germany.—The Deutscher Luftfahrer Verband is calling for a public subscription of 6,850,000 marks, of which 2½ millions are to subsidize the industry, as outside the Army and Navy there is no demand for air craft. 2½ millions will be required yearly for some time to form stations about 100 kilometres apart, to popularize flying as a sport. Other efforts, public and private, are described.

Austria.—Over 1,200,000 francs were voted in 1911 and in 1912 a subscription was called for. Some figures as to the numbers and pay of officers are given. A volunteer corps has also been formed. The con-

ditions of the military aviation meeting at Fischamond are described. The annual budget is 440,000 crowns.

Italy .- The King has given an important donation, 1,000,000 lire were raised by subscription, and 500,000 lire were allotted by the Minister for War. It was decided in 1912 to purchase apparatus to the amount of 2,000,000 lire. The expeditionary force in Tripoli had 23 aeroplanes and 34 pilots. A battalion of specialists has been formed, the tests for entry to which are severe.

Belgium.-In 1910 a school of aviation was formed at Braeschart, The budget for 1913 includes large sums for aviation, including 1,000,000 francs for continuing and perfecting experiments.

Russia has opened a subscription and 2,480,000 francs, collected during the Russo-Japanese War for the fleet, has been devoted to aviation. A school of airmen was opened in 1910 and furnished 20 pilots for the manœuvres in 1911. At the end of 1912, 100 officers should have certificates.

Bulgaria has used aeroplanes during the War in the Balkans.

It is calculated that in March last France had 450 pilots and 500 aeroplanes, Germany 140 pilots and 150 aeroplanes, and in September the latter had 391 officer pilots and 244 apparatus. Austria now has 85 pilots and 55 aeroplanes.

Some remarks are then given on the military employment of aeroplanes, and methods of concealing troops from sight from them.

MORE ABOUT KRUPP'S WORKS.

An article to supplement the account given in the number for September, 1912. Good photographs are published of the first muzzle-loading guns made of cast steel, and of the first breechloaders made by this firm.

THE WAR IN THE BALKANS.

In continuation of the article in the November number, an account is given of the operations of the Montenegrin Army, and the country through which it advanced from the 8th October, when war was declared against Turkey up to the 7th November, 1912, including the investment of Scutari. No descriptions of the battles, or details of tactics, are given.

January, 1913.

NOTES ON GUARDING THE LINES OF COMMUNICATION.

A sketch is given of the objects of the line of communications, of the necessity for securing these objects, and of the means for doing so adopted in the Swiss Army. Two instances are then given from the War of 1870-71 describing in detail circumstances which actually occurred at posts on the L. of C., viz.: the surprise by the French of the post at Stenay, and the destruction of the bridge at Fontenoy. Lessons are deduced from these two engagements, which are worthy of study.

REGULATIONS FOR SANITARY SERVICES.

Extracts from and criticisms of the new Swiss Regulations for Medical and Sanitary Services in Peace and War, based on reports received on the wars in South Africa and Manchuria. Chapters 1 and 2 are reviewed. The article is to be continued.

THE ROYAL ENGINEERS JOURNAL.

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THE "DEPORT" GUN IN ITALY.

Rapidity of fire, precision, and powerful effect are attributes common to all modern artillery, and further progress in these respects can hardly be secured at present. Increase in the field of action and more perfect adaptation to modern tactics are, however, still required, and have been the aim of Colonel Deport. It should be possible to increase the horizontal field of fire without having to move the carriage, and, also, in broken country where the angles of sites may vary considerably, to ensure large angles of elevation and depression being obtainable. Shortly, by splitting the trail into two portions, and so providing four points of support for the carriage, a horizontal angle of fire of 54 degrees can be obtained without moving the carriage. By cranking the axle of the carriage the gun can be elevated to 60 degrees, from 10 degrees of depression. The arrangements for checking the recoil are very ingenious. The opening and closing of the breech is semi-automatic. Clear descriptions, with diagrams and photographs, are given, and the methods provided for laying are explained. Only four gun numbers are normally required. Some remarks follow on possibilities of failure in Deport's system, but these are all controverted. The fact remains that the Italian Government has tried the gun and carriage against those of Schneider and Krupp, and has chosen the Deport. The tactical possibilities of the weapon are then brought under review, and a discussion ensues on the probable use of such guns, firing at high elevations for curved fire, in lieu of mortars which may, or may not be, at hand when required. This would entail another cartridge with a reduced charge of quick-burning powder, but would enable its own attacking infantry to be supported right through their advance to the delivery of the final assault.

THE MANGUVRES OF THE 4TH DIVISION IN 1912.

A short account of these operations with certain remarks, favourable and otherwise.

A. R. REYNOLDS.

RIVISTA DI ARTIGLIERIA E GENIO.

October, 1912.

THE INFLUENCE OF RECENT TECHNICAL INVENTIONS ON MILITARY OPERATIONS.

An article by Major Cardona of the Engineers in the October number of this Journal, on the influence of recent technical inventions on military operations, contains many valuable ideas and is of much interest. The successive scientific inventions applied to military art have produced, especially during the last half century, an evolution in the conduct of military operations, felt as much in modern armies as in those of 1866. The author proceeds to examine the result of these influences on strategy and tactics.

Influence on Strategic Operations.—The first point to notice is how the increasing size of modern armies (produced by new politico-social conditions), together with the perfection of new weapons, has created an enormous extension of battle fronts. This has led to a most difficult

strategical problem, viz. the handling of a large and extended force so as to ensure that the blow should be directed at the right point and with the greatest celerity at an opportune moment. If the strategy of the XXth century had only the same technical means at its disposal as it had in the times of Moltke, the conduct of the armies of to-day would be exceedingly difficult and risky. But, fortunately, useful and quick means of transmission—telegraph and field telephones and especially wireless telegraphy—have come to our aid, and dirigibles and aeroplanes provide a more powerful and speedier means of reconnaissance. Automobiles and motor cars also allow of a more rapid and convenient means of transport. All this technical progress tends to abolish "distance" and to gain time. A study of the mobilization of armies of to-day, their movements, their manœuvres and their actual armed life, as contrasted with that of 1870, convinces us of the advantages of the modern improvements in the field of strategy.

Mobilization of Armies .- The mobilization of armies is based upon the maximum carrying power of the railways, and is an operation of such importance that every effort should be made to shorten it by their perfect military organization. Even in Germany in 1870, the railways could not keep pace with the exigencies of the war, whilst in France they were totally inadequate. So grave were the inconveniences caused by the military employment of the railways during the mobilization of the French Army, that it was impeded and surprised by the German Army. The latter was able to complete the concentration of its army in three weeks, and this was an unexpected result as it had taken seven weeks to do so during the Prussian mobilization To-day it can be further greatly accelerated owing to the in 1865. increased power of modern locomotives. The abundant supply of automobiles must, moreover, be taken into account, as they may be substituted for ordinary carriages, and thus not only accelerate the actual mobilization but also remove part of the strain from the railways. Everyone knows that the rapid mobilization of an army is of the greatest advantage, as it may render a strategic surprise possible. General Von Blume was right in saying that the way mobilization is carried out is a sign of the grade of civilization of a country, of the spirit of its population, and of the vigour of the organization of the State. During the concentration of the troops the most important duty is to ascertain promptly when, where, and how the enemy's masses are concentrated, and to hamper the operations as far as possible by exploding bombs at their railway stations, especially from dirigibles, etc. For this reason the dominion of the air is likely to become as important as that of the sea. In aerial warfare the rapid aeroplane will probably be an adversary more to be dreaded than the dirigible. It cannot be expected that the efficacy of fire from special cannon fired at great angles of elevation, can be such as to greatly embarrass the enemy's dirigibles, which move at a great velocity and continually change their course.

Armies on the March.—The armies of 1870 were generally composed of a number of army corps, as is the case to-day, but each army corps had only two divisions, while to-day there are three. The notable increase of artillery and wagons shows also that an army occupies on the march a much greater depth than that of 1870. The difficulties in the movements of armies are to-day greatly increased by the remarkable increase in the size of armies. But fortunately new aids to strategy have appeared in the special and technical means of rapid transmission. In fact the telegraphic and telephonic communication of the present day allow of a completer control of the larger bodies of men than was possible with the smaller forces in past times. The use of the telegraph clearly shows this by the way in which movements of expansion and concentration of troops, ordered from the supreme command, can be guaranteed.

Strategical Manauvres .- When considering the employment of armies in strategical manœuvres, working on either external or internal lines, we must remember that, were it not for the rapid technical means of transmission (the telegraph and wireless telegraphy) and for transport (the automobile), the attack of the wings, or the frontal attack, the reinforcement, or other developments would be rendered too difficult for the commander, owing to the increased extension of the battle front. Even with these, for this reason, it is impossible to inform the commander, by means of the advanced reconnoitring cavalry, of all that is taking place in front, and it is necessary therefore for him to receive notice of the enemy's movements by means of aeroplanes and dirigibles. As soon as the aeronautical service becomes regularly developed, and the airships perfected with wireless telegraphy on board, strategical manœuvres will be of little danger to a forewarned adversary. Also aeronautical science will assist in preventing the rapid concentration of the enemy rendered possible by the telegraph. For example if the Austrian Army at Sadowa had possessed a single balloon it would certainly not have been surprised. To-day, when the front of an army is four times what it was in 1870, it will be still more difficult to execute strategical manœuvres by bringing up the reserves. But at the same time the military organization of the railways will allow of whole army corps being moved rapidly from one point to another, and, if no railway is available, the employment of motors will enable the General to adopt the necessary movements for counteracting those of his enemy,

Reinforcements.-When bringing up reinforcements, especially in urgent and critical cases (such as during and after a battle, in the pursuit or retirement), the new means of transport by motors will be of immense advantage. A motor of medium size has a radius of action of about 200 k.m. daily and can carry 2 tons, while an ordinary horse wagon has only a radius of action of 32 k.m. daily and can carry 1 ton, so that the motor has a radius of action six times as great as that of the ordinary horse wagon. Its greater rapidity of bringing up reinforcements also, especially after a battle, will be of the greatest advantage and will bring a powerful influence to bear on the subsequent tactics. In fact the the motor, acting as a mobile railway, will help to increase the liberty of action of the commander-in-chief, and will give the troops greater rapidity of movement, so that the army corps will be less tied by their communications. For this reason the communications of an army dependent upon motor traction will be less vulnerable to the enemy's attack than those depending on the railways.

E. T. THACKERAY,

CORRESPONDENCE.

THE INTERNATIONAL MAP OF THE WORLD. SIR,

I have read, with some interest and no small amount of disagreement, the account of a lecture, by my friend Mr. A. R. Hinks, on the International Map of the World. The lecture was published in the February number of the *R.E. Journal*, and I should be obliged if you would print the following comments on it. I will make them as brief as possible.

It will clear the ground to mention, in the first instance, those Resolutions of the International Map Committee which meet with Mr. Hinks's approval. They are those dealing with the adoption of the metre as the unit of height, the styles of lettering, the rules for the spelling of placenames, the use of contours as the basis of the precise representation of the relief, and, I believe I may add, the projection.

There is another Resolution which he appears, as far as I can judge, to condemn, a Resolution which has been affirmed by more than one International Geographical Congress and has not hitherto been questioned, namely, the division of the world's surface into a regular network of sheets bounded by meridians and parallels, reckoning from the meridian of Greenwich and the Equator, respectively. It is however hard to see what could be conveniently substituted for this system. As to breaking the margins, in cases where it may be thought desirable, there is nothing in the Resolutions to prevent this being done.

I will pass over the criticism on the want of uniformity in the selection of layer tints in the five published maps dealt with, only remarking that the variations appear to me to be within the four corners of the regulations, and that the Committee recognized the necessity of allowing a certain latitude in this, as in other matters.

I now come to a statement which appears to me to be entirely incorrect, namely, "there can be no question that in mountainous country, even in the not very formidable mountains of the Highlands, the layer system is a complete failure for one-millionth maps." No! The layer system is not a failure in such regions. I have compared the one-millionth layer map of the Highlands with its predecessor, the hill-shaded map, and have no doubt whatever that the information conveyed by the former is not only far more exact but far more graphic. The layer system is in fact the only system at present devised which shows relative heights clearly.

That there is a difficulty, on any known system, in representing an extensive high plateau is a cartographical truism of which I willingly make Mr. Hinks a present, but when he attempts to prove that it is

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impossible to represent a mountainous country satisfactorily by layers, then, I think, he both fails in the proof and is contradicted by experience. One would think that no mountainous country had ever before been represented in this way on small scales. Of course we all know to the contrary, for, after all, layer maps have been in use for three-quarters of a century. But perhaps what he has in mind is the necessity of choosing a suitable layer interval, and, in this respect, the International Resolutions give ample latitude.

In fact all through his criticism he misses the point that the Resolutions do allow a very wide discretion; for instance, great latitude is allowed in the selection of the contour intervals, the layer tints may be at the top or bottom of the intervals, editions may be published which do not make use of layer tints and so on.

The proof of the pudding is in the eating and I do not hesitate to say that the International system has been a success as applied to the Highlands of Scotland, and I am fortified by high authority in the opinion that it was wise to adopt this method. This is not, of course, to suggest that better systems may not be invented in the future. That, the future alone can show.

I have recently seen three sheets published by the Geographical Service of the Argentine Army. They are excellent examples of the International series and, with those sheets issued by the United States Geological Survey, and those which are being produced by Hungary, Italy and Spain, and the British and French sheets, will no doubt be exhibited at the International Geographical Congress which is to be held at Rome at the end of March next. I should mention that the French Government is devoting considerable funds to the systematic execution on the International system of the one-millionth maps of France and French Northern Africa.⁹

I am sorry that Mr. Hinks does not like the scheme, but am consoled by the reflection that the International Committee which drew it up was a competent and thoroughly representative body, and that it is not possible in any human undertaking to satisfy everybody.

In conclusion let me quote a remark from an account in the *Bulletin* of the American Geographical Society[†] of the progress of the United States sheets of this series: "Many of the valuable features of the map are due to the excellent requirements of the International agreement (mainly, let it be repeated, the one making obligatory the representation of relief by hypsometric coloring) which cannot but guarantee its high geographic quality."

> C. F. CLOSE, Colonel.

Ordnance Survey Office, Southampton, 10th February, 1913.

The Editor, R.E. Journal.

^{*} Since writing the above paragraph I have received from the Oficina de Mensura de Sierras, Santiago, four very interesting provisional impressions of the sheets of the International map of Chile.

⁺ Vol. XLIV., No. 11, 1912.

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RECENT PUBLICATIONS OF MILITARY INTEREST.

REVIEW OF BOOKS.

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FOREIGN ARMIES.

THE RUSSIAN OFFICER'S FIELD SERVICE POCKET BOOK. By Colonels Vitsnuda, Trotski, Pnevski, Imnadze of the Russian General Staff. 5th edition. 463 pp. Illustrated with numerous sketches and diagrams. 8vo. Vilna, 1912. Military District Press. 3s. 4d.

In the opening chapter of this book concise particulars are given of the organization of the Russian Army Corps, and cavalry division, the service of communication, march tables, the principles of appreciating the situation, writing orders, rendering reports, and preparing sketches. A chapter of 70 pages is devoted to fieldworks, demolitions, and railways; another of 122 pages to the tactics of the three arms and reconnaissance; other chapters deal with combined operations (140 pp.), line of communication services, and give a short account of naval organization and operations. Manœuvres and umpiring occupy 11 pages. The work has been carefully compiled and statements are substantiated by reference to the relative Army Orders. Large print is used for the chief matter, small print for lesser detail; abbreviations are freely employed. The book is an encyclopædia of information, and can be recommended. It must be admitted, however, that like many military pocket books it is bulky; it weights 1b. and requires a capacious pocket to hold it; thinner paper might have been used with advantage.

HISTORY.

1870. By Lieut.-Colonel Ernest Picard, Chief of the Historical Section of the French General Staff. In five volumes, each of about 350 pp., with maps. 8vo. Paris, 1907-12. Librairie Plon. 4s. each volume.

The majority of officers will probably have read this valuable work, the first volume of which appeared as long ago as 1906, but those who have not studied it are strongly recommended to do so as soon as possible. The author's style of writing is charmingly simple and at the same time very forcible, while his facts, in view of his official position, must be considered unimpeachable. The work, which is a collection of papers published from time to time in the official organ of the French General Staff (*La Revue d'Histoire*), consists of the following five volumes :---

Volume 1.-The loss of Alsace.

Volumes 2 and 3 .- The War in Lorraine.

Volumes 4 and 5.-Sedan.

The object of the author is not so much to describe the various details of the fighting as to enquire into the causes of the French disasters and to bring out the lessons to be learnt from them, whilst at the same time endeavouring to follow what was in the minds of the commanders and to discover why they acted as they did.

Volume I deals with the events from the commencement of the war up to the Battle of Wörth (inclusive). An interesting description is given of the personal qualities of the principal French generals and their staff officers, and the author points out that, whilst important commands were given to Bourbaki, Felin, Douay, de Failly, and Frossard, because they were favourites at Court, such excellent soldiers as Palikao and Trochu were not employed with the army of the Rhine at the commencement of operations, because they did not shine in society. Writing of the engagement of Saarbrucken, Colonel Picard considers that the 2nd, 3rd, 4th, and 5th French Corps should, on Angust 2nd, have advanced on Saarguemines, Saarbrucken, and Volklingen, and that the Guard Corps should have been left at Saarlouis, at which point the Germans were expected to cross the frontier. Had this been done, Colonel Picard thinks that the impatient Steinmetz would certainly have hurried forward and attacked the French, with the result that four French Corps would have had only the 1st German Army to deal with. It is claimed that a French offensive movement across the Saar on August 2nd would have had the additional result of causing the 2nd German Army to halt. The grounds for this contention are that the orders to this Army laid down that if the enemy took the offensive, the 2nd Army was not to move forward, but was to "concentrate to the east of the mountains and accept battle there."

As regards the action at Weissenberg, the French Staff is severely criticized for having sent Abel Douay there without definite orders as to what was expected of him; whilst Douay himself and his successor Pelle are condemned for attempting a fight to a finish when a delaying action and a subsequent retirement were clearly indicated as the proper course of action. After giving a singularly clear account of the Battle of Worth, Colonel Picard adds : "A study of all the documents connected with the operations of August 5th and 6th has convinced me that if General de Failly had done his duty and had complied with the orders given him by Marshal MacMahon, instead of allowing himself to be put off by unimportant topographical considerations which will not hear examination, at least two divisions of the 5th Corps and its reserve artillery could have been assembled at Reichshoffen at 1 p.m. on the 6th August, at the disposal of the Commander of Alsace." Had this bappened it is considered that MacMahon would undoubtediy have been able to hold his own at Worth.

After discussing the question as to who was responsible for the disaster at Worth, Colonel Picard comes to the conclusion that both de Failiy and MacMahon were to blame for it; the former because he refused to respond to MacMahon's urgent appeals for help and disobeyed orders; the latter because he accepted battle without having first concentrated his forces.

The second volume deals with the events from the Battle of Spicheren to the Battle of Borny (both inclusive). Having pointed out the defects in the position occupied by Frossard at Spicheren, and having described the battle with admirable lucidity, Colonel Picard proceeds to enquire into the causes of the French defeat. He has no hesitation in saying that the responsibility for the disaster must be assigned to Bazaine, whom he severely criticizes in the first place for not proceeding to Spicheren himself as soon as he heard that a battle was going on there. He adds further: "Instead of ordering the whole of the forces at his disposal to march at once to the battlefield, Marshal Bazaine left the divisions of Montandon and Castagny to their own devices; he gave Metman's Division a purely defensive $r\delta le$; he immobilized Decaen's Division and the reserve attacking. Now Bazaine might have ordered all his troops to march to the sound of the guns before 2 p.m. Had he done this they would have anived on the seche between 5.30 and 6 p.m., and it is probable that the battle would have ended in a victory for the French Army."

Pages 169 to 180 contain the author's views regarding Bazaine's character as a soldier and a man. It will suffice to say that there is hardly an opprobrious adjective in the French language which is not applied to the unfortunate Marshal.

After describing the engagement at Borny, Colonel Picard tells us that French Headquarters were much pleased with the result of the action, and that when, some hours after the termination of the fight, Bazaine went to make his report to the Emperor, he was received by the Imperial suite with "manifestations of great joy."

Apparently, however, the rank and file did not gain much confidence either in themselves or in their generals as the result of the fight at Borny, for it is evident from the author's description of Bazaine's army when it reached Metz subsequently that the *moral* of the men was at rather a low ebb.

Volume 3 opens at the Battle of Rezonville, and concludes with an account of the Battle of St. Privat,

Discussing the Battle of Rezonville, Colonel Picard refuses to accept von Moltke's view that it was a German victory, but claims that it was indecisive. The strategical result of the battle was unfavourable to the French in that the presence of hostile forces about Trouville prevented them from using the road to Verdun by Mars-la-Tour without fighting again. On the other hand, however, the French were at perfect liberty to move by Etain or Briey. The author agrees with the criticisms which have usually been made with regard to Bazaine's action in reinforcing his left instead of strengthening his right during the battle. Summing up his views regarding the operations in Lorraine, which ended with the withdrawal of Bazaine into Metz, Colonel Picard comes to the following conclusions :--

- (a). In spite of all statements to the contrary, Moltke had no original intentions of bringing about the situation which existed when Bazaine retired into Metz.
- (b). The factics of the Germans were by no means sound in many instances, and the French had a number of opportunities of inflicting serious reverses on the enemy which were lost owing to the total incapacity of the higher leaders in the French Army.

Volumes 4 and 5, which deal with the events connected with the drama of Sedan, are exceedingly interesting reading. In assigning the blame for this disaster, Colonel Picard considers that the responsible persons were :—

- (a). The Empress, who was obsessed with the idea of keeping the Emperor away from the capital.
- (b). The War Minister for having an insufficiently considered plan and for insisting on MacMahon carrying it out to the letter,
- (c). Marshal MacMahon for his weakness in attempting to carry out a plan which he knew to be hopelessly unsound.
- (d) General Wimpffen for insisting on taking over command after MacMahon was wounded and not carrying out General Ducrot's plan, which, if adopted, might have saved the French Army from capitulation.

CHINA'S REVOLUTION, 1911-1912; A HISTORICAL AND POLITICAL RECORD OF THE CIVIL WAR. By Edwin J. Dingle. 298 pp., with two maps. Svo. London, 1912. T. Fisher Unwin. 15s.

Mr. Dingle is a journalist who has travelled extensively in China. He was present at Hankow at the time of the outbreak of the Revolution on October 10th, 1911, and remained there until the Peace Conference was opened at Shanghai on December 18th, 1911.

The account of the operations near Hankow and Han-Vang (pp. 57 to 150) is the most interesting part from a military point of view, and is the only portion with which this review deals. The author pays a high tribute to the fighting qualities of the Chinese soldier. His opinions are expressed in somewhat exaggerated terms, but they are valuable as being those of an eye-witness, and are shared by other foreign observers.

Of the Battle of Kilometre Ten, he says: "Here fighting was being carried on with a pluck which astonished all beholders. The Imperial Army was, for the first time since the Chinese Model Army had been organized, plunged into real warfare. The Revolutionaries were for the most part raw recruits, but their bravery would have made many an occidental regiment blush with envy." Of the Northern Army he says that "there were none but highly trained men in whom were instilled strongly the absorbing lessons of the Army. They knew nothing else. They did nothing else. They were fighting machines. . . There are certain great weaknesses in Chinese military organization which have to be removed, but the Northern Army founded by Yüan Shih-kai himself. . . . had the minimum of these defects."

The transport and medical services of the Northern Army were, however, woefally defective, and, had the peace negotiations failed, it is most improbable that the Imperialists, setting aside the question of their loyalty to the Throne, would have been able to undertake a prolonged campaign. The lesson of this brief struggle is that, if financial difficulties can be overcome, the organizing power of Yüan Shih-kai will produce an army from this material which no Power can afford to despise.

The actual events seen by the author are very graphically described, but the vast area over which the operations were spread naturally renders difficult a complete account of the Revolution. The operations around Nanking, and General Chang-Hsün's retreat up the Tientsin-Pu-k'ou Railway are very briefly dismissed. No mention is made of the fighting on the Shan-Hsi Railway, which, by threatening the communications between Peking and Hankow, rendered the situation of the former place for a time very precarious.

An event exercising a powerful influence on the course of the Revolution, and one of which the author has lost sight, was the action of General Chang Shao-Tseng in North-East Chih-li at the end of October, 1911. General Chang was in command of the 40th Brigade, which had been ordered from Mukden to the assistance of the dynasty. His ultimatum to the Throne had a remarkable effect on the Imperial attitude towards the revolutionary movement, and was the precursor of Yüan Shib-kai's return to political life. Mr. Dingle has had access to correspondence between Li Yüan-hung and Yüan Shih-kai, and to letters addressed to Admiral Sa by the young China party at Wa-Chang. These throw interesting light upon the indecision existing in the minds of the chief actors in the Revolution. This indecision was reflected in the conduct of operations and in the lack of confidence on the part of the men in their leaders.

WELLINGTON'S ARMY. By C. W. C. Oman. 395 pp., with index, illustrated. 8vo. London, 1912. Edward Arnold. 7s. 6d.

Our warmest thanks are due to Mr. Oman for this most interesting volume concerning Wellington and his Peninsular Army. To most people it will be found to contain much that is new concerning its organization, daily life, and psychology, and yet to understand what these men accomplished a knowledge of these and similar details is really essential. The author devotes a chapter to enumerating and commenting on the sources to which the student may turn for information about the Peninsular War. The numerous diaries and records that exist on this subject will come as a surprise to most people.

The following three chapters deal with Wellington as a leader of men, as a strategist, and as a tactician. The limitations of his heart are fearlessly exposed, while at the same time the fullest credit is given to those wonderful powers of brain which enabled him to be his own chief of the staff as well as to handle delicate diplomatic questions with almost unvarying success. The organization of the army is then examined and explained. Its headquarters, its brigades and divisions, its regiments, its officers, and its men are dealt with in turn. From a study of these chapters we are able to obtain a view of the system of staff duties which obtained in the army and of the grouping which its units assumed as the war progressed.

Another chapter deals with the auxiliaries, the Germans and the Portuguese, who rendered such valuable assistance, the former from the commencement of the struggle, the latter from the time when the reorganization, carried out by Marshal Beresford, had taken effect.

Mr. Oman devotes further chapters to such matters as Discipline and Courts-Martial, The Army on the March, Impedimenta, Sieges, Uniforms and Weapons, and the Commissariat, on all of which questions he has amassed a store of deeply interesting information. It is impossible in so short a review of this nature to deal adequately with such a work as Mr. Oman has here given us. We advise all those who take an interest in Wellington and his army to make a point of obtaining a copy and reading it for themselves.

A MEMOIR OF THE KHANDESH BHIL CORPS, 1825—1891. By A. H. A. Simcox, I.C.S. 281 pp., with 5 illustrations and 1 map. 8vo. Bombay, 1912. Thacker & Co., Ltd. 9s.

An interesting account of the raising and working of the parent of Indian Local Corps, The narrative has been compiled largely from Government records, and original despatches are freely quoted. Those written by Lieut. J. Outram (afterwards Lieut.-General Sir J. Outram), who raised the corps and commanded it for to years, are of especial interest.

Although the book will commend itself more to those who are interested in Khandesh and the Bhils than to the general reader, yet its pages will repay perusal by those who wish to find exemplified the principles which underlie the proper employment of local corps.

STONEWALL JACKSON'S CAMPAIGN IN THE SHENANDOAH VALLEY OF VIRGINIA FROM 4TH NOVEMBER, 1861, TO 17TH JUNE, 1862. By William Allan, 284 pp., and 8 maps. Svo. London, 1912. Hugh Rees. 6s.

This is a reprint of the valuable work published in 1880 by the late Lieut.-Colonel Allan of the Staff of the Second Corps of the Army of Northern Virginia. It covers General Jackson's career from the Romney Expedition in the winter of 1861 until he left the Valley in June, 1862, to take part in the seven days' battle in the Yorktown Peninsula.

POLITICS.

THE CONDUCT OF WAR. (La direction de la Guerre). By Commandant V. Dupuis. 367 pp., with a map to illustrate the operations on the Loire. Paris, 1912. Chapelot. 4s. 9d.

The author of this interesting and ably written work belongs to the Historical Section of the French General Staff and has already carried off one of the most coveted prizes of the French Academy as a result of his literary ability. The object of his present book is to consider the

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all-important question as to how far the Government of a country is justified in interfering in the conduct of military operations carried on by its soldiers. The first part of the book, which deals with "The liberty of action of Commanders-in-Chief," describes various operations during the Revolution, the Reign of Terror, the Directory, the Consulate, and the first and second Empires, with a view to show how far the military commander was allowed freedom of action and how far he was fettered by political considerations. In the second portion of the book the author gives his views as to the relations which should exist in time of war between a Commander-in-Chief and his Government. He considers that experience and common sense indicate that it is impossible to separate politics from the conduct of war, and that in all warlike operations, not only the soldiers and the Government, but also the diplomat must have a share of responsibility. In time of peace the Government provides the means for making war, the diplomat completes the work of the Government by arranging alliances, and the soldier considers how the means placed at his disposal can best be utilized if war breaks ont. During peace the Government and the diplomat are much in evidence, but the soldier does not appear on the scene. When hostilities commence, however, the state of affairs is quite different. Just as the fireman at the theatre remains out of sight at ordinary times, but becomes the principal figure when fire breaks out, so the soldier, on the outbreak of war, emerges from obscurity and has all eyes turned on him.

Discussing the method of conducting war in the case of monarchies and empires, the author says that it is only natural that the head of the State should be anxious as to the outcome of war, because the stability of his throne often depends on the result of the operations. This anxiety naturally induces the head of the State to interfere in the conduct of the war, especially if things are going wrong. The result of such interference varies in accordance with the military capacity of the monarch, and since it is rare to find a thoroughly capable soldier at the head of a State, Commandant Dupuis comes to the conclusion that it is a mistake for a monarch to interfere actively in military operations. He points out, however, that there are exceptions to this rule. For example, in the Franco-German War the King of Prussia on one occasion intervened most opportunely. It will be remembered that at the end of November, 1870, there was a violent difference of opinion at German Headquarters as to whether the correct course of action was to concentrate all energies on the bombardment of Paris or on the defeat of the Army of the Loire. The King of Prussia decided the dispute by ordering immediate operations against the Army of the Loire.

Writing of the conduct of war in the case of a republic, the author makes the somewhat curious suggestion that Army Headquarters should be accompanied by delegates from the Government, and that they should consult with the Commander in Chief as to how the operations are to be carried on. Commandant Dupuis claims that had this been done in 1870-71 much friction between the civil and military authorities would have been avoided.

Although the views of the author will not be generally accepted by soldiers, the book is so well written and the arguments in it are so clearly put forward that the reader cannot fail to be interested.

AWAKE, YOU BRITISHERS, TO YOUR PERIL FROM OVER-THE-WAY AND HASTEN TO FACE IT. By Colonel Sir Lonsdale Hale. 23 pp. 8vo. London, 1912. Love & Malcomson. 2d.

This pamphlet is based on four articles which appeared during the course of the past summer in the *Pcople*. Its object is to arouse the nation generally to the peril in which it stands at the present time as regards "National Defence." This peril is, the author points out, twofold, including both loss of independence and loss of position.

The remedy lies with the nation itself, and equally concerns every class of the community. No political party will, however, adopt the measures advocated unless and until it is plainly shown that it is the wish of the majority of the people. Sir Lonsdale Hale, therefore, appeals to the voters at large to examine the question carefully and seriously, and to avoid making it a party question. It is to be hoped that this pamphlet will be widely and generally read.

THE STRANGLING OF PERSIA. By W. Morgan Shuster. 367 pp., with 85 illustrations, map, introduction, index, and 6 appendices. 8vo. London, 1912. Fisher Unwin. 12s. 6d.

While opinions will differ on many points in Mr. Shuster's narrative, deductions, and expressed opinions, and while allowances must be made for the circumstances connected with its publication, this book is one full of interest, especially at the present juncture, and will repay careful perusal.

In the Introduction the course of events leading up to the appointment of the American financial experts in Persia in 1911 is outlined.

Chapters I. to VIII. deal with affairs in and connected with Persia during Mr. Shuster's tenure of his appointment as Treasurer-General.

In Chapters IX. and X. Mr. Shuster gives his opinions on the character of Persian officials and people, and of European politics as bearing on Persia.

In Chapter XI, Mr. Shuster deals with the plans for reorganization of the Persian finances.

METHOD IN THE STUDY OF STRATEGY. (La méthode dans l'étude de la stratégie). By Colonel Cordonnier, of the 119th Infantry Regiment. 46 pp. 8vo. Paris, 1912. Lavauzelle, 10d.

The author of this interesting little pamphlet was formerly a professor at the French Staff College, and has recently made a name for himself by the publication of the first volume of his book entitled "The Japanese in Manchuria, 1904." Colonel Cordonnier urges that there is a complete want of proper system in the study of strategy, and holds that it is of vital importance for an army to have a sound strategical doctrine. He insists that the doctrine must be sound, otherwise he considers that it is better for an army to have no strategical doctrine at all. The first step towards the founding of a sound strategical doctrine must, in the anthor's opinion, be a very close and exhaustive study of military history. Cursory perusal of a number of campaigns is practically valueless.

The next point brought forward by Colonel Cordonnier is that strategy should be taught on the ground and not in the lecture hall. Further, he lays great stress on the necessity for imbuing the whole army with the strategical doctrine which, after profound study, has been accepted by its chiefs.

As an example of the lack of study of the strategical lessons to be learned from history, Colonel Cordonnier quotes the action taken by the French when they were some years ago threatened by war simultaneously on their North-Eastern and Alpine frontiers. Had the lessons of 1866 been taken to heart the French would have held the comparatively unimportant frontier of the Alps with their Territorial troops, and would have massed all their best troops at the vital point—the North-Eastern frontier. Instead of doing this, picked troops (the chasseurs alpins) were used on the Alpine frontier, and one of the best generals in the French Army was placed in command there.

To show the results of having an army without a thorough knowledge of sound strategical doctrine, Colonel Cordonnicr quotes the operations on the Valu. Knopatkin wished to gain time for the arrival of reinforcements, and he accordingly ordered the commander of the Russian detachment on the Valu to delay the Japanese by fighting a series of rearguard actions. The reply of the Russian detachment commander to this order was: "The Emperor has made me a knight of St. George, and I will not retreat."

GREMAN AND ENGLISH TACTICS. (Deutsche und englische Taktik). By E. von Estorff. 93 pp., with six sketch maps in the text. Svo. Berlin, 1912. E. S. Mittler und Sohn. 3s.

Recent events have led people in Germany to pay more attention to the British Army and its factics than they have done heretofore. Both the German and British Armies have submitted their factical creeds and regulations to a searching criticism and corrections since the Manchurian War.

The author points out and compares these alterations in his book using as specimens of British factics as they were, the employment of troops in various battles of the South African War, and indicating how mistakes then made are combated in the latest text books,

His closing sentence is illuminating :---

"However efficient the British Regular Army may have become, its numerical weakness renders it scarcely worthy of consideration in an European War; and the value of the Home Defence Force, the Territorial Army, will always remain questionable."

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