This article was downloaded by: [134.117.10.200]

On: 15 March 2015, At: 15:11

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK

Royal United Services Institution. Journal

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rusi19>

Modern Weapons and their Influence on Tactics and Organisation

Captain W. H. James Late R.E.

Published online: 11 Sep 2009.

To cite this article: Captain W. H. James Late R.E. (1899) Modern Weapons and their Influence on Tactics and Organisation, Royal United Services Institution. Journal, 43:262, 1289-1307, DOI: [10.1080/03071849909423663](https://doi.org/10.1080/03071849909423663)

To link to this article: <http://dx.doi.org/10.1080/03071849909423663>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan,

sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

THE JOURNAL OF ROYAL UNITED SERVICE INSTITUTION.

VOL. XLIII.

DECEMBER, 1899.

No. 262.

[*Authors alone are responsible for the contents of their respective Papers.*]

MODERN WEAPONS AND THEIR INFLUENCE ON TACTICS AND ORGANISATION.

By Captain W. H. JAMES, late R.E.

Wednesday, May 17th, 1899.

General Sir HENRY BRACKENBURY, K.C.B., K.C.S.I., R.A.,
Director-General of Ordnance, in the Chair.

I WILL ask you, in the first place, to allow me to express my great regret that the Commander-in-Chief is prevented by a bad cold from being present this afternoon, and at the same time to say, Sir Henry, how much I feel indebted to you for coming forward at such short notice to take his place.

Within the limit of time allowed me this afternoon, it would be impossible to do more than briefly outline the points to be dealt with in my lecture; rather do I hope that what I shall say may form the skeleton to be clothed with flesh and blood by the succeeding discussion.

Napoleon said it was necessary to change a system of tactics every ten years. If this were true at the beginning of the century when alterations in arms were small and unimportant, ten times more true is it at the present day when the improvement in the weapons employed have been so enormous and far-reaching.

At the beginning of this century practically no progress was made in small arms beyond slight ameliorations in manufacture, such as the invention of the inverted touch-hole.

The artillery of the Napoleonic era was very little superior to that of Marlborough's, beyond the introduction of shrapnel, originally known as "spherical case," the effect of which in one instance at any rate, Bull's Battery at Waterloo, was great.

Not much progress was made in the smooth-bore artillery weapon until it was replaced by a rifled gun, both it and the musket remained stationary for fifty years. But in the ten years which elapsed from '55 to '65 European nations armed their infantry with muzzle-loading rifled

weapons, with one notable exception, that of Prussia, who first adopted the needle-gun in '41, at a time when the percussion musket was only just replacing the old flint-lock in our Army. In the same decade, the artillery was also provided with a rifled arm, but no efficient shrapnel was used in any modern European war.

Now we find the latest form of the breech-loading gun, viz., the quick-firer, being introduced in every European artillery, while high-explosive common shell either from howitzer or field guns are being rapidly introduced. The hand fire-arm is a small calibre, long range, flat trajectory, magazine weapon capable of delivering twenty to thirty shots per minute.

The leading of troops on the battle-field becomes every year more difficult. Armies deploy for action at distances undreamt of a hundred years ago. The range of artillery shrapnel enables an efficient fire to be brought to bear on troops up to at least four thousand yards. High explosives are annihilating when they strike, infantry fire is dangerous at two thousand yards and deadly at a thousand yards.

The conditions of war are so altered that it behoves us to inquire whether old methods of handling troops, which still largely obtain, are in any way adequate to the position which has arisen.

The first point to consider is whether the relative advantages and disadvantages of attack and defence have in any way been changed. I think a little consideration will show that this is the case, and that now the tactical defensive is far stronger than it ever was in war. The moral advantages of initiative still, of course, lies largely with the offensive, but a skilfully conducted defensive seems to me to offer opportunities for effects which can scarcely be obtained from a blind offensive. No doubt the man who "goes" for another derives from his vigorous action some advantages. A passive defence can never gain victory, any more than a prize-fighter can win the fight by merely warding off the blows of his opponent; but it is not an uncommon thing for a fencer to allow an adversary to weaken himself by vigorous attack and then to assume the offensive against him when he is tired out by his exertions.

That is the secret of a proper defensive, viz., the power and ability to assume the offensive at the right moment. For instance, Waterloo, where the allies occupied a position affording them fair cover with a view to holding the French. Wellington meaning to assume the offensive as he did at the end of the day, knowing full well that his Prussian allies, by striking on the French right flank, would be certain to give a decisive victory.

It is a curious fact that two great masters of war—Clausewitz and Moltke—have both taught that the offensive-defensive was the strongest form. Moltke says:—

"According to my opinion, owing to the improvement in fire-arms the tactical defensive has gained a great advantage over the tactical offensive. We were always offensive . . . in 1870 . . . but at what sacrifices! It appears to me more favourable if the offensive is only assumed after repulsing several attacks of the enemy."

Wellington is generally looked upon as the great exponent of this system, although two of his most striking victories, Salamanca and Vittoria, were distinctly offensive; but in others he used the offensive-defensive, and Waterloo is a striking example of its value.

The defensive has had its advocates even in modern times, for instance, when the breech-loading rifle was introduced into the French Army Maréchal Niel taught its value, but in the Franco-German war—I speak only of the struggle against the Empire—the defence employed by the French was a passive one, and this can never gain a victory.

Superiority is gained on the battle-field by inflicting loss. If fifty per cent. be sufficient to stop an attack, then we commence inflicting this loss over a longer distance, and, as the pace of the soldier is still the same, over a longer time than hitherto.

Moreover, the defensive has the great advantage of cover. A defensive line well covered with a clear foreground is almost unassailable in front under modern conditions. It is no good deducing lessons from the days of Frederick, or even from those of Napoleon. In both instances troops could get within distances of their enemy which nowadays would mean annihilation, but which they reached with comparatively small loss.

No modern European war even has been fought under conditions which now obtain. To have any idea of what modern rifle fire is capable of we must look to the Chilian war, or even better to our recent operations in the Soudan; and although we cannot in civilised war expect to find an army attack in the dense formation assumed by the Dervishes, yet even admitting this point, the battle of Omdurman clearly shows what the modern rifle is capable of. Similarly the operations both at this battle and at the Atbara plainly prove the value of the modern shrapnel. I shall deal later with the question of machine guns and high explosives. There can be no doubt that the value of artillery fire has enormously increased, that it is far more accurate and its shrapnel shell a far more efficient man-killing projectile than any which has yet been employed in modern war, and that a similar increase in the value of infantry fire is due to the modern rifle.

Now the probability of a man being hit in the open compared with one in a sheltered trench is at least four to one—some authorities put it much higher. If the man thus sheltered can commence to hit his adversary at one thousand five hundred yards while his artillery fire is efficient up to four thousand yards, it is plain that the assailant's task is vastly harder than of yore. True it is that the latter also employs better weapons, but it is *cover* which aids the defensive, and this is only available for the offensive at brief intervals, while for a far longer time the troops adopting the latter rôle must in their forward movements be fully exposed to fire. Moreover, the defensive has another great advantage. It can keep its supports close up to its firing line. This the attack cannot do, as they would suffer equally with those in front, and while thus condemned to a passive part, being unable to fire, they would experience losses fully as great as those of the firing line. For be it remembered

that the ground in front of an infantry position is covered by fire up to seven hundred or eight hundred yards when the defenders are firing against an assailant at anywhere between four hundred to six hundred yards. Unless, therefore, the ground be extremely favourable it is idle to imagine that troops can be led in support of the firing line for any lengthened period. The experience of 1866 and 1870 will be repeated over again, those in the second line will go on to the first line or go back, but they will not continue to advance under fire without making an effort to get at the foe, and failing ability to do so will fall back.

Skobelev appreciated this after the sanguinary assaults on Plevna, and he has left behind his estimation of what is the only possible way of attacking a position, viz., by successive waves of men. The front goes on till exhausted, a fresh wave must then be sent in to carry it on until its impulsive effort fails, when a fresh one must be sent forward to join the advance. But as we have seen, these advances can only be carried on under fire which will strike them while they are advancing, they must be passively carried on because the firing line in front prevents them returning the fire of the defenders. It is hardly necessary to allude to the moral support derived from firing back. The advances then of the supports must be carried out without return, under fire which it is not too much to describe as devastating, ten times as deadly as troops have ever yet been called on to face. Unless the fire of the defenders is diminished, is less powerful than that of the assailants, how can the latter expect to be able to advance? The defenders have the advantage of cover. They will seek for a straight position with no pronounced salients, and with secure flanks. If fairly well placed they put as many rifles in the front line as their enemy's, while their supports will be close up within ten yards in deep shelter trenches. To attempt to push home an attack against them unless their *moral* has been shaken is impossible. The only way this can be done is by artillery fire. For it is more probable that the rifle fire of the defence can be concentrated against the attack than that of the latter against the defence.

Why is this? Because the attack in its advance will have more irregular formations, more salients, and re-entrants than the defence, which will seek as far as possible to occupy a straight line position. To his artillery, then, the assailant has to look to gain the superiority before venturing on a frontal attack. But the universal projectile of modern artillery is the shrapnel, and this is practically useless against troops in shelter trenches. Of course the artillery of the assailant will always have this advantage: that if skilfully handled it is likely to obtain the upper hand over that of the defenders. For the latter must be more disseminated, while the former can, theoretically at any rate, be better concentrated. On this point, however, it must be borne in mind, with the number of guns now employed with the army corps, roughly the same in all countries, viz., one hundred and twenty to twenty-five thousand infantry, that deployed in one line they occupy nearly a mile and a half, *i.e.*, practically the whole front over which the army corps would attack. Greater concentration is therefore only possible in situations in which

tiers of fire can be employed. Guns which are capable of high-angle fire, such as howitzers, or the weapon which I shall later describe, can of course be used for this purpose, but the flat trajectory quick-firer certainly cannot, unless the ground be remarkably favourable.

But let us consider again how this long line of guns will affect both the defence and attack. You cannot have infantry where the guns are. With regard to the former, positions must therefore be chosen where they can fire over the heads of the infantry, otherwise we must have recourse to the old plan of putting the guns some distance in front of the latter, and withdrawing them when the enemy's infantry gets too close. But this would always be difficult and might be impossible, and if neither of these alternatives is available, then the only other plan is to have the guns on the same level as the infantry, *i.e.*, to double the length of the line of battle. Even then you will have this fact to deal with, *viz.*, that for close action the guns are not so good as the infantry rifles.

With regard to the attack. The field guns will be deployed along a line almost the same length as that of the attacking force; the infantry advance will probably take place in fractions through the artillery line, thus allowing the unmasked portions to support them. When the first set of infantry fractions have progressed sufficiently far to enable the whole of the guns to re-open fire, the remaining fractions will go forward, masking for a time those portions of the guns which supported the first infantry advance. When the second set of infantry fractions have gained the ground occupied by the first set, the whole line will be ready to go on once more if sufficient artillery preparation has been attained, the guns firing over them. Against the points in the enemy's line which the general means to capture or break through, the howitzer batteries will now be brought up to supplement the former, with a concentrated high-angle fire, which will often have a decisive effect. I doubt if we shall see many changes of position on the part of the field guns in the battles of the future:—

1. Because of the difficulty of moving such long lines of guns.
2. Because the nearer they get to the enemy, the sooner will they have to cease fire, to prevent hitting their own infantry, and hence it is best to remain in a position whence fire can still be kept up.

Moreover, up to four thousand yards even, their accuracy is very great, and the remaining velocity amply sufficient for proper shrapnel efficiency, and by remaining in this position they will be much better placed to cover a retreat of the infantry, and not have to find new ranges. Do not misunderstand me: I do not say guns will always stop at such a range as this, but I do say that on the whole they are more likely to attain their end by being kept in a position whence they can fire longest with effect. If they accompany the infantry advance, they lose the range and must cease fire, unless on the flank of the attacking force, while under modern infantry fire it will be difficult to get within fifteen hundred yards. I may say that Germany, Austria, and Switzerland have

abolished case shot ; plainly showing that they do not contemplate close ranges for their guns. France has retained them, but given the gunners splinter-proof shields.

If you have followed my arguments, I think you must admit that the success therefore of a purely frontal attack must be, to say the least, problematical. If this be the case, then it is plain that the defensive has gained greatly in comparison with the offensive. I may here call your attention to the fact that the French have abolished the supporting line for an infantry attack, and there is some tendency in Russia to move in the same direction, *i.e.*, to have only one line behind the firing line.

We have then the authority of Skobelev and the view of the French to advocate the successive wave system of attack, both the Russian and the French authorities recognising the impossibility of the ordinary system of a firing line with support and reserves—in other words, admitting the great difficulty of frontal attack.

What are the other auxiliaries which either side can call in ? They are two, namely, machine guns and high-explosive shells. With regard to the former, there can be no doubt whatever that on the defensive machine guns will be of the greatest utility ; they enable a concentrated fire to be poured in far greater than from a similar front of infantry, and hence they increase the fire value of that portion of the line. They are, moreover, very mobile, and can therefore be rapidly brought up to strengthen a threatened point, while they afford a very small target to the enemy. On the defensive, it seems probable that, considering their essential nature, to which I have just alluded, machine guns should not be concentrated. On the offensive, however, I am inclined to think they should be used in small batteries. The experience of our troops in Egypt, and that of the Americans in Cuba, shows the feasibility of this practice. Hunter Blair's battery of six Maxims at the Atbara and Parker's battery of Gatlings in front of Santiago both show that this can be done. To leave the machine guns with the battalions on the offensive would be to degrade them to the position of the old battalion gun, which was an encumbrance to the foot soldier, and of no tactical worth from an artillery point of view. The better plan would be to concentrate the four machine guns of the brigade into one small battery. Such a unit would occupy very little space—axle-tree to axle-tree the four only occupy eight yards. On many a battle-field places could be found where such an organisation could with safety concentrate its fire over the heads of the advancing infantry on the point selected for attack. Parker did this at Santiago. The argument usually employed against concentration, *viz.*, that it betrays the position of machine guns, only applies to them when firing smoke-giving powder. But the best help for the attack will undoubtedly be derived from the use of high explosives. It has justly been remarked that battles are gained not by killing men, but by causing the survivors to run away—in other words, by the moral effect of losses. The more sudden and terrifying these losses, the greater their effect.

There can be no doubt that high-explosive shells are, from the annihilating effect of their explosion, of this nature. Their physical

effect is clearly shown from the results obtained by Elmsley's battery at Omdurman; their effect on men can be deduced from the action of the dynamite guns employed by the Americans in Cuba. These fired a projectile weighing eleven and a half pounds, and which contained three and a half pounds of nitro-gelatine, and had a range of about three thousand yards. Even with such small shells the effect produced seems to have been extraordinarily great. One shell, according to the English Consul, destroyed a house which it struck. Parker, to whose Gatling battery one was attached, says:—"We could drop one within twenty yards or so of the place aimed at. It invariably created a commotion, as may be well imagined, and the gunners of the machine guns were keenly alert to restore order among the Spaniards on these occasions." On one occasion a dynamite gun put a Spanish battery, apparently of three five-inch guns, completely out of action. A shell struck fairly under the centre gun, blew it fully twenty feet into the air, disabled the other two, and killed or wounded most of the men in the battery. The moral effect of the guns in the Puerto Rico expedition also seems to have been great. You must not imagine that this weapon is of the Zalinski type. It is really an ordinary gun, the charge being largely air-spaced so as to reduce the pressure and the explosion taking place in a subsidiary chamber. The advantage of this method of construction over the ordinary howitzer is that it gives a much lighter weapon, as the powder pressures are so much less. Since the war it has been largely improved.

A five-inch gun constructed for the United States Government fires a thirty-three pound shell containing eleven pounds of nitro-glycerine, and with a pressure below two thousand pounds per square inch. Groups of three and four shots at from two thousand five hundred to four thousand yards were contained in a circle of three yards radius. The Board charged with the experiments stated that, in their opinion, "no living being could exist within one hundred yards of the bursting shell." This gun on its carriage weighed thirty-one hundredweight and had hardly any recoil. It is probable that a gun to fire a twenty-four pound shell with eight pounds of nitro-gelatine might be constructed to weigh not more than thirty-two hundredweight with its carriage, *i.e.*, about the weight of the twelve-pounder horse artillery guns. Our five-inch howitzer fires a shell which weighs fifty pounds and contains ten pounds of lyddite, but it is far heavier—forty-five hundredweight without detachment.

For use in the field such a mobile weapon would have great advantages. Its effect would be enormous, whether against troops in the open or behind earthworks—no cover, whether head cover or otherwise, would be any protection. Houses, villages, woods, would be worse than useless, only earth would afford any protection. I venture to predict that we shall see this gun, or some similar one, largely employed in future war. In the meantime, most Armies are introducing high explosives. The French and Germans use them with their quick-firing howitzers. But the United States is the only country which has tried the above described form of gun in the field.

Never forget one point, whatever form of artillery be employed it must cease its fire when the hostile lines of infantry approach within six

hundred or seven hundred yards of one another. The backward action of high-explosive shells takes effect over even a deeper space, so that within, what I may call, collision distance the infantry must depend on infantry fire alone, unless it be possible to support them by machine-gun fire. Of course the defensive here again will have the advantage, as it will choose positions which favour the employment of artillery in rear of the infantry. This fact about the machine guns leads us to another important consideration. Should the machine guns be the same calibre as the rifle? For simplicity of ammunition, Yes; but for real utility, No. Simplicity of ammunition, if carried to its extreme limit, would abolish artillery, and may well be disregarded if the introduction of another calibre can be shown to be of great utility. Now, the considerations which limit the size of the rifle, bullet and charge, viz., the capacity of the man to withstand the recoil and the amount of ammunition he can carry, are totally absent in the case of the machine gun. Recoil has no effect and the cartridges are transported by wheel carriage. An increase in the weight of the bullet giving a higher proportion of weight to diameter, coupled with an increased powder charge to give higher velocity, would produce a much more formidable weapon. A bullet of five hundred grains, with a bore of $\cdot 350$ -inch and a muzzle velocity of two thousand eight hundred feet, would provide a gun which would penetrate all ordinary cover and which could hope to deal with guns in the open.

At Santiago, Parker's Gatlings silenced a Spanish battery firing *en barbette* at one thousand five hundred yards. The gun I propose would be formidable at three thousand five hundred yards, and it would be easier to range than the service machine guns because the effect of the projectiles would be more easily seen. Such a weapon would by its increased range be able to keep up fire over the heads of the infantry from a fairly safe distance and aid an attack when the artillery fire had ceased.

I may say here that I have conversed with officers who have used the machine guns on the Indian Frontier, in the Soudan, in South Africa, and on the West Coast. In the three last instances there was no doubt expressed as to their value, in the first they seem to have been of little use. The reason is obvious. The enemy did not afford a proper target. The weapon for use there is the high-explosive shell.

Those who have followed me will, I think, agree that more than ever the Napoleonic maxim is true: "*Le feu est tout, le reste n'est rien.*"

Let me, then, briefly review the situation.

Owing to the improvements in weapons the moral advantage of the attack have largely decreased in value when compared with its material disadvantages. How far these may be counter-acted by the introduction of high explosives cannot be seen till tried in war, but these bid fair to be the predominating factor on either side, for they will destroy the cover of the defensive and any large targets such as massed troops or guns in the open.

Attacks will, of course, be necessary, but these will usually take the form of a holding attack in front, the main efforts being delivered

against the flanks. Such out-flanking movements must necessarily be wide, and yet must be fairly sudden if they are to succeed, for otherwise they will only result locally in frontal attacks. Hence the troops that conduct them must be mobile. Again, to ward off such attacks, or to assume the offensive from the defensive, mobility is again required, as the troops for the counter-stroke must be kept back out of fire till wanted. Infantry, artillery, cavalry, all alike, must be organised so as to develop this quality in the highest degree. The foot soldier, especially, must carry nothing more than is absolutely necessary. For instance, the thousand men a battalion each carry a pair of boots. Yet within a fortnight of commencing operations we know that the battalion will not have more than eight hundred men in the ranks. Surely it would be better to carry five or six hundred pairs regimentally. The soldier should have little beyond his canteen, rifle ammunition, haversack, knife, water-bottle, intrenching tool, and some cover for the night and for sleeping. The man will no longer be bound up in the wilderness of straps in which he is at present imprisoned. The Norwegians have recently made a novel departure, which is worth alluding to. They have abolished the great-coat, which gives but poor cover at night, and substituted for it a thick fisherman's jersey weighing two pounds three ounces, and a sleeping bag of three and a quarter pounds weight. The arrangement is considered most satisfactory, and seems worthy of trial.

I have said nothing about the cavalry. In the actual line of battle, with flat trajectory weapons, their chance of success must be small, so long as the enemy's infantry is not demoralised; but the moment that the courage of the defenders fails and they begin to fly, then is the time to let loose the horsemen. But still a great deal may be done by an active cavalry, in the shape of wide turning movements. The British cavalry division, with its mounted infantry, two batteries of artillery, and eight machine guns, seems particularly adapted for such employment. The effect of such movements disturbing the enemy's flank and rear may be very great.

Will cyclist infantry be much employed? I confess to doubting it. They occupy such a great length when marching, coupled with the fact that their machines when the men are dismounted cannot be kept close together, on account of the difficulty that would arise if it were required to mount them quickly. Their true function is in small bodies to support cavalry, or for very rapid movements and for reconnoitring. For the latter purpose they have the very great advantage of being noiseless.

Lastly, I would like to say a few words about training. The true foundation of training is a proper system of discipline, without which, it is impossible to handle troops under modern fire. The next is a proper instruction in the use of their weapons. What was it that made the English archers so celebrated? Their fire, which was accurate because it was a matter of daily practice to them. What was it that made the English infantry so redoubtable at the beginning of this century? Their fire. It is true they had a more powerful weapon than their adversaries, for Brown Bess fired a bullet of fourteen and a half to the pound with six

drachms of powder, against the French musket with a ball of seventeen to the pound and a smaller powder charge. But you will find that even in the Peninsula itself a good deal of time was spent on target practice, and, moreover, the two-deep line was superior in fire power to the formation of their adversaries—this superiority of fire it was, not the bayonet, which gave to us the victory. As it was then so must it be now. The men must be taught by constant practice to shoot well.

Another point which must not be neglected is the use of the spade. Cover is not only necessary for the defender. The assailant may have to use it, for in the battles of the future, which may last for more than one day, it will often be difficult to bring up the forces sufficiently early in the day to lead to a decisive attack before night-fall. In such a case the infantry should advance as far as it can without undue loss, and cover itself with shelter-trenches, thus making a defensive position. Behind this, troops should be accumulated in sufficient number, under protection of the night, so that at break of day the enemy's position may be rushed. It may be, however, that the first day of battle would only allow a position being taken up to cover the formation of the artillery line to batter the point or points selected for attack, and in this case the infantry should not be pushed forward until sufficient effect had first been obtained on the next day.

Our organisation must also be mobile. Napoleon declared that what he wanted was "*activité, activité, activité,*" and surely no general more fully carried out this maxim. I think myself the ideal army corps will consist of three divisions, and no corps troops, which had better be distributed for rapidity in marching. Two brigades of five battalions each with seven batteries of artillery, of which two or three should be for high explosives, and the usual engineer and supply organisations, would form a handy force capable of independent action. For difficult country, such as the Indian Frontier, no organisation should go above a brigade, for the divisional organisation is only adapted to long lines of battle.

But no system is of any good unless it fully embodies the spirit of the nation, and our studies are scarcely directed in the proper way to foster it. The people read with avidity, but with unretentive memories, the despatch of the correspondent who records the heroism of some small hill-fight or bloodless battle waged against an ill-armed foeman, but the study of our ancient records, the deeds of the Black Prince, one of the most original tacticians who ever lived; the nearer history of Cromwell, a far-seeing strategist and most consummate cavalry leader, remain unstudied; while the deeds of Marlborough, the forerunner and inspirer of Napoleon in at least one campaign, are totally neglected and entirely unknown in their influence on military art. Even Wellington, the first appreciator of the predominating factor of war, viz., fire, has never yet received his due meed of praise; and yet the spirit which won Crécy, Poitiers, Blenheim, Oudenarde, Salamanca, Vittoria, is still existing among us, though dormant—I had almost said despised. Ever and anon as at Delhi, at Kabul, at Isandhlwana, it has shown clearly forth. Men have held their lives as nothing compared with the honour of the flag,

and that spirit properly directed, wisely trained, and ably led, will as of old know how to lead the invincible legions of the three nations to ever-succeeding victory, because officers and men alike are endowed with that inestimable gift: the inability to appreciate defeat and the deep-seated desire to win a victory.

Colonel W. J. ALT (22nd Middlesex R.V.):—It is impossible, Sir, for any speaker in the time allowed for discussion to review the whole of the paper, to the reading of which we have listened with great interest. There is, however, one point upon which I should like to make a few remarks, and that is the question of machine guns. Associated as I have been with the use of machine guns with infantry since the invention of the Nordenfeldt gun, and having, as I may claim, introduced them into the British Army, it is particularly gratifying to me to find them alluded to in the manner they have been by Captain James for use in the attack. When I first attached machine guns to my battalion, they were looked askance at by the authorities; later on they were considered to be good for use in defensive positions, but whenever I attempted to use them with advance guards, or with an extended line in attack, my ideas were more or less ridiculed, and I was told that it was out of the question to deal with them in such a manner. Happily their tactical value, both in defence and attack, is now better appreciated. We have no experience in European warfare as to what the effect of machine guns, properly handled, would be.¹ The lecturer has called our attention to their effective use in the late Spanish-American war, and so far as the working of those guns with infantry at peace manœuvres, over any sort of ground, can guide us as to their use in warfare against European troops, I entirely endorse the lecturer's views as to what might be done with them in the advance. I cannot agree with him as to their being used massed together, because I consider one of the great values of machine guns is the small target which they would offer in whatever way they may be used. If you put three, four, or five together, you form something which the enemy's artillery would pick up much sooner than if they were worked singly, and, in attack, sneaked up on the flanks of a battalion. Another thing I may say is, that with the improvement in the manufacture of steel machine guns, carriages can now be so constructed as to carry a shield which will resist or deflect rifle bullets and shrapnel, and form a perfect shelter for the gun detachments. Machine guns so handled would be a very great moral support to the firing line which they accompanied. So long as the men pushing forward found there was something holding its ground and not being annihilated, they would be encouraged to hold on also and continue the advance. Then comes the question of what sort of mounting and carriage should be used. I have never been in favour—as those who know how I have been working my guns are aware—of using animal traction. You want to diminish the target, and therefore you do not want, and indeed you could not have—at least in the attack—a limber and mules in the first wave or the second wave, or whatever the formation for advance might be; and I adhere to my belief that a lightly constructed handy carriage on two wheels, drawn by hand, containing its own ammunition, and with a trail forming a tripod and consequent rigid platform, whatever the nature of the ground, is preferable to any other system. The guns might be brought up, if you like, by animal haulage, but as soon as you launch them in the attack you must have guns which can be easily handled by the men, who can pick them up and move forward or retire with them, and which form a very small target indeed. As to calibre, I think that is an open question. No doubt the advantages of having the same ammunition as that used by the infantry are very great, because you can carry a larger quantity and can

¹ The use by the French in 1870 of immobile batteries of mitrailleuses, massed in defensive positions, was not a valuable tactical lesson, but no doubt influenced military opinion in questioning the value of a mobile machine gun for all purposes. —W. J. A.

replenish to some extent from the pouches of men who are placed *hors de combat*, and so pick up some ammunition as you go along. On the other hand, there is a great deal in what the lecturer says, that barrels like I am at present using, viz., the old Martini-Henry, would certainly be much more effective against shelter trenches than the small bore. All I can say is, in conclusion, that so far as my experience goes in handling machine guns for fifteen years, with marching columns, and at peace manœuvres, working them always by hand in all weathers, by any roads and across any sort of country, I certainly think they will form a most valuable adjunct—not massed together, but used independently with battalions—in future attacks, no matter what enemy you are dealing with. I will not discuss the possibility or impossibility of carrying a position by frontal attack, but the attempt must be made, and the more fire you can bring to bear, either of continuous volley firing or by the fire of one or two machine guns with each battalion—which is practically volley firing—the more chance you will have to creep up and perhaps find an opportunity of rushing in under the cover of the machine guns, after the preliminary weakening of the position by artillery fire has been brought about.

Lieut.-Colonel E. GUNTER, *p.s.c.* (late East Lancaster Regiment):—I am sure that the members of this Institution are very much indebted to Captain James for giving so much of his very valuable time in preparing and delivering the lecture which we have heard here to-day. We are always glad to welcome him; he always keeps us up to date. There are one or two points, perhaps, concerning which I, as a student of tactics, may venture to differ a little from him in his method of treatment of the tactics of the present day. I think he lays almost undue stress upon the great advantages of the defensive. It is true that smokeless powder increases the advantage of the defensive, as it enables the defenders to conceal their position; but I think great stress should be laid, which the lecturer has not done, upon the counter-attack. He spoke of cover in purely passive defence. I think so strongly on the subject of the counter-attack, which has attracted a great deal of attention lately, that I quite agree with what the well-known Staff College Professor, Colonel Henderson, said the other day at a lecture at Aldershot, that he would abolish the words "offensive" and "defensive" and substitute "attack" and "counter-attack," leaving the word "defensive" to apply to those rare occasions where a passive defence must be taken up, such as where you are awaiting reinforcements, where you are in very inferior strength, etc. Captain James has not alluded to supporting the attack by a fire from the flank by infantry, not the infantry advancing. I think that if properly conducted the attack still has many advantages. Nothing could exaggerate the great moral effect of the attack. I think all will allow that in a small position the defence has *primâ facie* a great advantage; but when you come to an immense position like Gravelotte, it is extremely difficult for a commander to overlook the whole. You cannot get over this fact, which is, of course, repeated in all the text-books and is well known, that the attack has only to make an entry at one point in order to be successful, whereas the defence must be successful all along the line. Captain James has alluded to the French having done away with the supports of the firing line because they cannot fire, but will be exposed to fire. I think, perhaps, the moral effect of a supporting line has been overlooked. That moral effect cannot be ignored. If the troops advancing to the attack have no troops within five hundred and fifty yards of them, they turn their heads over their shoulders with the old cry, "Where are the supports?" The lecturer states that supports following in rear of a firing line will be exposed to the same fire. But General Rohne, who is an authority, and has written a great deal on this question of artillery and infantry fire, states that if the supports are kept at a distance of two hundred and twenty or two hundred and thirty yards behind the firing line they would not suffer. A recent well-known writer on tactics in Germany comes to this conclusion, that it is best during the advance, probably for the moral effect, to keep a line of support; but that when they come into decisive infantry fire

distance, about five hundred yards from the position, to let them merge in the firing line. I quite agree as to the desirability of having a lighter gun firing a high explosive, and I think we are very much indebted to Captain James for his most interesting remarks as to the use of the American gun in Cuba. I cannot go through all the questions raised in the paper, as we did not get the synopsis in sufficient time before the lecture to enable us to study it; but as regards one other point, viz., organisation, which I agree with Captain James might be improved, I venture to ask whether the present organisation of three divisions in the corps would not be improved by having three brigades in the division instead of two. That will give the English division twelve battalions as most foreign divisions have. With regard to the advance to the attack, I also notice Captain James lays great stress upon Skobelev's plan of advancing by successive waves. But were they always successful? Did not that advancing by successive waves lead them to be destroyed in detail, and did they not suffer immensely in the attacks on Plevna? Were they not destroyed one after another? A strong attack, strongly developed from the first with supports, provided they are kept at an adequate distance from the firing line, seems to me likely to win the day.

Major A. W. POLLOCK (late Prince Albert's, Somerset Light Infantry):—Captain James has called our attention in the very interesting lecture to which we have listened, to two things. First, the real subject of the lecture, namely, changes in tactics produced by the improvements in modern weapons; and, secondly, he has compared the advantages of the offensive and defensive. He reminded us of Napoleon's opinion that "fire is everything and the rest nothing." I take it that is the key to the whole situation. At the Albara the British Army won because the fire of the attack was superior to the fire of the defence. On the other hand, the Dervishes were beaten at Omdurman because the fire of the defence was superior to the fire of the attack. That superiority of fire can be got in two ways, either by superior weapons or by having superior men behind the weapons. I do not think, when we come to compare the future with the past, that there would be the same disparity between an attacker armed with, for example, the Martini against a defender armed with the Lee-Metford, as there was between the Germans armed with the needle-gun and the French armed with the Chassepot. I believe that the Chassepot was superior to the needle-gun by as much as the Lee-Metford is superior to the Martini, and yet, notwithstanding that, the better trained and better led troops won—nearly always on the offensive. Theoretically, with modern weapons, no attack is possible. In theory, the whole ground in front of the defenders' position is so covered by fire that it is impossible for any man to go over it and live. But fortunately—or probably unfortunately, because if attack were impossible war would cease—so far from every bullet having its billet in the ordinary acceptation of the term, the billet of most bullets is mother-earth. As an example, the 38th Brigade at Mars-la-Tour had fired against them, according to Balck, an average of 452 rounds for every Prussian knocked over. I think the total number of rounds fired against the 38th Brigade was 194,000, with the result that one man was hit out of every 452 rounds. That was in the case of an advance chiefly in the open, cover not good anywhere, and in some places none at all. Of course that attack was a failure, partly because it was executed against odds that were absolutely overwhelming, and partly because it was not very well organised. At all events, it came to grief. The difference, to my mind, between the attack of the present day with modern weapons and the attack of long ago lies chiefly in the questions of time and distance; that is to say, the long-range weapon becomes effective at a distance which was unheard of a hundred years ago, and the troops consequently come under fire earlier and are under fire longer. They begin to suffer from the fire at, we will say, 2,000 yards, and continue suffering more and more as they go in. One would imagine the result of that to be that the attack would come to a standstill and fail to get to close ranges. So it would, except that we come to

the old question, Whose fire is going to be the most effective? As Captain James has reminded us, it is obvious that the defence has advantages in the delivery of its fire which are not enjoyed by the attack. The men are under cover, they are not fatigued, and consequently they may be expected to shoot better. So long as they remain unshaken and undemoralised by the fire of artillery or of infantry, obviously the attack cannot close with them; but if there is to be a victory won, it is just as clear as ever that the attack must close with the defence and cause the defenders to run away at the sight of their bayonets—or by the feel of them, if they stand. Unless the attack can, in some way or other, close with the defence so as to make the defenders run away, there can be no victory any more than there can be victory on the part of the defence except by a counter-attack which causes the attackers not only to cease to attack but to run away from before the position which they have assailed. I saw it stated the other day, in a military paper, that because modern weapons are so tremendously effective at long ranges the battle must culminate at about 1,000 yards. In other words, the attackers, when they come within 1,000 yards, are to be content to shoot, and to be shot at, until one side or the other resigns the contest. It would not be the slightest use to depend upon an attack of that kind, because it is just as imperative for the attack to close with the defence now as it was in the days of Julius Cæsar. It has got to be done somehow. How to do it is another matter. Colonel Alt reminded us of the fact that both sides at the present day are armed with weapons of equal power, therefore it is merely a question of having more weapons on one side or the other, or having the better men to use them. The battle will be won by the side which, at a distance of 400 or 500 yards, has got the best of the fire fight, whether it be the attack or the defence. If the attack can get so near as 400 yards and there maintain itself, nothing can defeat its assault unless it be a counter-attack, and that counter-attack will have to be made by troops that have not yet suffered appreciably from the fire of the attack.

Major L. C. JACKSON, R.E. :—I did not come here prepared to address this audience, and I should not have ventured to do so, but that I think one practical point has been passed over rather lightly by the lecturer—one which seems to be always passed over with equal lightness by all those who consider the subject of defensive actions. I allude to the actual construction of intrenchments. If I understood Captain James rightly, in giving weight to the chances of a force acting on the defensive, he is assuming that it is to be intrenched. Now, I fully agree that with good trenches the defence will have an excellent chance against the attack, for if the defending infantry can have good protection against the artillery bombardment, it will be in good condition to repel the subsequent infantry attack, and will probably do so. But the question is whether, under existing circumstances, you can extemporise good trenches, and my opinion is that you cannot. People seem to think that if a general decides to intrench a position he has only to give the order and it will be done. But the question is, How long will it take and with what tools is the work to be done? There are good trenches and bad trenches. If you ask infantry to intrench themselves in a given position, you will find after a couple of hours that they have scratched an irregular hole in the ground about a foot deep and two or three feet wide, and in this they propose to get cover against artillery fire! Anyone who has seen practice against such trenches at Okehampton or elsewhere, will know that the cover which is supposed to be gained is a perfect fraud. Again, people talk about the advantage of trenches from certain modern instances, as if those trenches which had been most successful in war were extemporised under the ordinary conditions of the battle-field. Zewin in the Russo-Turkish war is cited as an instance. Now, in that case, the Turks had been in position about a month, and they had excavated trenches four or five feet deep and wide with strong parapets. It was no wonder that the Russian artillery could not drive them out and that they made an excellent resistance. On the other hand, at a battle a little later, in the

same part of the world, Aladja Dag, where the Turks had again intrenched themselves, but with less labour, the trenches were of bad profile, and the consequence was that the defenders were hammered out by the Russian artillery before the assault. The attacking infantry had nothing to do. The point I wish to make is simply this, that trenches to be of any use against artillery fire must be of good profile, and such trenches cannot be made in an hour, or even by most battalions in a morning, with light intre-aching tools. If you are going to depend upon trenches as an important factor in your defence you must give your men something with which they can dig ; you must train them, and you must accustom the officers to lay out the trenches quickly and make all the necessary arrangements for their construction.

Captain JAMES, in reply, said:—There is very little for me to say in reply, because I think practically most of the speakers have agreed with me. Colonel Alt. rather objected to my views about massing the machine guns, but at the same time he said he thought they ought to be drawn by man traction as opposed to animal traction. It seems to me if you draw it by man traction that you will put down the target to very small dimensions. I therefore cannot see that the objection to massing the guns because they make such a target will hold good with man traction, and certainly the effect of the massed guns will be greater than with only one. The objection to massing was really aimed at guns with smoke-giving powder. This is no longer used. There is another little point to which Colonel Alt alluded, viz., the fact that if you have the same calibre as the rifle, you will be able to fill up from the men's pouches who have fallen on the field. Yes, but you have to fill the belts also, and that is rather a critical thing to do under fire, and I do not think it would be very actively carried out. My old friend Colonel Gunter said that I had stated nothing about the counter-attack. I must say I think that is rather hard, because I did flatter myself that I had said a good deal about it, and I gave what I thought was rather an apt simile, saying that the prize-fighter who merely wards off blows and does not strike back, will not gain the victory, and that my view was rather in favour of the fencer who, having exhausted his adversary, proceeds to attack him and beat him. Counter-attack is the essence of the defensive. Again, with regard to the point he brought out about fire from the flank by infantry, that is all very fine, but where are you going to get your flank in a long line of battle? It does not follow that there will be any position from which you can get a flanking fire to bear on the line. For instance, at Albara the machine guns on the left were able to sweep the intrenchments, but if that line had been ten miles long they would not have been able to do so. Therefore, although you may be able to get this flanking fire against an enemy when you are attacking only a small front, it does not follow that you will be able to do it when you are attacking a long one. Colonel Gunter said that Gravelotte was an example of the weakness of the defensive. There I join issue with him completely. I say that Gravelotte proves that a proper defensive is a very valuable form of fighting a battle. I say that that was shown by the action of the second and third French corps on the left of the line. The losses in these corps were small compared with what they were on the other side of the French line, and they certainly gave the Germans quite sufficient to do during that battle. Now we all know that the action of the seventh and eighth Prussian corps against the second and third corps was practically nothing. They could not get beyond the fringe of the woods which were some distance from the French line. They lost enormous numbers of killed and wounded, and no practical result was obtained by the German attack on the French left. Why was that? Because Frossard, who, my friend Major Jackson will forgive me for saying, was an engineer, had made use of trenches which he was able to throw up, which afforded such efficient cover that the loss in his corps was very small for a fight which lasted such a number of hours.

Lieut.-Colonel GUNTER:—I did not say Gravelotte, I merely said a large position like Gravelotte.

Captain JAMES:— I do not wish to argue with you about the matter; perhaps my hearing was deficient. You must not judge anything by Gravelotte, because Bazaine handled his troops so badly. If he had had his reserves on the right flank; I do not think that the German Guard Corps and the Saxons would have been successful against him, and certainly if he had had them there, there was a very excellent opportunity for a counter-attack. The French Guards could have done something by coming from between Amanvillers-St. Privat against the tired-out Prussian Guards. With regard to the great advantage to be derived from the moral effect of supports, if those supports are non-existent, as I think they would be under modern fire, where is the moral effect? The wave system is the only one which can be employed for frontal attack. I know General Rohne gave a range of two hundred yards beyond which the supports were fairly safe, but do not forget that the French consider the ground up to six or seven hundred mètres in front of this position will be swept by modern infantry fire. Of course it is quite open to argument whether we should have three brigades in a division. Tripartite organisation is, no doubt, a very good one. The only reason I suggested five battalions instead is this, that if we are to have a division consisting of all arms, all the corps troops being split up amongst three divisions, you would, if you had three brigades, get rather a large unit moving on one road. My friend Colonel Alt said that I had not assumed that both sides are equal. I stated most emphatically that both sides were supposed to be armed with the same weapons. I know that he is greatly on the side of the offensive, and I remember that he once gave a lecture in this Institution, when I supported him in the views which he put forward. But I think things have changed since then a bit, and that the great improvement which has since taken place undoubtedly puts the advantage on the side of the defensive, because they can use cover, which the attacking side cannot. There is one thing I should like to say on the question as to battles being less sanguinary now than formerly. At the point where actual collision takes place the leading company of the leading battalion is annihilated, and that battalion itself suffers huge losses; but these take place only at the decisive point, and in the other portions of the battle-field the losses are not so great; so that although the absolute loss to the colliding bodies is very great, over the rest of the field the losses are not so large, and therefore the total average is less. There is also another thing to be said. We have actually reliable statistics nowadays, and I very much doubt the statistics of former times; I do not know who got them or how they were got, or anything about them. At Borodino there was said to have been a loss of a quarter of the troops engaged, whereas we know that in the great battles of the Franco-Prussian war, about one-eleventh were placed *hors de combat*. I agree with him in what he said about the old guns. I very much doubt whether any gun can be invented—except, perhaps the automatic machine gun—which delivers a deadlier fire than the old gun did within grape ranges. Within six hundred yards of the enemy I rather suspect that the fire was as hot as it could be. It would be better if it had been from a quiet fire, but it was very powerful, and the effects obtained from it were very striking. I think there is nothing to say in reply to Major Pollock: he practically agreed with what I have put forward. As to Major Jackson's remarks, I should like to endorse most emphatically the view which he puts forward about the Wallace spade. It is a most excellent thing; it is the sort of thing which is advertised for tourists; it will make an excellent hat-box, and can be turned into a piano-organ, or something of that kind, but for digging purposes I do not think there is much in it. When the Russians passed over the Balkans to go to Constantinople in 1878 they had suffered at Plevna, and they had learned by experience, and they therefore carried the long-handled spade which the foreign farmer uses to dig with. I think that is a great proof that the men appreciated the value of having a proper intrenching tool with them. It was said that the one thing they would not part with was the spade which they had picked

up in the later operations round Plevna. One great reason why the French were beaten at Gravelotte was because the troops on the right were not properly intrenched. Had the Guard Corps been on the right instead of on the left, where it was almost useless, the Germans would have not gained the victory they did. I may tell Major Jackson that I once saw under fire the half-hour shelter trenches very well put up in ten minutes.

The CHAIRMAN (Sir Henry Brackenbury):—I am sure you will all join with me in thanking Captain James for having given us a most extremely interesting lecture. He is one who has given a great deal of thought to the subject on which he has spoken, and I, for one, always feel that I learn whenever I have the pleasure of hearing him. It is about 26 years since I gave a lecture in this Institution, at the request of the Council, on the tactics of the three arms as modified to meet the requirements of the present day. The "present day" is 26 years old now, yet it seemed to me, in listening to the lecture to-day, and the discussion which followed upon it, that I was hearing over again almost exactly that which I said myself 26 years ago, and what was said in the discussion which was raised upon it by the able speakers and thinkers who spoke on that occasion, General Sir Patrick McDougall, Sir Edward Hamley, Sir George Colley, and others, who were great authorities at the time on the subject of tactics, but who have now passed away. After all, we are simply repeating to-day what was said then, that improvements in weapons have made the attack upon a properly defended position more difficult than of old. The same question was raised then as now, as to how that attack was to be carried out; the same question that flank attacks would always be attempted if they could possibly be made, was raised then as now. I think there is the same recognition now, as there was then, of the fact that it is quite impossible to depend solely upon turning the flank of a position, and that we must, come what may, be prepared to force the position held by the enemy in front. Now there is this difference in what took place 26 years ago and what I heard to-day. There are certain terms imported into the discussion to-day which were then more or less unknown. The first of these is "machine gun." Machine guns were not unknown then; but they have come since into very much greater prominence. I think that in this country full importance is given by the authorities to the value of machine guns. But it must be remembered that there is always one difficulty in connection with machine guns, and that is ranging them—the fact that we do not see with them as we see with an artillery, where the projectiles fall, and that we cannot get our range with the same ease. I learn that at the battle of Omdurman both Maxim guns and infantry were taking their ranges from the artillery. That is the first time I have ever heard of that being done. Coming to the next new subject which is mentioned, viz., quick-firing field guns, Captain James said that almost every nation has now got quick-firing field guns. I venture to say, if he will pardon me for what appears to be contradicting him, that so far as I know, no nation except one has got a true quick-firing field gun. They have what are called quick-firing field guns, but they are not quick-firing field guns. Russia, Austria, Germany, and other Powers like ourselves, have got an improved field carriage which lessens the labour of the gunners and which does increase the rapidity of the fire. But that is far from being a quick-firing gun in the sense that we understand a quick-firing gun as mounted in our fortresses. But, unless I am mistaken, you will shortly hear that quick-firing field guns will be in the hands of the French troops this autumn and used in the manoeuvres. You will shortly learn that the French have got a real quick-firing field gun, but at the same time, I think, you will learn that that real quick-firing field gun has been attained at the expense of reducing the weight of their shells from 15 lbs. to 7 lbs. The French think that this will require changes in tactics. They say they have a gun which is, in all senses, a perfect quick-firing field gun. The layers of the gun sit down, and the firer of the gun sits down. There are seats provided on the

carriage, and they can fire an incredible number of shots in a minute. They claim that these small shells which they propose to fire will require an actual modification in tactics. Whether that will be so or not remains yet to be proved. Whether the effect of quick-firing field guns or the effect of increasing the rate of fire of our present field guns—perhaps nearly doubling it, as I hope we shall be able to do—will favour the offensive or the defensive, I should be very sorry to predict, because I think it always comes back to the same old problem. The troops on the defensive, if they have time to prepare their position, have undoubtedly a great advantage in giving their men shelter, but the offensive always has the great advantage that it can select the weak part of the enemy's position, and can concentrate its fire upon that part. It has been said, however long the line of defence may be, however perfect it may apparently be made, if it is broken in any one part, two flanks are at once turned. The third point which is new since the time of which I have been speaking, is the question of high explosives. I am inclined myself to think that the value of high explosives in the field has been somewhat exaggerated. I have seen a great deal of fire of high-explosive shells; I have seen a great deal of fire from 9·2-inch guns, and from 6-inch guns, and from 8-inch howitzers, 6-inch and 5-inch howitzers, and even from our 12-pounder guns, and there is no doubt of this, that if with howitzer high-angle fire you can get your shells behind the cover, you can do a work of destruction, or of alarm, which is equal to destruction, that you cannot get from any shrapnel fire when men are protected by works. But from what I have seen of the power of the very small shells, that is to say the 12-pounder or 15-pounder shells, with high explosives, I believe them to be practically worthless. The Germans use high-explosive shells for field guns, and fire with time fuses. As you probably know, the great difference between the bursting of a shell filled with powder and the bursting of a shell filled with high explosives is that the angle of opening of the high-explosive shell is very much greater, that is to say, when a powder shell bursts, pieces go forward in a cone with an angle of about 60°, but when a high-explosive shell detonates the pieces are thrown to right and to left and upwards and downwards at an angle of 180°. And the contention of the Germans is that if you burst these shells exactly over the men who are under shelter, the pieces will go straight down upon those men and will kill them. The shrapnel cannot search them out, because they are hidden by the shelter. I can only say that we tried that exhaustively. We put up light screens and burst the projectiles on the screen right over the heads of dummies placed where the men would have been, and we got practically no result at all, although we have got quite as good high explosives and fuses as the Germans. When using shells with time fuses it simply comes to this, How far can you depend upon your time fuses bursting the shell exactly in the right spot? You cannot depend upon it. At 2,000 yards range a difference of one-tenth of a second in the burning of a fuse makes a difference of 100 feet in the position of a shell when it bursts. When you use high-velocity, high-explosive shells with percussion fuses against troops under cover, then you get the same difficulty. As with shrapnel, you have to get through or over the shelter behind which the men are; whereas, if the men are in the open, not behind a shelter, there is no single shadow of doubt in my mind that shrapnel is better than any small high-explosive shells ever invented. Then with regard to howitzers, all Powers have now got them firing high-explosive shells, but only in comparatively small numbers, and those howitzers will be useful for searching out cover which shrapnel cannot search out. There is very little doubt about that, but it must be remembered that these are more or less heavy guns, that they are not mobile in the sense that field artillery is, and I do not think that we shall get that enormous amount of advantage from these high explosives in the field which is generally attached to them. I would like to say one thing more with regard to high explosives. Captain James alluded to the gun which the Americans used in Cuba. That gun is one of the guns with air-spacing

and all sorts of complicated arrangements, which the Americans, I suppose, used because they were under the impression that those arrangements were necessary in order to be able to fire high-explosive shells with safety. But they are not necessary. We fire our high-explosive shells with the ordinary service charges from our 9·2-inch guns and 6-inch guns, and all other guns, and they are just as safe as any other explosive shells. We are going to introduce them into all our fortresses; the Navy have introduced them for use in ships, and they are just as safe as any other shell. You do not want all those complicated arrangements which the Americans had in their guns. The next point I would touch upon is one upon which Captain James spoke, viz., the question of organisation. I think he spoke of doing away with the corps troops. It was rather curious to me to hear what Captain James said with regard to the Germans, and it will interest him to know that the Germans have abolished the corps artillery, and are dividing it up among the divisions of the Army, with the exception of the howitzer batteries. I am not sure whether those are to be attached to the corps, or to be distributed among the divisions. My own personal opinion is that that is right, and I should personally like to see in our Army, with our three-division organisation, which I like, those three brigade divisions of artillery which we have with the corps artillery put one to each division of the Army. But that theory does not hold favour with the highest authorities in our Army, and it will not be done. Then, to conclude, it comes after all to this, that the best men will win, say what you will. You may have the best weapons in the world, and if your men have not the heart to use them, you will be beaten. Where you have equally good weapons it is the heart of the men which will win. That brings us to the great question of the training and discipline of the men. Once, when I was Military Attaché in Paris, I was holding a conversation with Gambetta, and he said to me, "In these days there are only two things which a soldier need know: he must know how to march, and he must know how to shoot." I said, "I beg your pardon, Excellency, there is a third thing, which you have forgotten." "What is that?" said he. And I replied, "He must know how to obey." It is not enough to know how to march, it is not enough to know how to shoot; there must in addition be fire-discipline, and that fire-discipline comes of the soldier's knowing how to obey—to obey not merely with a blind obedience, but with an obedience which comes from faith, faith in their officers, faith in their justice, faith in their knowledge, faith in their skill, and faith in their being the soldier's true friend. In that I must say I do not think the British Army has any reason to fear that it is behind any other Army in the world. Be the tactics what they may, when the day of battle comes, in that respect I think—and I look upon it perhaps as the greatest of all—we need not be afraid. Gentlemen, I ask you to return a very hearty vote of thanks to Captain James for what has been a most interesting lecture.