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CONTINENTAL *versus* SOUTH AFRICAN TACTICS: A COMPARISON AND REPLY TO SOME CRITICS.

By *Lieut.-Colonel F. N. MAUDE, p.s.c., late R.E., Commanding
Hampshire Royal Engineers (Vols.).*

Thursday, 6th February, 1902.

Major-General H. M. BENGOUGH, C.B., *p.s.c.*, in the Chair.

DURING the past eighteen months the papers have teemed with proposals and suggestions for the reform of our system of military training. These have been contributed by all sorts and conditions of men—statesmen, soldiers, journalists, and “the man in the street”; and, as far as my study of their writings has gone, all appear to start from the proposition that the fire of the magazine rifle has proved “unprecedented” and impossible to be faced. Since, if examination shows that this presumption is not justified by facts, these propositions not only fall to the ground, but become actively injurious to the efficiency of the whole Army, by impairing that spirit of attack on which alone all fighting which aims at a decisive victory is based, it seems necessary to analyse very carefully the facts on which they are founded, facing them in their naked significance without partiality, favour, or affection.

As a type of this criticism, I select the following passage from a little book on the war which has been very favourably reviewed and widely disseminated:—“Our infantry has been compelled to abandon the formations inculcated in the Drill-book, not because the Boers undoubtedly have shewn wonderful skill in availing themselves of cover, nor because they have selected positions with abnormal judgment, or because their marksmanship has been of an exceptional character, but *because they are armed with the Mauser rifle.*”

This sentence appears to me to embody in brief the whole position of the numerous critics of Continental methods, which until very lately were also our methods, for the training and employment of troops in war; they all, from M. Bloch downwards in varying degrees, according to their ability as controversialists, maintain the thesis that in face of the enormously increased destructive power of modern infantry armaments,

the principles laid down for the conduct of warlike operations in all countries require grave modification.

They have, however, all alike omitted to prove the first proposition of their syllogism, confining themselves to the mere repetition of such epithets as "unprecedented," "appalling," and the like; considering, no doubt, that the admitted fact that modern breech-loaders are stated to have a rate of fire of some 30 shots a minute compared with the three rounds of the old smooth-bore muzzle-loader, together with a ten-fold superiority in range, rendered any such proof quite superfluous; yet so very different are the conditions underlying the employment of weapons in the mass in the field from those which obtain on the practice ground, that I venture to hope I shall have little difficulty in destroying their assumption from its very roots.

Rapidity of Fire.—Dealing with the individual weapon and firer first, it is perfectly obvious that however much the mechanical process of loading has been accelerated, the time required for taking accurate aim has undergone no corresponding change; indeed, on the whole, it has been increased as a consequence of the greater mean range at which fighting takes place—obviously it takes longer to get one's sights on to a target the size of a man at 1,000 than at 100 yards distance.

The point to consider is, not how often a skilled mechanic specially trained for the purpose can load and fire a weapon in a test for extreme rapidity only, but what rate of fire in the ordinary individual holds out the prospect of the maximum number of hits in a given time.

With regard to individuals, I can find no trace of any experiments, but for bodies of troops, such as sections and companies, a very comprehensive series was carried out both in France and Germany about the year 1880-3. In both it was found that for every body of troops there was a certain rate of fire per minute which gave the greatest "intensity" (*i.e.*, the best percentage in proportion to number of rounds and time occupied), dependent on the discipline and drill of the troops exercised, and that when that rate was exceeded the proportion of hits fell off inversely as the square of the number of rounds fired.

In France the best rate was found to be four rounds a minute, with the Gras rifle—whether as volleys or independent. In Germany, I am told, it was fixed at six, with the Mauser. And the time saved in loading by mechanical improvements since that date will barely suffice to increase these figures by more than one round a minute each.

Actually, both the needle-gun and the Chassepot, being bolt guns, could be fired nearly as fast as the Gras or Mauser, hence the practical increase in velocity of fire resulting from all the mechanical improvements since 1866 to the present day does not exceed one round a minute—in other words, an average company cannot usefully expend

20 per cent. more ammunition in a minute now than formerly. Of course it can fire double and treble this number, but only with the certainty of missing its target, a proceeding which no authorities, to my knowledge, recommend.

Increase of Range and Accuracy of Fire.—At a target which cannot shoot back, both increase of range and accuracy of fire are obviously all clear gain; but when the target can shoot back, the question becomes much more complicated.

Because the power of the weapon is greater, both sides come under the disturbing influence of its bullets at longer ranges and their fire becomes mutually less destructive. During the course of a combat it is well known that the accuracy of fire falls off to an almost incredible degree, and the mean expenditure of bullets per man placed out of action previous to the introduction of long-range weapons never fell materially below 200.

Now let us consider the cases of two bodies of troops in similar formation, but armed with weapons of different ranges, when firing under average battle-field conditions. Some fire high, others low; some to the right, others to the left; but all the bullets have to move within the space swept out and bounded by the path of the highest bullet, of the two widest right and left, and by the ground. (See diagram.)

The solid figures thus bounded are not susceptible to an easy or exact analysis, but we can approximate to its significance by a formula adopted from the practice of naval architects.

For the purpose of comparing the cubic content of two or more hulls they use an expression called the co-efficient of fineness, and in like manner to compare the intensity of fire, *i.e.*, the number of bullets moving in a given cubic space, which fixes the probability of being hit in passing through the shot-swept zone, we can use a co-efficient of accuracy; and, assuming the accuracy in both cases equal, then the intensity of fire within the two spaces will be proportionate to their cubic contents.

Now since the accuracy in both cases is, by hypothesis, the same, *i.e.*, whatever the weapon with which the troops are armed, equal numbers of each body make equal errors in elevation and direction, and the

consequences of such errors increase as the range, these consequences can be expressed as equal fractions of the range; so that we can take the total cubic content of each solid as given by the formula—

$$k \left(l \times \frac{l}{a} \times \frac{l}{b} \right) = k \frac{l^3}{a b},$$

i.e., the chance of being hit in any particular case must vary as some function of the cube of the range.

If the co-efficient of accuracy becomes very great, *i.e.*, if all aim almost equally true, and the trajectory is almost parallel with the ground, the expression approximates to zero, and the chances of being hit become certainties—probabilities no longer.

There is a practical way of arriving at the same result which may be more convincing.

Take four pieces of tin, and on them plot out to scale the trajectories of two weapons under comparison in duplicate. Then connect each pair by a strip having the same width and fill both with flour. Then into each sprinkle and thoroughly mix up a number of currants equal to the number of bullets discharged by the line of troops. Get your cook to bake the cake, and send for the nearest school-boy and give him his choice of a slice. If he likes currants, as most of them do, I think he will be found to select a slice from the smaller one, as obviously it will contain more currants to the cubic inch than the larger one; and if now in your mind you convert the cake into an imaginary space of atmosphere with bullets in it instead of currants, it will be equally clear that for an equal number of bullets the larger space will be the safer.

Now combine the above with the question of amount and rapidity of fire to be faced in the time necessary to cross the shot-swept zone.

In the old days of Frederic the Great's time, men stood three deep, and could fire, say, four rounds a minute, which gave $450 \times 4 = 1,800$ bullets per 100 yards of front per minute, and the bulk of these bullets struck the ground within, say, 300 yards, few of them rising higher than 200 feet.¹ A body of men with modern weapons, firing equally wildly, would send their bullets 3,000 yards in distance and 2,000 feet in height.

But $900 \times 300 \times 200$ is only the $\frac{1}{16}$ th part of $9,000 \times 300 \times 2,000$, and the time required to cross over the fire-swept zone is nowadays only ten times as great; so that for the risk to be equal, the number of bullets per minute would have to be ten times greater than it was in Frederic's time. But nowadays, troops will rarely stand even two deep to fire, and we have seen that, because the difficulty of aiming increases with the distance, the rate of fire cannot exceed materially the four rounds a minute

¹ See "History of the first Silesian War, 1742," by the Prussian General Staff. Also, "Kriegsgeschichtliche Einzelschriften, No. 28."

customary in the old days. So that we are still far from equalling the intensity of fire we had formerly to face.

There remains yet the flatness of trajectory to be considered, and this, too, works out in a most unexpected way.

If every man kept his muzzle horizontal when firing at fixed sight ranges, it is obvious that nothing could possibly pass the zone of ground thus covered; but unfortunately this is a condition practically never realised on service, and the moment it ceases to be observed the flatness of trajectory becomes an evil rather than an advantage. In the old days, if a man missed the first line, his bullet was almost certain to ricochet into the second, a couple of hundred yards behind it, but the same tremor of the hand that sent the bullet wide with the old musket causes it to fly a thousand yards clear of its object nowadays. The point may best be realised by the following simple experiment:—Take an ordinary garden watering hose with a rose nozzle, and turn on the water with a low velocity so that it dribbles out almost at your feet, then turn on a full head so that it spurts out in jets. In the former case you will saturate the lawn at your feet, in the latter the same amount of water will barely lay the dust.

So far I have considered only bodies of troops with the old and new weapons with approximate equal frontage, but it is well known that the Boers never attempted to fight in such dense formations as European tactics formulated. As near as I can ascertain, 500 men to the mile appears to have been their normal fighting density, therefore, either their shooting must have been far more accurate than that of the French, who in 1870 fought normally (on the defensive) 5,000 to the mile—and my authority denies them any special distinction as marksmen—or the fire was not “unprecedented,” as others would have us believe.

Actually a comparison of casualty returns of the two wars, as far as at present available, shows us that as a fact it was never as against equal targets and under similar conditions equally effective,¹ though in proportion to the number of rifles there seems to be overwhelming proof that it was individually better directed, which is only what was to be expected, when we remember that about one-third of the Boers, say all over thirty years of age, possessed a skill with the rifle acquired after game in the same topographical and climatic conditions, which exceeded by far anything our own men could possibly possess, and in which they were probably only equalled by the few British officers who have devoted the whole of their lives to big game shooting all over the globe; and of

¹ Compare Colonel Long's guns with the batteries Trautmann-Grügge at Gravelotte; the Highland Brigade at Magersfontein with the Prussian Guards at St. Privat.

the remainder under thirty, all except the foreigners had enjoyed opportunities of handling arms and judging distances such as no densely-peopled civilised nations can conceivably supply for their soldiers. Neither we nor any other race will ever meet such shooting in Europe again.

We must look elsewhere than at the rifles to find the true conditioning factor of the special phenomena of the present campaign, and I venture to suggest that if all the special circumstances of the case are considered we shall find "mobility" ultimately the predominant influence.

In no European campaign that we can conceive can "mobility" by itself play such an all-important part, for no theatre of war presents an equally favourable area for the development of this special quality, and no political conditions on the Continent would allow of the full evolution of its strongest points. In Europe time and space are all-important factors in strategy, for war which does not for the time being paralyse all civil existence is inconceivable.

A rapid succession of decisive victories which will end the war in the shortest possible space of time is the object of all modern strategy; but in the case of South Africa we were debarred by technical difficulties of transport from aiming at decisive results, and the Boers had everything to gain and nothing to lose from the policy of evasion which they so successfully practised.

As the problem must have presented itself to them, every day gained increased the prospect of European intervention, and every mile added to the length of our communications reduced our effective force at the front. Had the British Army system been really the wooden inefficient machine the Boers, together with all our home critics, believed it, humanly speaking, it is certain that with the 70,000 men and line of communication troops it was designed to furnish, we could never have got to Pretoria, or even maintained ourselves in Bloemfontein; but when the rickety old machine suddenly developed (as some of us, who had, perhaps, studied its fundamental principles to better purpose than the critics, had ventured to predict) a surprising reserve of vitality, and sent out fully three times the forces it was expected to supply, the bottom was knocked out of the Boer calculations, though even then the tactics of evasion remained the best they could employ.

But these tactics required a practically unlimited depth of area for their employment, and where in Europe will such a depth be available?

Again, in no other theatre of war except, perhaps, in North America, can the advantage of mobility be so entirely on one side as in South Africa; for nowhere else can the difference in "condition" between the horses of the mounted forces be so extreme.

This difference of "condition," I take it, was the ruling factor throughout the campaign, for it is enough to substitute well-trained cavalry in high condition for the broken-down wrecks we had in the Free State to see what all-important results must have followed from their employment.

An Indian, Austrian, German, or French division carrying the same weights as ours would have covered the 74 miles from Ramdan into Kimberley without distress in 24 hours, and could have ridden into Bloemfontein from the latter place in about 34 hours. In front of such troops every attempt made by the Boers to stand must have resulted in another Paardeberg and consequent surrender, and this was the line of action every cavalry officer with whom I discussed the matter, and that was a pretty large number, had resolved to take if he got the opportunity.

Unfortunately, none of us foresaw—and I submit that we could not have foreseen—the utter breakdown of the horses which actually happened, for all military history furnishes us with no similar example.

Our horses in the old sailing-ship days were often far longer at sea under far worse conditions without suffering to the same extent, and in India we have railed them equal distances without inconvenience, and in previous South African experience it appeared that only the deadly "horse sickness" had to be feared, a calamity which, however, we seem to have escaped. Into the causes which led to this deplorable breakdown I do not propose to enter—trustworthy evidence is still not forthcoming; but the facts being as they were, the tactical procedure of our infantry grew out of the conditions quite naturally.

It could never be to our advantage to force a decision by deliberate orthodox attack methods, for the Boers would only have mounted and cantered away; all we had to do was to hold them in front by as weak a line as possible whilst our jaded mounted troops tried to work round their flanks. Against an enemy known to be averse to counter-attacks the extreme extension we adopted was justified by results; but it would be a very unsound generalisation to assume that similar extensions would answer against an active European drilled Army, or would suffice against an enemy whose flanks were secured by natural obstacles and who was determined to stand.

Substitute for the Boer mounted infantry, ordinary European troops in the usual proportions of the three arms and of approximately the same numbers.

Now, the first actions of the war—Talana Hill, Elandslaagte Belmont, and Graspan—were quite sufficient to prove that 500 men

to the mile were quite inadequate to stop British infantry, and as a consequence the Boers would have had to thicken their line.

But it is obviously easier to find or create good cover for 500 men to the mile than for 1,000 or 1,500; the advantage of concealment would thus have largely diminished, and at the same time our fire would have told more rapidly, not only because the cover was less, but because there were a larger number of heads to be seen, and the moral effect of losses increases more rapidly with the greater density of the bodies on which the losses fall. Thus, step by step, the Boers would have been driven back to the formation of supports and reserves, and this is where the real difficulties in the conduct of a defensive action commence, and which, to my mind, in normal ground are almost insuperable.

The Boers made great use of covered communications to their fighting positions, we are told, exactly as European troops have always done in siege works, but the execution of these works is mainly a question of time; and if their rate of movement had been reduced to ours, this time would not have been afforded them so liberally; and European troops do not carry with them black labour for their trench work, but have to do it themselves at the sacrifice of often essential sleep and rest. Fewer trenches and more men to the mile would have been the consequence, and since their numbers are assumed as equal in each case, this thickening of the line could only be attained by a diminution in the extent of front, and, say, 20,000 men would have found about four miles of front the very utmost they could have undertaken. But to turn a front of four miles is a far simpler and speedier operation than to turn one of twenty to thirty, hence the need of "frontal attacks," assuming these to be always and everywhere "anathema," as our Press critics would have it, would not have arisen.

Mr. Winston Churchill, in one of his letters from Colenso, calculated the advantage to the Boer due to his mobility as five to one over our infantry. I confess I believe he underrates it. I should put it at ten to one. For judging by such maps as I have seen, I believe that 100,000 infantry with guns could not have held the line of the Tugela against us with equal success owing to the impossibility of rapidly reinforcing the threatened sections of the line in that exceptionally difficult country.

So far I have dealt with the problems presented by the Boer War from a theoretical standpoint only; let me now call in the aid of experimental research to establish my positions synthetically.

To the student of tactics, the battle-field, and its results historically recorded and critically investigated, is to the progress of his knowledge what the laboratory is to the physiologist, the chemist, and the engineer;

and though, fortunately for humanity, if not for the soldier, battles are of rare occurrence, and cannot be appealed to to settle every theory or fad; considered in their broad outlines over a sufficient space of time, they do furnish us with *data* which can be handled and dealt with precisely as the results of any other branch of physical research. The limits of variation are, indeed, far wider, and this it is which constitutes the extreme difficulty of the subject, and accounts for the many variations of opinion that one still encounters; but within these limits the facts are absolute, and afford firm foundation for further progress.

Let me now beg your closest attention to the following summary of the process of tactical evolution which has been in progress ever since fire-arms became the dominating influence in warfare.

The first consideration present to the mind of any commander who makes out to beat his enemy is, that the enemy also has a will of his own and may turn the tables upon his opponent; the best plan of battle, therefore, may prove illusory, unless it is itself founded on the power to resist a sudden attack. It is the principle of the "engaging" guard in swordsmanship, and just as no fencer expects to kill his man by remaining on guard eternally, so no leader anticipates victory except as a consequence of an appeal to attack, for which disorder resulting from movement in the attacking forces may afford him the opportunity.

With this purpose, from very early times, both sides drew up in such order as ensured the protection of their front by fire as long as the order remained intact; and since the early weapons were slow in loading, they adopted a formation of open files, twelve to sixteen deep, in which each man in succession delivered his fire and then retired through the intervals to reload. In this manner, with good drill, the whole twelve or sixteen men could discharge their pieces within the minute, giving six to eight bullets per yard of front; but it is clear that the order was especially liable to be broken by men falling across the intervals, and took a very large number in proportion to the front covered. But though the fire of these dense columns was most formidable for defence, it was almost useless in attack; practically they could only charge home with the pike, and six bullets a minute per yard of front was sufficient argument against such a proceeding.

As artillery was still in its infancy, it was impossible to rely on its aid alone, and to meet the difficulty recourse was had to skirmishers, known then as "die verlorene Haufe," whence "forlorn hope," who fought individually in advance of the columns and did what damage they could to the enemy; but then, as now, it was fully recognised that "unshaken infantry," were unassailable in front.

This turned attention to the flanks,¹ then, as now, the weakest point and every effort was made to rest them on insuperable physical obstacles, and obviously there is a better chance of finding such obstacles for a long line than a short one. To lessen the density of the line and increase its length was then the object of every commander, and this could only be done by increasing the rapidity of the loading of the individual arm, either by improving the weapon itself or by a higher standard of drill, or by both.

Thus, step by step, the ordinary three-deep line was evolved as the normal fighting formation of all nations, and as it was much more mobile in attack than the old column it had displaced, and its fire far more effective, because it overlapped the flanks of the columns, the importance of the skirmisher waned and he only retained his position in special circumstances as in the case of columns for the assault of a breach, where we still find the name, though no longer the thing, in the Peninsular times. It was the striving after increased fire-power which primarily led to the intense importance attached to drill, and incidentally solved the problem which civilians even nowadays find so hard to comprehend.

In a period of chronic warfare between Armies more nearly equal in respect to armament, equipment, and recruiting, than have since confronted one another, it was found as a matter of experience that the best-drilled troops always retained their power of combined action, *i.e.*, remained formidable longer than less-drilled ones, and the point was accepted as an axiom that needed no demonstration, which in the existing state of psychology could not have been given if demanded.

From these long-continued struggles under uniform conditions, a state of dead-lock presently resulted. The want of roads made bold manœuvring almost impossible, except to leaders who possessed in an unusual degree the power of infusing a portion of their own fiery determination and spirit into the men under them, and hence when troops engaged more or less frontally, they mutually destroyed one another before either would yield. A victory was almost as irreparable as a disaster, for recruits took years to train and each made soldier in the ranks represented a cash capital alone of some £100 sterling, and there were no national debts in their present form available.

The average leader found it harder to resolve to risk all to win all than he does nowadays, and small risks and equally small profits became the order of the day, with the result that hasty fortification was had

¹ Some few years ago, Colonel Hime, R.A., made calculations on the same basis, which substantially agree with my conclusions.—See “Stray Papers on Military Subjects.”

recourse to to an extent which has never since been equalled, probably never will be again in Europe.

This led to a war of stratagems, and hence we derived the meaning still current in this country for the term strategy, and to which we owe the thoroughly mistaken notions as to the true "art of the leader," which finds its expression in every newspaper, magazine, or other vehicle for printed information by which we are surrounded. Above the pettiness of this game, only such great commanders of men as Marlborough and Villars succeeded in raising themselves, but the true measure of their greatness has never yet received justice in this country.

Meanwhile, the Prussians were preparing in all silence a surprise for the rest of Europe, which exceeded in relative magnitude their subsequent revelation of fire-power in 1866. By means of the iron ramrod and the no less iron discipline of the "Alte Dessauer," they succeeded in more than doubling the rate of fire of their infantry; and since this rate was only attained by dint of more constant drilling, they had acquired also a steadiness and cohesion which made them still formidable in attack after losses which would have broken any other troops in Europe. The command of these troops was about to pass into the hands of an absolute monarch, responsible to no one for the sacrifices he chose to demand of them, and competent (as events proved him to be) of inspiring that devotion to his person which is the principal characteristic of a truly great leader, a power which time and again has outweighed all possible advantages of armament, numbers, and position; and this leader was about to appear on a theatre of operations almost as different in its characteristic features from the "Cockpit of Europe" as the Transvaal from the Lorraine.

Néver, perhaps, has a more complete revolution taken place in all the conditions of war, and it was some time before professional experience could adapt itself to the sudden change.

In the absence of a mobile field artillery capable of preparing the way for the infantry, the fighting was most bloody and arduous, and the King's resources both in men and money were distinctly limited.

To economise their lives he first had recourse to his cavalry. Now, in old days, when the 18-foot pike was still the queen of weapons, it had been a physical impossibility to break unshaken infantry by shock alone. The cavalry, therefore, had taken to riding up at a trot to convenient range of the squares, and from thence disturbing their order by the fire of carbines and pistols until the confusion became sufficient to allow them to press home, which they did, still at a trot, because their training generally was not high enough to enable them to keep close order at speed.

The pikes had long disappeared, but the old tradition, "Cavalry cannot charge unshaken infantry," retained all its old vitality, and the attempt of the Austrians to ride home at Mollwitz had not encouraged them to try again, but the King and his cavalry generals, Ziethen, Seydlitz, and Driessen, set to work to raise the standard of individual horsemanship till charges at full speed with closed files again became practicable, and when the ground allowed, as at Roszbach, the combination of fire and shock tactics proved irresistible and most economical to the victor. But the ground did not always permit, and then the King had recourse to his celebrated "oblique order," the essence of which was to concentrate an overwhelming fire on one extremity of the enemy's line, and, as disorder set in, to roll up the whole front in succession.

What was needed for success was extreme endurance on the part of the line on which the brunt of the fighting fell, great manœuvring power and, as a consequence, space to manœuvre in, which the great plains of Prussia abundantly afforded.

The Austrians and Russians now took refuge in relatively broken ground, but it was only their enormous numerical superiority which enabled them to do so. With equal numbers, Frederic's superior mobility would have immediately been directed on their lines of communication; but with two widely separated antagonists, each his equal in strength, he was compelled to turn from one to the other, and could never finish with either; and the army not directly threatened used the time gained for entrenchments on a most formidable scale, armed by guns heavier than any he could bring against them.

These works were generally of a bastion trace, always designed to give mutual support, the profile with a 9- to 12-foot ditch, in itself a serious physical obstacle to assault, and every possible use was made of abbattis and other obstacles quite as formidable as wire as used in the present war, and actually more difficult to cut a path through; behind these the infantry stood with ranks of loaders ready to pass fresh muskets to the front, and along the whole, batteries of 12-, 18-, and even 24-pounders were interspersed in groups of four to six, at 15- to 18-foot intervals, to a total number of 200 and upwards. Yet against these the Prussian infantry flung themselves, sometimes successfully, more often not, but always fighting, till sheer physical exhaustion compelled cessation. Against these entrenchments the King wore his armies out, and the war was brought to a close by mutual inanition; a long peace ensued, economy became the order of the day, and the long-service army eat its heart out in idleness in the usual way.

Meanwhile, the progress of social evolution was preparing another and most startling revolution in the whole art of the employment

of troops in warfare, but the process was so gradual that the impending change remained entirely unsuspected by its contemporaries.

Outside the theatre of the Seven Years' War, Western Europe had been making enormous progress in population and agriculture, villages had grown into towns and towns into cities, and for their convenience a great network of roadways had come into existence.

The magazine system of supply, which had arisen in the previous century (seventeenth) as a consequence of the devastation of the Thirty Years' War, and which had mainly conditioned the strategy of Marlborough and Frederic's epoch, ceased to be a necessity, and it became again possible for Armies to live upon the country; but the change was not apparent to the old routiniers of Prussia and Austria, and their failure to appreciate its possibilities brought about ultimately the downfall of the old school of warfare, and opened the road for Napoleon's subsequent career of victory.

For when the Revolution in France had destroyed the old Royal Army, and the country was called upon to fight for its existence without money, credit, or supply trains, it had to fall back on the primitive methods of barbarism, and to make war support war. It was a counsel of necessity, not of perfection, as events were ultimately to prove, but for the moment it proved a veritable philosopher's stone, opening a road to Armies which formerly gold alone could have supplied.

Because there were no magazines and convoys to consider, the French Armies could move faster, and in proportion as they moved faster they had a wider area to live upon. Where, in 1792-3-4, the Austrians and the Prussians, hampered by lengthy communications, could only subsist hundreds, the French managed to feed thousands, and it was sheer weight of numbers, not superiority of tactics or strategy, that drove the allies ultimately beyond the Rhine and freed the French frontiers.

Unfortunately, this change coincided with a marked alteration in the tactical methods employed by the French Armies, and, as so frequently happens, the cause of their successes was sought in the obvious and visible, instead of in the action of silent, unobtrusive, social evolutionary changes. Since the consequences of these tactical alterations are in full vitality at the present day, and are largely, if not entirely, responsible for the confusion of thought still existing all over Europe, I may be perhaps excused for dwelling on them somewhat in detail.

At the close of the Seven Years' War, the Prussian Army was the military model for all Europe, and the principles of the "line" were embodied in all drill-books. The French, however, never took kindly to the "line," mistaking the rigid brutalising discipline of the Prussian parade-ground for the spirit of the thing, a mistake we fortunately avoided.

The dislike for the parade-ground found its chief support amongst those officers who had returned from America and had fought side by side with the Red Indians—the most perfect skirmishers in the world. And like the present advocates of extreme Boer methods, forgetting the extraordinary diversity between American and European conditions, they endeavoured to raise skirmishing to the one and only form of infantry action.

Similar tendencies were at work in all other Armies, notably in our own, the Prussian and Austrian (Dietrich von Bülow was their principal exponent), but it was only in France that, thanks to the destruction of the old Army, they obtained full scope.

The early French Revolutionary Armies were little more than a *levée en masse*, quite destitute of the precision of drill and the resulting spirit of self-sacrifice, which alone renders "line" fighting formidable.

Though they took the field in "line" regulations, they failed altogether to stand up to the work, and under fire they broke up into dense swarms of individual fighters, through the bravest going forward, the others hanging back, and since time for a more thorough training was unattainable, the practical soldiers who now began to come to the front, and who, thanks to the previous discussions, were thoroughly familiar with the skirmishing question, made the best of the matter and evolved a system based on skirmishers and small columns which at least rendered it possible to fight in some fashion, though not in the best.

The essential point is, that the system was a makeshift expedient, in which men became skirmishers first and learnt discipline afterwards; whereas in our own Light Division, whose origin also dates back to the American forests, we made disciplined soldiers first and grafted skirmishing on to their training afterwards.

The *début* of this new infantry was far from satisfactory, taking into consideration the numbers engaged. The disciplined British, Prussian, and Austrian battalions simply swept them away with their fire, and often buried more than their own numbers. Nothing whatever occurred to shake the faith of the experienced generals on our side in the superiority of the traditional system. But they were unable to meet the French numbers on an equal frontage, and being at the same time tied down to the defence of their communications and magazines, they fell into the habit of splitting up their commands into numerous small columns, of a couple of brigades, a battery, and a few squillions each; and in the attempt to execute combined operations over a wide front, individual columns got astray and left openings through which the French poured. In 1795 and 1796 this habit of operating over wide fronts had attained such magnitude that armies of 30,000 Austrians are found fighting over 30 miles of front, as at Stokach, Biberach, etc.¹

¹ See "Geist und Stoff im Modernen Krieg," by C. von B. K.

Meanwhile, on the survival of the-fittest principle, the French Army was developing into a war-seasoned body of veterans. The Revolution was driving the pick of the race into the Army, and the level of intelligence in the ranks was far above that supplied to the other Armies in Europe by their antiquated recruiting methods. The French were in earnest, and the generals fought with the guillotine behind them. The Austrians, as a nation, hardly felt the pressure of the war at all, and their Army was still divorced from the nation at large, recruits and money were grudgingly supplied. Hence, whilst the French became daily more formidable, the Austrians declined in value and her generals lost the power of initiative.

Things were in this state when Napoleon appeared on the scene at Savona, and realising at once the essential weaknesses of the Austrian "cordon" system, massed every available man, horse, and gun against his nearest opponent, crushed him at the Monte Legino, and rapidly turning upon the others, overwhelmed them in succession at Dego, Cossaria, Ceva, etc., the essential point to note being that he won by sheer weight of numbers and the resistless energy in execution he managed to inspire into all his subordinates, not by superior tactical methods.

This turn of fortune inspired the French infantry with the true spirit of invincibility, and from henceforth, until he discovered the "mul of Poland," they fought well under his eye--in any and every formation--and the improvement in their quality is distinctly traceable in the growing percentages of killed and wounded their casualty lists reveal.

I need not linger on Ulm and Austerlitz, for Jena is the point on which all modern tactical evolution turns. The Prussian Army which faced Napoleon on 14th October across the Landgrafenberg, though outwardly a replica of what it had been forty years before, inwardly had lost all its original spirit.¹ For economical reasons, the number of men with the colours had been constantly reduced until at length the average duration of the training had sunk to only one month in the year, and the staff throughout, though very highly educated, had had all spirit of initiative crushed out of them under the despotic rule of the old King. Yet, in spite of all their faults and disabilities, they did, as a fact, succeed in placing their army in a position which ought to have ensured Napoleon's destruction.²

Want of initiative, want of the power of combined action in the field in all ranks, paralysed all their efforts, and the result of the day was, as we all know, one of the most decisive victories for the French in history, which they followed up by a pursuit which rendered further resistance impossible.

¹ Max Jähns, "Geschichte der Kriegswissenschaften."

² Von Lettow-Vorbeck, "Krieg 1806-7"; and Clausewitz.

Essentially it had been a conflict between a peace-trained Army, led by asses, against war-seasoned veterans, led by lions, and the result ought not for a moment to have been doubtful; but the principle of the "line" proved its soundness by the tremendous punishment it inflicted on its adversaries, both at Jena and Auerstädt.

To admit the soundness of the tactical forms employed, however, would have been to condemn their own competency in employing them, and this the Prussian officers very naturally shrank from. Hence, on paper, the whole blame of the failure was laid upon the forms, and from this time forward the "line" became "anathema," and remains so even at the present day.

To revive the "line" at the moment would have been in any case impossible, for the conditions of peace imposed by Napoleon could only be evaded by curtailing the period of training to the shortest possible time, and under these conditions skirmishers and small columns became the only possible expedient. Similar conditions, or nearly so, prevailing in all the Continental States, the same policy was adopted, and the "line" disappeared from Europe until its glories were revived in the Peninsula.

Meanwhile, the French infantry had reached the turning-point of its improvement. The losses of three years' consecutive fighting and marching had already led to the conscription for the years 1807 and 1808 being anticipated, and once the horrors of the Polish winter campaign began to be realised these conscripts no longer came willingly.

The problem was to make them fight at all, and the solution was found by the action of the French artillery at Eylau and Friedland under Senarmont and Drouot respectively. Artillery is not an arm that can be improvised—hence the part played in the earlier wars had not been imposing—on the other hand, it suffers less deterioration in quality in the field than either cavalry or infantry, and by this time it had become a highly mobile body, capable of exact precision in evolutions, and the task of galloping half a dozen or more batteries up to case-shot range had at length become possible.

Whereas in Frederic's time the infantry had primarily to rely on itself for the attainment of the fire superiority, which, then as now, alone guaranteed the successful execution of the final assault, now it became possible to relieve them of a great portion of this most arduous task, and how the infantry fought was almost immaterial, provided *they could be induced to go forward at all.*¹

But Napoleon realised, as no other leader ever has done, that the harvest of victory can only be reaped by pursuit, and successful pursuit

¹ There is a legend in the French Army that the Imperial host occasionally was called on as a last reserve to supply this inducement.

is only possible when the spirit of an army has been thoroughly shaken by slaughter. Hence resulted the typical form the battles of his later years nearly everywhere assumed.

They commenced by the deployment of dense lines of skirmishers with supports, who engaged along the whole front and were met by corresponding formations on the other side. Then ensued a long-continued fire fight by which the enemy was misled as to the final point of attack and induced to use up his reserves. The French, who now no longer intended a decisive skirmisher assault on the old lines, could afford to nurse their reserves better. So that after some hours' fighting the balance of fresh unshaken forces still in hand was largely in their favour.

Then came the artillery preparation by massed batteries at case-shot range, and as the Prussians, Russians, and Austrians generally elected to meet this in columns standing up on the exposed slope of the position (note the Duke's comments about Ligny), the slaughter was usually terrific.

To take advantage of this havoc, masses of cavalry were then let loose (at a trot to prevent a universal bolt as sometimes happened), and behind the screen of dust and confusion, a whole corps was marched up, the intention being to occupy the gap in the enemy's line without firing, in order to be available for further action against the enemy's reserves. Hence fire action became dissociated from the idea of a decisive attack, and rigid absolute obedience, irrespective of skill at arms, became the ideal of the infantry soldier.

We, in England, at least, know how it fared with these principles in the Peninsula and Waterloo, but the Continent was then and has always remained too busy with its own affairs to study our methods.

When, on the evening of the 18th June, 1815, the Imperial Guard finally recoiled, broken and shattered beneath the volleys of the 52nd and the Guards, the night of a great peace descended on the military world of Europe. Everyone felt that their life-work was done, and they settled down in a comfortable routine to doze out the remainder of their mortal existence. Only in Prussia was the lamp of military learning still kept burning; this, not because of any unusual development of the military instinct in the race, but because the principle of *universal* short service compelled men to study to enable them to act as instructors to their men. This is the true secret of Prussia's present military pre-eminence, and nothing else.

But up to the end of the fifties, there is very little trace of intellectual effort or research in the vast majority of their productions; with the exception of Clausewitz's masterpiece, the bulk of the publications were biographical, and almost entirely confined to the period after Jena.

Generally, they lived on the Napoleonic legend, and the Seven Years' War was looked on as barren ground; they lived on oral tradition only, and it was natural that the tactics to which they believed their final victory to be due should have received special attention. It was only with the accession of King William I. and his selection of Moltke as Chief of the Staff, that those men who had spent their years of isolation on the frontiers in professional study can be said to have commenced to reap their reward.

The influence of von Wrangel and of Prince Frederic Charles was also productive of good results, but at best the intellectual standard of the Prussian Army was not a high one—men were too much absorbed in "the daily round, the common task" of preparing for inspections to find the time or mental energy the useful study of military history requires—and from the nature of the case inspections were all based on the tradition of the Napoleonic struggle.

As the generation of officers which joined the Army subsequently to the great wars began to come to the front, a marked divergence of principle became manifest between the views of the staff and the regimental officers, and the introduction of rifled small arms and of the needle-gun not only favoured the latter, but cut the ground from under the feet of the former, whose arguments, based on experience, could be met by the rejoinder that the new weapons rendered all such experience illusory, a line of reasoning with which we are all sufficiently familiar in our own country at the present moment.

The pamphlets of Captain May—"The Tactical Retrospect" and the "Prussian Infantry"—together with Bronsart von Schellendorf's reply, though not published until after 1866, are typical of the whole controversy and exhibit in the most glaring manner the limitations of each party. May viewed battles as essentially decided by a firing line of companies much as in the early days of the French Revolution, and expected the highest results from the independent action of the individual skirmisher: his book, in fact, was but a revised version of Bülow's work, which must have been familiar enough to him.

Von Schellendorf, as spokesman for the General Staff, reminded his readers that battles were not won by the untutored impulses of excited individuals, but by the combined interaction of disciplined masses, taking as his model the recognised Napoleonic type; but both ignored the revolution in the conditions brought about, not by the breech-loader, but by the increased range of the muzzle-loader, which, as the experience of the American Civil War abundantly demonstrated, rendered the case shot preparation by artillery for the time being an impossibility, and thus threw one back on the old Frederician pattern of every possible rifle in the fighting line and a minimum of reserves.

Moltke may or may not have said, *à propos* of the American War, that "there was nothing to be learnt from this struggle between two mobs," but the wide circulation given to the story shows the bias with which events across the Atlantic were regarded in Prussian circles, an attitude of mind they have since had cause to regret, their progress in tactical science otherwise would have been much facilitated and many a life been saved in 1870. For actually the American War summarised within three short years the whole evolution of tactics during the previous century upon the Continent and disproved in most startling fashion all the current fallacies of the period.

The topographical features of the country, the absence of good roads, and the extreme sparseness of population, from the first threw back the strategical possibilities to the days of Marlborough. Magazines and convoys obtained their old importance, and these destroyed the mobility of the contending forces to such a degree that time for important entrenching work became available. The increased range of the rifle kept back the smooth-bore artillery chiefly employed by both sides beyond effective case-shot range, and hence the two opposing infantries had to fight out the issue by themselves.

Beginning with skirmishers and sniping operations they soon found out that no decisive results were to be obtained that way, and realising all that was at stake in the contest, the whole race, though the most individualised and intelligent in the world, voluntarily adopted the sternest methods of discipline and drilled themselves into such cohesion that presently we find them rivalling the endurance of the staunchest veterans in their desperate assaults upon each other's works.

It has been much the custom to see in these losses the proof of the tactical incompetence of their leaders. Viewing the war as a whole, nothing appears to me further from the truth, for by no other policy could the end of the war have been attained.

They could not manœuvre with freedom—the absence of roads was against that—hence the attacks had always to be, locally, frontal, and not only did the long range of the rifle keep the artillery at too great a distance for the act of preparation, but it increased the fire-swept zone from 300 to 1,000 yards at the least, which had to be crossed practically in one movement, without firing, since the loss of time and the exposure in loading (standing up) was fatal to the forward impulse of the whole.

The outlook for the attack has never been so desperate: on the one side seasoned soldiers, behind loopholes in skilfully designed entrenchments, unhampered by serious artillery fire; on the other, upright targets, whose one hope of safety lay in the rapidity of their forward movement.

Realising this the attacks were made with the utmost resolution, line following after line, the hinder one carrying on the wreck of the troops in front; and when experience showed that two lines did not suffice they increased the number to four and five, thus attaining in 1864 to a point the Germans only began to reach some twenty years later.

Heavy losses and occasional repulses were inevitable under these conditions, but the line formations rendered it possible to execute these attacks with only one-half the number of men to the mile, which contemporary European methods (not British) would have entailed. The percentage of loss with the latter would probably have been lower, but the aggregate, due to the greater vulnerable area exposed, would undoubtedly have been higher, and it is with aggregates, not with percentages, that the nation (not the soldiers) have to reckon.

But of all this the Germans remained in ignorance, and their experiences of 1866 only tended to lead them further astray. The campaign in Bohemia was decided primarily, not by the breech-loader, but by the higher initiative and individuality of all ranks, the direct (if unforeseen) consequence of the provisions of Scharnhorst's law of universal service, which alone rendered Moltke's strategy a certainty. The Austrians were recruited by conscription for seven years with paid substitutes and re-engagements, and as a consequence the whole Army was paralysed by centralisation. But these causes had operated so gradually and imperceptibly that their influence escaped the attention of the critics, who were carried away by the visible consequences produced by the breech-loader.

Only one observer, General Dragomiroff, at that time military *attaché* to Steinmetz, noticed the point, and speaking of the alleged unparalleled harvests reaped by the needle-gun, he asked, "Have you all quite forgotten the volleys of the British infantry in the Peninsula?" And in truth, against troops handled as were the Austrians, any weapon would have sufficed to inflict a similar punishment. But the Prussians surrendered themselves fully to the new illusion, and when two years later it dawned on them that they were no longer the only bearers of the new fetish, but, on the contrary, were presently bound to face a weapon which could be fired twice as fast and killed at four times the range as their own—their outlook became far from attractive.

When the Franco-German War was over, it was hastily assumed in this country—indeed, everywhere—that the Prussian tactics had been deliberately framed to meet the special emergency. No assumption, however, could have contained greater fallacies; more truly their tactics might be termed the outcome of a council of despair.

Strategically, they knew that their blows would be aimed at the enemy's flanks, but, tactically, being better informed on this point than our amateur critics of to-day, they were aware that all turning movements end locally in frontal attacks, and the prospect of having to close in on the enemy from 2,000 to 500 yards practically without firing a shot, and, as they believed, with little assistance from their artillery, was a prospect to shake even the boldest. Nor was the difficulty over even when they got within the limit of their own range, for between 600 and 500 yards, their first effective firing position, the Chassepot was at least three times as accurate as the needle-gun, and it was known throughout the Army that the French intended to meet them in line behind entrenchments, thus bringing roughly five rifles under cover against each skirmisher, who showed, when standing, six times the area, so that the odds against the Germans stood approximately, irrespective of the quality of the men, as $(5 + 4 + 3 + 2 + 1) \times 3 \times \frac{3}{2} = 135$ to 1—about; and this was not all, because the Germans reached their first position, blown, excited, and largely out of the control of their officers. It was as if a flurried and excited man found himself compelled to fight a duel with five adversaries, all comfortably under cover, prepared to meet him.

There was nothing in their regulations to prevent their advancing in "line," and now and again they did so (by companies, notably at Mars-la-Tour and St. Privat—see Hoenig and the regimental histories), always with the result of bringing a far larger number of rifles to bear under better conditions, but generally they attacked in skirmishers and small columns, with the consequences depicted in the following quotation from Meckel:—

"Looking back on the past, we see quite another picture. The pitiable self-destructive belief in the unavoidable disorder and in the impossibility of guiding the fighting instincts of the individual finds in the events of 1870 its own condemnation. There, too, we heard the drums beating and saw the colours waving, and whole brigades dashing recklessly across the open, only to break before the unshaken fire powers of the adversary, and then every trace of order disappeared in the confusion of the independent order of fighting. Woods, villages, hollows, hitherto empty, were suddenly crowded with stragglers, and the open fields lay tenanted only by the victims of premature violence. But reverse the order of the proceedings: let the thunder of the guns go before the beat of the drums, the roar of musketry before the bayonet, and skirmishing in its old signification before the assault, *not follow after it*, and the battle will again assume its normal appearance."

The Germans were ultimately everywhere victorious in spite of the inequality of armament conditions, not because of their tactics, but because the strategic direction of their armies was immensely superior to

the French, and the leaders held on with dogged pertinacity until the strategic design had time to work. Ultimately, after Metz, they learnt to wait for the guns to do their work, but by that time the French troops went into action half-beaten already, and relatively a few common shell sufficed to give the final impulse to their tottering structure of discipline; but the easy success of the artillery continued for years afterwards to exercise an effect on tactical progress, which no student can afford to neglect.

There exists in every community of men, a certain section of extremists who seem intellectually incapable of sifting evidence; with them personal impressions count for everything, and their own views always appear to them of surpassing interest to the world at large. The German Army is no exception to the prevailing rule, and almost before the smoke had drifted clear of the battle-fields, busy pens were at work to disseminate their hasty generalisations founded on insufficient *data*. I need not recapitulate the names—they are familiar to every student of military literature.

We in England were placed in a difficult dilemma. It was evident that great changes had occurred in the science of warfare, and, except the breech-loader, there was no obvious factor or factors to account for them, and we were limited almost exclusively to hearsay evidence; further, the study of tactics and military history in this country had been for years almost extinct, and those who, in spite of all difficulties, had continued to struggle against their surroundings, had been compelled to draw their inspiration from Continental (French and German) sources, both of which started primarily from the skirmishers and small columns of the Revolution, the very system which had failed consistently before the British line and the true skirmishers of the Light Division.

The distinction between the three forms is as follows:—The business of the true skirmisher is to inflict annoyance on the enemy without risk to himself; all the cunning of the Red Indian and the "sliinness" of the Boer are here in their proper place; a wide choice of position, *i.e.*, large intervals, is an inseparable condition for his success.

The "line," on the other hand, has to crush the enemy by overwhelming fire, and its own fire is its best protection; individual choice of position is here out of the question.

The French Revolutionary system and its descendants is a hybrid between the two, with the defects of both and the good qualities of neither; the man never knows whether he is to obey his officer or to act on his own judgment. If the degree of extension is sufficient to afford individuals space enough to exercise their private judgment in taking cover, the number of rifles is too small to make head against the enemy's return fire, and if the men are crowded together so as to get more rifles

in the firing line, they start with that sense of dissolution of control which it would be better to leave the enemy's fire to effect. Why do your adversary's work for him?

We were led to believe by our first informants that the fire of the new weapon was so terrific that closed bodies could no longer exist before it, and in the absence of statistics no reply was possible; but, surely, this would have applied equally to the small four-deep columns in support which were generally equally conspicuous and drew the enemy's converging fire, and to these small columns all foreigners stuck persistently. Either the enemy's fire was aimed or not; if it was aimed, then the small columns were certain to suffer more than the line. If it was unaimed, then the formation is immaterial. The rain falls on the just and unjust alike; but more tons fall on the square mile than on the acre, and more in an hour than in a few minutes.

Actually we have known for the past twenty years that the casualties inflicted by this terrific fire were not only not excessive, but always well within the limit of well-disciplined troops to bear, and it is on this line that the common sense of the bulk of the infantries of Europe has since been proceeding; and but for the prejudice against everything connected with the "line," which originated at Jena, the chances are that all would long since have gone over to our old Peninsular model many years ago. Indeed, in all but the name, they have actually done so, for the normal interval between skirmishers in the line attack formation gives everywhere rank entire, and in practice it has long become necessary to put a veto on the man's right of private selection.

Men are still taught everywhere to skirmish intelligently, and in Germany and Austria for years past everything possible has been done to educate and encourage individuality, precisely in accordance with the spirit of the old 52nd at Shorncliffe in 1803,¹ but when the real attack commences, the discipline in the fighting line is as rigid as possible, and all following reinforcements still move, where the ground permits, in the traditional old two-deep line.

But whilst these points were being thrashed out by the infantry, an improvement of incalculable importance had been made in the artillery.

In 1870 the Germans had only common shell, and not more than one battery in four had been trained to the modern methods of ranging. The uniform adoption of this system at once quadrupled the fire power of

¹ It is usual to credit Sir John Moore with the making of the Light Division at Shorncliffe Camp, but in a note to p. 68, "Historical Record of the Oxfordshire Light Infantry" I find that "letters from Sir John Moore are now extant which corroborate the assertion that the improved system of marching, platoon exercises, and drill were entirely Lieut.-Colonel (afterward Major-General) Kenneth Mackenzie's."

the batteries, and simultaneously the introduction of new guns with 1,500 feet a second initial velocity and a reliable shrapnel shell completely destroyed the existing conditions of the battle-field.

Where the power of the infantry arms had increased twofold at the outside, the power of the guns had multiplied at least twentyfold, and with the introduction of Q.F. guns the advantage became fortyfold.

It was only natural that the French, with their traditions of Senarmont and Drouet, should be the first to realise the full possibilities this change entails, and this explains their readiness to sacrifice many minor points in their equipment to secure the full advantages of the Q.F. system, and to be content with somewhat lower ballistic properties to gain the power of firing without relaying. For this at once placed them relatively on a par with the old case-shot attack in the early years of the century and facilitated the task of preparation in a corresponding degree.

Hitherto both French and Germans had counted on the slow degradation of their enemy's infantry fire by common (or H. E.) shell. This it was calculated would take considerable time and give ample warning of the point of attack, thus facilitating the movement of reinforcements; but realising the full possibilities of the new weapon, the French elected not to prepare, but to cover, the infantry advance by such a hail of shrapnel bullets that practically nothing the size of a man's head and shoulders could exist above the entrenchments long enough to take aim and live, and even if by chance it did, the dust and smoke of the bursting shells would deprive it of all objects to aim at—precisely the conditions we produced at Pieters Hill.

This settled the question of infantry attack formation once and for all; for against unaimed fire only the area exposed and the duration of exposure signify, for the reasons stated above. The sole condition is that when the artillery fire ceases, as at last it must, the infantry must be so disposed that every available rifle can be brought simultaneously to bear, and the "line" is the sole formation which satisfies this condition.

The decisive battle of the future, therefore, will unfold itself as follows:—The side which is first ready to strike must advance at once to catch its enemy while still in course of concentration, and the cavalry screen will play a more or less important part according as the country is more or less open—it is a convenience, not a necessity. If the enemy is caught whilst still on the march, entrenchments cannot well be formidable and the advantage is all with the strategic initiative; but if he is found already in position, then the task of fixing the details of his alignment must be carried out by infantry extended in the good old-fashioned light infantry style, twelve paces at least to the file.

This operation will need both time, and a high degree of trained tactical faculties on the part of all ranks, a degree which can only be attained by systematic instruction extending over a course of years; and I should, therefore, train the whole of our Regular infantry as light troops.

During this delay and on the information received, the commander fixes his point of attack and taking every advantage of cover, long lines of artillery are developed, and enter into action simultaneously (by rocket or balloon signal suggested).

There is obviously greater opportunity for an artillery surprise now, when the area for the selection of position covers a zone from 2,000 to 8,000 yards from the enemy's guns than in 1870, when it extended between 1,000 and 3,000 only, and it will be remembered that the long-range fire of even the Imperial French infantry, steadier by far in the early battles of the 1870 war than any modern conscripts, never succeeded in silencing a well-served Prussian battery, as long as its ammunition held out. Colonel Long's guns only ceased fire at Colenso when their ammunition was expended, and they were under a converging relatively close-range infantry fire.

On the artillery duel it is not necessary to dwell at length. One side or the other must get the upper hand eventually, and, whichever wins, its infantry must go forward to attack, to utilise the advantages gained; but since the advantages require only to be local, say, on a front of five miles out of thirty, the probability of success lies largely with the side that retains the strategic initiative, *i.e.*, with the assailant. This part of the action falls under the old Napoleonic formula: *On s'engage partout et on voit*; and, meanwhile, the infantry and artillery destined for the assault are being massed under cover of the woods and hollows from which no European battle-field three miles deep is ever likely to be free. The artillery, relieved from the pressure of the enemy's return fire and largely reinforced, gallop in to most effective shrapnel range, and as their infantry break cover, the whole of the defender's front is covered by a pall of smoke and dust, through which accurate-aimed fire is impossible. From time to time the fire is interrupted to tempt the enemy to put up their heads, and then renewed with full intensity, and, underneath the storm of shells, the infantry advance in a succession of "lines," breaking into line of company columns, or remaining in two-deep lines as the ground and circumstances demand; the essential being that when the artillery fire overhead ceases and the dust cloud sinks, every available rifle should be ready to take up the fire-fight with the opposing infantry. Then the best shooting, which will be a consequence of the best discipline and highest *moral*, will decide as it has always done, and the position fall to the bayonet-charge exactly as in the past.

But behind the enemy's ridge, reserves will also have been forming, and fresh troops thoroughly in hand, *i.e.*, in close order, must be available to take up the struggle. This is the moment when on either side the cavalry may play a decisive part, for concealed approach (better *unobserved* approach) is open to either, and our military bullets will no longer drop a horse dead in his tracks like the old 12-bore musket, a fact well known to every sportsman.

It is to take advantage of these moments that the German cavalry all carry lances, though their extra weight and general unsuitability for out-post duties are thoroughly well understood.

Briefly, from the Continental standpoint, the problem of the modern battle lies in the use of the reserves after the first position has been carried, not in the carrying, and this explains the importance they attach to close-order drill and precision of manœuvres.

To sum up the historical argument, *i.e.*, the result of experimental research :

In all periods both sides have striven to surround themselves with a barrier of fire sufficient to stop all direct assaults as long as the troops remained unshaken.

To shake and disorganise these troops has always required time, which time could and can be utilised to move up troops for use in all contingencies.

As between two equally armed infantries this task of shaking the adversary has always been a long and bloody business, but experience has shown that in open ground the surest way was to get as close to the enemy as possible, consistent with the maintenance of fire control, and then overwhelm him with every musket which could find room in the fighting line. Fontenoy and Quebec are the classic instances of this method. At the former the first volley of the British Guards is alleged to have swept away 600 of its opponents, and at Wolfe's last fight on the Heights of Abraham the "perfect volley" which opened the action practically decided it.

When the ground permitted, the combination of cavalry with infantry obtained the greatest results in the shortest time, and at the least cost to the victor.

The tactics of the French Revolutionary levies, afterwards adopted by all Europe, had their origin in social changes and marked relapse—not progress in military evolution. Infantry other than British were no longer good enough to fight out a battle to a decisive finish; and but for the evolution of mobile artillery, attack and defence would have balanced one another. All this time, from 1740 to 1840, there was no essential change in armament, though the casualty lists show extraordinary variations.

The invention of the long-range rifle eliminated the use of artillery for case-shot preparation, and immediately battles became as severe as of old, though the rate of fire possible was materially reduced.

In 1866, in spite of the increased rate of fire, on one side the casualties were markedly lower.

In 1870 the worst armed infantry was victorious, but the losses in the bloodiest battle only came to 2.5 per cent. per hour.

In 1877 the worst armed infantry again ultimately proved victorious (the Krnka rifle being almost, if not quite, as outclassed by the Peabody-Henry as the needle-gun by the Chassepot); the slaughter again did not equal the standard of former days.

Neither in the Zulu War, in Egypt, nor in Afghanistan have Martinis or Lee-Metfords inflicted equal slaughter on similar targets as the old muzzle-loaders in French hands in Egypt and Syria, or in British hands at Meancee and Hyderabad. At Meancee every musket on the ground killed three and wounded six in three hours.

In South Africa the percentages of killed and wounded have been the lowest ever recorded in warfare between two equally stubborn antagonists, equally well armed.

On these grounds, foreign authorities have everywhere come to the conclusion that, with equal arms, losses are practically independent of the nature of the weapon, but are mainly conditioned by the skill of the leader in his choice of the moment for attack, and the means at his disposal for the execution of the act of preparation. Where time is not the governing factor in his decision, it is in his power to suit his choice to the quality of his troops, and not to send them into the assault until the enemy's fire is so far reduced that the losses to be anticipated will not exceed his estimate of the endurance of his men.

The introduction of shrapnel and of Q.F. guns has actually placed the power of artillery relatively to infantry in a more favourable position than in the case-shot days. For not only can a Q.F. gun throw an equal number of bullets per minute (bullets which do not scatter till well up to their target), but owing to the greatly increased range the fire of ten times the number of guns can be concentrated on any one point of the defender's lines, and, thanks to this power, it is considered probable that the assault of a position will no longer decide a battle, but that the decision will depend upon the perfect discipline of the men and the personal initiative of officers in the struggle which must ensue within the enemy's position, for which no rules can be given. Cavalry will find their full opportunities against each other and demoralised infantry precisely as in the past.

Generally, increase of range in the infantry weapon, by facilitating the concentration of fire on any point, whether in the flank or centre, has very materially added to the advantages of the assailant, and to strengthen all the above arguments add the demonstration given above: that the risk of being hit in the passages of a fire-swept zone of ground is actually less, not greater, than in the past, and the argument, in favour of training troops to fight under the strict control of their leaders, *i.e.*, in close order, has been enormously reinforced.

APPENDIX.

Calculation to show the best formation for a battalion to advance across an open glaxis.

It is assumed that in order to establish a fire superiority preliminarily to an assault, a battalion (under cover) receives orders to seize a ridge 400 yards nearer to the enemy, and for this purpose has to cross an open slope swept by the enemy's fire with a uniform intensity which will place two men out of action per minute of exposure, on every 200 paces of front, the men being deployed in single rank. Find the formation that will entail least loss on the attacking troops.

The problem is almost identical in character to that solved by the 38th Brigade in the battle of Mars-la-Tour.

The fire being assumed uniform in dispersion, then if four hits a minute are scored on 200 men occupying in single rank 200 paces, then only two hits per minute would strike 100 men extended at four paces interval, or one hit in two minutes if at eight paces interval. If in two-deep line, then each hit may be taken as disposing of two men; in in three-deep line, then of three.

For the purpose of this investigation, it is further assumed, that not less than 300 rifles are required on the ridge to beat down the enemy's fire; less than that number will be overpowered by him.

The distance being 400 yards, the time required to traverse it will be four minutes.

In that time a three-deep line, 600 strong, would by hypothesis lose $4 \times 12 = 48$ men, reaching its firing position with 552 rifles, who would be most inconveniently crowded.

A two-deep line would lose 32, and with 368 rifles would very closely fulfil the requirements, and be able at once to hold and beat down the enemy's fire.

Single rank would lose 16 out of 200 men, and would at once require reinforcing.

Assuming, to simplify the calculation, that owing to high crops, the men have to fire standing, then if their support follows 200 yards behind, two minutes will elapse before it can reach them, and in that time 168 men already on the ridge will lose an additional 12 men, and their reinforcement starting 200 strong will also lose on the way up, which entails four minutes' exposure, as many men, viz., 32, as the line before it, so that after two minutes there will be 324 rifles in action, *i.e.*, 44 less than the two-deep line could dispose of simultaneously.

With men extended at four paces interval, *i.e.*, 100 men to the whole front of 200 paces, 16 men would drop in the advance and 3 whilst waiting for the next support, which also losing 16 by the way would bring the total number of rifles up to 165, in two minutes. Similarly, a third line at the same distance would bring the numbers up to 241, and it would require a fourth to bring it up to 316, in eight minutes; showing a loss of 84 men against 32 and 72 respectively of the former ones.

Proceeding in the same way, 50 men at eight paces would lose 8 men in their advance, and allowing for losses incurred by the firing line whilst waiting for their reinforcements, it would require 14 minutes to bring 312 rifles out of 400 to the required position.

The losses, therefore, would be in the following order: line, 64; single rank, 72; 2 paces extension, 84; 4 paces, 88; three-deep line, 96. But the percentages would be: three-deep line, 16; two-deep, 16; single rank, 18; 2 paces extension, 21; 4 paces extension, 22.

Next take a distance to be covered of 600 yards, all other conditions remaining the same, by the same method the results work out:—

Formation.	Loss.	Percentage.
Three-deep line	48	24
Two- " " " " " " " " " "	32	24
Single rank, requires two reinforcements=600 men to exceed 300 rifles	181	30
Two paces extension, 5 reinforcements=500 men in 10 minutes	147	29
Four paces extension, 9 reinforcements=450 men in 18 minutes	145	32

For 870 yards the result is even worse for the extended lines, and the whole investigation proves, to my mind, conclusively what I have always maintained, viz., that of all "battle" formations, the "line" is the most economical of human life and the one best adapted to meet all emergencies.

We have only to suppose a counter-attack developing unseen behind the ridge, as was the case at Mars-la-Tour, to see how far stronger for immediate resistance the line with its 304 or 336 rifles available would be than any of the other formations submitted.

Moreover, it is an admitted fact founded on the experience of years, that troops in close order will stand up to heavier punishment than troops extended, and here the line requires them only to stand from 16 to 24 per cent., a low rate according to the old standards, against the 30 per cent. demanded from the extended formation, a rate which they certainly never have faced in the past.

The argument, of course, holds good whatever the intensity of the enemy's fire. I have chosen the above figures simply for facility of calculation.

Major-General C. E. WEBBER, C.B., *p.s.c.* (Ret. R.E.):—I have just a few words to say in connection with this most interesting paper. Its whole tenour appears to me to lead up to the one contention in the last part, namely, that the movement of troops within the zone of fire must be most advantageously effected in a line formation, in close order, in two ranks—what the speaker calls the British line. If he is right, there is no doubt he has taken our minds back to a condition of things under which we can study the battle of the past with quite as much advantage as we can study the questions that have been emphatically brought before us lately in South Africa. In his example he refers to a body of 400 infantry who have to move a distance of 400 yards from a position where they are under cover to a ridge which intervenes between them and the defenders—whose locality is not given to us—but whose distance may be estimated by the hypothesis of the effective fire which sweeps the area over which the 400 men have to advance. It is that the effective measure of the defenders' fire is 8 casualties per minute in 200 men in a single line in close order. Anyone can picture the conditions to themselves. You are defending a position, and between you and the attacking force which before it advances is under cover there is a ridge which this attacking force is called upon to occupy. In advancing from their position of cover to the ridge the 400 attackers have to cross the zone of your fire. The intervening space is described as a glacié. I am not going into the question of the 400 yards a minute, but let us accept that figure. Then we are told that if the 400 men in two ranks of 200 men in each, in close order reach the ridge in four minutes, they will have suffered 64 casualties, that is to say, 32 in each rank; each hit will put two men out of action one in each rank. The next example which he gives us is that of the 400 men advancing in two single ranks of 200 each with an interval, which I think he would say that he means to be one of two minutes, which would mean that the 400 men would reach the ridge in six minutes, and then he says the casualties would be 72. I am not quite sure whether it is 72 in four minutes or 72 in six minutes!

Lieut.-Colonel MAUDE:—Six minutes.

Major-General WEBBER:—Then take the next case in which these 400 men advance in four lines of 100 each at one pace interval between the men, starting from their position of cover at intervals of two minutes. They would reach the ridge in ten minutes, and the losses in that time, according to Colonel Maude, would be—What!

Lieut.-Colonel MAUDE :—84.

Major-General WEBBER :—Then Colonel Maude gives you a fourth case in which these 400 men would advance through that zone of fire, over that glacis, in eight lines of 50 at two paces intervals, starting at intervals of two minutes between each line. They would take eighteen minutes to get there. In that eighteen minutes they would have lost—How many ?

Lieut.-Colonel MAUDE :—88.

Major-General WEBBER :—I cannot conceive it is what would happen, and, therefore, I do not think that Colonel Maude's example is a practical one. In each of his examples no individual man is more than four minutes under fire. In the first, you will have to keep up your fire on him during six minutes. In the second and third, during ten and eighteen minutes respectively. The object of this advance in Colonel Maude's example is to get 400 men as quickly as possible into a new position. If instead of with two minutes, he were to start them in the second case at one minute interval, the four ranks would be 100 yards apart and the last rank would have arrived at the new position in seven minutes ; and in the third case, if at half a minute, the eight ranks would be 50 yards apart, and the movement would have been accomplished in seven and a half minutes. In the same case with a quarter minute interval, it would be over in five and three quarter minutes. It seems to me, that, the only justification for Colonel Maude's theories is this : that if 400 men in their advance have to traverse a fire zone with an equal and constant density of projectiles, they will have the fewer casualties irrespective of their formation the less the interval of line between the moment of advance of the first and the arrival in the new position of the last man. This is no true argument, I submit, in favour of *line* formation, which distinctly means shoulder to shoulder, touch to touch, a formation which entails slower movement, and therefore the longer time spent in the fire zone. All it means is, that, in whatever kind of rank and at whatever intervals the movement is made, it shall not be made with such speed as will produce a tailing off into lines coincident with the direction of your fire.

Captain STEWART J. MURRAY (Gordon Highlanders) :—I think that the lecture which Colonel Maude has given us to-day is a very valuable one, as it breaks ground on a subject which will be discussed a great deal in the near future ; and also because it will give what I consider a much-needed warning to the extremists not to be too certain that they are absolutely correct in their, perhaps, premature deductions from this war. We all know what these extremists are. I remember some years ago, before the war, they used to say, "Oh, what is the good of bothering about what the foreigners are thinking, for we shall never have to fight a European enemy." And now no doubt we shall hear them say, "Oh, what is the good of bothering about what the foreigners think, for they have not been in South Africa." Now, as regards the so-called "lessons" of the war. A great many civilians, press correspondents, and even some officers, appear to think that these "lessons" are absolutely new. That, of course, is not the case. Most of these so-called lessons of the war were known before the war began, and are to be found in the more advanced books on tactics, which a great many people appear to have forgotten. In such books, for instance, as Hoenig's "Tactics of the Future," written some years before the war, most of the so-called new features of the war are to be found fully discussed. Here are to be found such things as the use of advanced invisible positions : the consequent difficulty of reconnaissance, as cavalry cannot get near enough to be able to make out the main position with the naked eye ; the impossibility of thus finding out by reconnaissance more than the position of the

enemy's flanks, and the necessity of finding out further information by fighting; the added strength of the defence, and the consequent ability to hold a position with fewer men, thus increasing the number held back for counter-attacks; the impossibility of volleys under modern fire, and the consequent necessity for careful training in controlled independent fire; the inevitableness of a mixture of units, and of training the troops to fight with mixed units; the difficulty of command and the necessity of training men to pass the words of command down the line, etc; the use of low invisible shelter-trenches with head-cover and splinter-proofs, in which men could remain invulnerable to artillery fire till wanted. All these so-called new features of war had been foreseen and discussed by Continental tacticians, and the present Continental tactics are drawn up by men fully acquainted with these questions. It seems to me that the only thing Continental tacticians have not taken fully into account is, what everybody who has come back from the war tells us is, perhaps, the most important point of all, namely, the tremendous and moral effect produced by fighting against an invisible enemy, and having to fire against an enemy whom you could neither see, nor locate, nor fix as to range. With the exception of this very important point, it seems to me that Continental tactics are based very much on what we know now. Such tactics were not applicable to South Africa, no doubt, owing to circumstances, to the peculiar nature of the enemy, the country, and the climatic conditions. But it by no means follows that they are not applicable to the country for which they have been specially thought out, namely, Europe. Let us not make the logical mistake of arguing from the particular to the universal. Don't let us be in a hurry to dogmatise. *Festina lente*. Now, as to the frontal attacks. A great many people say that frontal attacks have been proved to be an impossibility. But that is merely wild talk, and objection must be taken to it. I say that the frontal attacks which have been proved to be impossible are really only such attacks as foreigners would call regimental attacks, what we call brigade attacks, with three or four battalions, *not* divisional attacks, not army corps attacks, not attacks with great numbers of troops such as Continental tactics are based on. It was perfectly well known after 1877 that regimental attacks, with three or four battalions, could not hope to succeed against entrenched positions, every such regimental attack in 1877 entirely failing, such as the regimental attacks on the Grivitza redoubt, or the twenty-four battalions who tried to take the Omar Bey Tabya in a series of regimental attacks. The men got close to the trenches, and in some cases on to the trenches, but were then driven back for want of sufficient lines following in support. If those twenty-four battalions had been employed simultaneously on Skobelev's principles they would have succeeded. I thought it was after 1877 an accepted axiom that it was no good attacking entrenched positions with only three or four battalions, a foreign regiment or British brigade. In this war we have tried that same thing again and again, and it has failed, as everybody said such attacks must fail. That lesson of 1877 has been retaught. But it is not a new lesson. But I submit there has been no instance of such an attack as Skobelev's attacks failing in this war. Every position he was ordered to take he took, because he never made regimental attacks. He never attacked with less than sixteen battalions line behind line, on a narrow frontage and with great depth. In his attack on the Green Hills his first line of two regiments (or British brigades) in three lines, I think, was brought to a standstill at 500 yards; he then reinforced with fifteen companies, who carried the line on to 300 yards and were brought to a standstill; he then reinforced with twenty companies, who carried the line on to 150 yards, and were stopped; he then placed himself with

some reserves at the head and captured the trenches. But how would his first two regiments have fared if they had not been so strongly reinforced? They would have failed of course. But Skobelev knew better than to waste his forces piecemeal. In his attack on the Scheinovo entrenchments he had, I think, sixteen or seventeen battalions. First came two rifle battalions in front, then another battalion; then the Uglia Regiment, each battalion in two lines at 380 yards distance, total depth of Uglia Regiment 2,000 yards (*i.e.*, the second line of our Drill Book), and the Kasan Regiment followed the Uglia Regiment; and he took the position without artillery preparation or covering fire, except one mule battery, I believe. The point I want to make is this, that it is not fair or correct to say that these Continental attacks with masses of troops cannot succeed in future war, because they have not been tried in this war. They succeeded in 1877 against the tremendous hail of bullets poured on to the ground over which they advanced by the Turkish quick-fire. The only frontal attacks which have been tried and have failed are those which also failed in 1877, namely, regimental attacks. We only failed where the Russians failed. We should have succeeded, I firmly believe, in attacks made as Skobelev made them, if we had had enough men to try them, and they had been necessary. There is another point which a great many people talk about, and that is flank attacks. People say that you must never attack in front, but always work round the flanks. That is all very well in some cases, but it won't do for all. To begin with, if you want to hold the enemy to his position while your flank attack comes off you must make a frontal attack. And every flank attack itself must end in a frontal attack for the troops who make it. The only difference is the difference between a frontal attack on an entrenched position and one which is not entrenched or only slightly entrenched. And, therefore, as far as the troops are concerned, and their training, the only thing to consider is how a frontal attack can best be carried out. I think this is a point which requires to be pressed, for you hear civilians abusing every frontal attack as if it were a frightful crime to make one. Whereas every attack must, to the troops engaged, be a frontal attack. To avoid misconception I would wish to state that I do not, of course, for a moment deny that there are many most valuable lessons to be learnt from South Africa, only these lessons are chiefly lessons relating to detachment fights, and do not so much affect the tactics of pitched battles, which is what Continental tactics deal with. And, as everybody knows, there is a great difference between the tactics most suited to detachment fights, and those most suited to obtain decisive results in a pitched battle. As regards these Continental tactics of how best to make use of masses of troops, I have seen in the newspapers most severe criticisms, accusing foreign officers of ignorance of the effect of fire, and all kinds of things, which, of course, is absurd. The point I wish to press is that these tactics are adopted after full consideration of all the so-called lessons of war, with the single exception perhaps of a full appreciation of the moral effect of fighting against an invisible enemy. If we examine them critically, therefore, we must not assume that foreign officers are ignorant of the effects of fire, or any other material factor of the modern battle-field, all of which we know they have exhaustively studied. These tactics should be regarded from the standpoint of what modifications, if any, are rendered necessary owing to the new moral factor which has been so strongly brought out in South Africa. I think it is very probable that they have themselves seriously considered this new factor, and are preparing the consequent modifications, such as, perhaps, that the assault shall be postponed till the close of the day, when the gathering dusk will

render it easier, etc. But if so, this modification would not be apparent at Continental manœuvres, for there the attacks have to be hurried over in haste and finished early, so that the troops may get back to their billets. So we must be cautious, and not make too hasty judgments on foreign tactics as displayed hastily at foreign manœuvres. I wish to again press the point that the only frontal attacks made in South Africa were regimental, or, as we should say, brigade attacks, which 1877 had already demonstrated to be too weak to carry an entrenched position. Their failure is, therefore, no new lesson, but only the repetition of an old one. It proves, however, as Skobelev proved, that attacks on entrenched positions must not be less than divisional attacks to have a chance of succeeding. The lesson is, that if we have not enough men for such attacks by sixteen or twenty battalions, then we must get them, *i.e.*, we must have universal service. I consider that the lesson points to the fact that for European warfare we must have great numbers of troops available for attack, which numbers can only be obtained in one way. As regards the actual conclusions of the lecture, I think we owe great thanks to Colonel Maude for so ably putting the mathematical theory of the attack before us for consideration. But in every case, after laying down the theory of the matter, we have to make the necessary allowance for human nature—the material with which we deal. Therefore, I think single rank, a loose single rank, is necessary, for the actual firing line—for I believe a double rank would at once become an overcrowded single rank. I think his conclusion is more applicable to the advance under unaimed fire of the troops of the second line for the actual assault at the close of the day, possibly in the dusk of the evening. But the whole question raised by this lecture requires the deepest and most prolonged consideration, which it will doubtless receive. And it is extremely valuable as a warning against too hasty generalisations from the detachment fights of South African warfare to the tactics of pitched battles in Europe. And the application of the matter of this lecture to ourselves is this:—If our fleet is ever defeated, or, after perhaps a drawn battle, has to return to port to refit, if we are ever invaded, the military problem before us will be the following: Three army corps entrenched on our shores, while the great liners which brought them hurry back for more. In a week three more or so will have reinforced the first three. In another week three more will reinforce those six. Both France and Germany have ample transport in great liners for this. Our problem will be how to overwhelm those first three or six army corps before they are reinforced by more. That is to say, that what we have to consider in this country for home defence is the problem of pitched battles. The commercial and industrial conditions of this country are such as would render a prolonged campaign an impossibility. We must take the offensive in overwhelming strength—two to one—for a pitched battle. Our military problem is how to get the requisite number of men of discipline and training fit to attack European troops in an entrenched position in a pitched battle for our existence. We have not got them at present, and the sooner we get them the better.

The CHAIRMAN (Major-General H. M. Bengough, C.B., *p.s.c.*):—It is quite possible that there are many here to whom Colonel Maude is familiar in his literary capacity, though not known to them personally. It is only quite recently that I had the pleasure of making his acquaintance, through the fortunate accident of an introduction by a common friend; but I am well acquainted with his writings. A good many years ago, when I was captain of my regiment in India, I came across a report of the lecturer's—then Captain Maude of the Engineers—on some cavalry manœuvres in Germany; and I was very much impressed by the thoroughness and grasp of the subject, and the acquaintance that the author showed with an arm of the

Service not his own. As you will remember, in those days it was considered an intrusion, if not an impertinence, to attempt to pretend to any knowledge of any arm of the Service outside your own. This characteristic of thoroughness Colonel Maude has always exhibited in his writings. We all agree that we have had a very valuable paper, rather a difficult paper, perhaps, to get at: It seems to me a little doubtful as to how far it is possible to prove theories on the science of war by mathematical formulae, the science of war being so much based on moral principles and dealing with human flesh and blood. But they are exceedingly interesting, and serve to show the great care with which Colonel Maude has prepared his paper. The paper seems to strike in different directions. I do not propose to follow General Webber in the intricacies of explaining these problems. But it seems to me that the point to which Captain Stewart Murray directed his attention is most useful. There is no doubt that we have learnt many lessons from the war, but with these useful lessons there are mixed up a great number of fallacies—I might almost say heresies—which have crept into the extremist views which Captain Stewart Murray referred to. I will review briefly one or two of these which appear to me to be specially refuted by Colonel Maude's paper. Our friend, the question of attack and defence, is a very old one, as old as primeval man. Now it seems to be decided, that the improvements of modern weapons, entrenchments, and barbed wire—I did not know that barbed wire was a recent invention!—have made attacking a position impossible. Much may be said on this question, but I would ask you to examine one or two simple considerations only. If it is true that the defence has benefited so much by effective fire as to be able to hold a long line with a small number of men, surely it is equally true that the attack in the same way can hold or contain an enemy with a small number of men, thereby being able to throw a larger number at any given point in the line, or turn a flank. With regard to the effective fire of modern rifles, Colonel Maude has shown that the casualties in the present war have been considerably less than in the Seven Years' War, or Napoleonic period. In the same way with regard to the weapon of 1870, the Germans had an inferior weapon, and they were able to take positions by assault from the French, who were equally brave soldiers. In the Turko-Russian War the same thing occurred. We have experienced the same ourselves in this campaign, our own troops having in no less than five general actions successfully carried out an assault. Therefore I think we may fairly say that the attack has still some legs to stand on, and I hope that so long as the British Army lasts those tactics will be employed. Then comes the popular fallacy to the effect that a trained Army is no longer required by Imperial needs, and that a civilian Army is equal to all our requirements. That seems to hardly need any refutation, if it were not supported by such respectable authorities as Dr. Conan Doyle and our much-lamented friend—speaking in this Institution—M. de Bloch, whose excellent paper was only recently read at this Institution. It seems that this idea has gained ground from a few unfortunate incidents that happened to our Regular troops early in the war, compared with the excellent work carried out by the Volunteer troops. I am sure we soldiers are the first to allow every possible credit to the Volunteer troops for their admirable and gallant behaviour in South Africa. In to-day's paper I notice the mention of the New Zealand Horse, Scottish Horse, and South African Horse, who have performed some excellent work. Allowing all this very willingly, it must be said still that any civilian Army, any untrained Army, must be wanting in that great bond of union, that power of self-subjection for the general good which we call discipline, and where discipline is wanting all other military virtues will be of little avail. You will remember that the foreign officers who fought

DIAGRAM SHEWING RELATIVE POWER OF THE

THREE ARMS.

CURVE OF LOSSES PER HOUR AT VARIOUS PERIODS
FROM TYPICAL INFANTRY BATTLES.

Fig. 1.

Fig. 2.

Fig. 3.

in the Boer ranks largely hemoaned the want of initiative in the Boer Army; which they said was due to the absolute want of discipline amongst the Boers. Passing on to a third fallacy, which, I am sorry to say, some of the members of the Army seem to support, I would speak of the cavalry arm. People say now that the Regular cavalry is an arm of the past, and expect the cavalry soldier soon to be as extinct as the dodo. I do not think many officers who are in a position to judge would quite agree with that. I have no doubt our cavalry will require changes in their training, in their shooting, and in their equipment; but, when all that is said, I believe Colonel Maude, who is a strong advocate for the cavalry arm, will say there is still a future for well-led and well-trained cavalry. Lastly, I may mention the artillery. That is an arm from which we expected very great things during the war. It has not altogether fulfilled our expectations, not from any want of energy on the part of the arm itself. It is said now that artillery is unable to maintain an effective fire on troops in entrenchments, and to subdue the fire of those troops, and, therefore, is of no further use for preparing for an infantry assault. Some of you may have been present at a lecture by M. de Bloch a short time ago, when General Sir Frederick Maurice presided, when this point was mentioned by M. de Bloch, and General Maurice said:—"Yes, but let us remember that if guns are not able to turn troops out of trenches, if they can by a shower of shrapnel keep the troops in the trenches, preventing them from making use of their rifles, and thus enabling the attacking party to advance, they will be doing very useful work. Let us remember that our field artillery was undoubtedly outclassed during the war. When properly used, as at Pieter's Hill, they almost decided the action." I have not the honour of being an artilleryman, but I look in the future to the use of vertical fire as a very important adjunct to our Army. I think a 5-inch howitzer shell dropped among the Boers in their trenches would have somewhat disturbed their very cleverly designed domestic arrangements. You will, I am sure, authorise me to assure Colonel Maude of your appreciation of his clever and valuable paper.

Lieut.-Colonel MAUDE, in reply, said:—With regard to the losses of the line mentioned by General Webber, the distance of 200 yards in two minutes was taken simply as an example, and from the ordinary Continental practice. I had no particular reason to take that distance more than another. But if you halve that distance, as General Webber rightly points out, you will diminish the loss, and by halving it again you diminish the loss still more. If you can go on until the ranks come close together you practically wipe out all the extra losses, except those due to the bullets that may go through two men. I made the assumption that every bullet would go through two men, but it is not always the case; as the men fall, the line approximates to single rank, and a correction is due under this head. Besides, a great deal of the fire we should have to encounter would be shrapnel, which would not take two men. I was more than surprised myself at the result being so favourable. My contention for several years has been that what we wanted to do from the very beginning was to go back to what our forefathers learned before us, and remember that there were wars before 1870. I maintain that if we had only taken the Peninsular War as our model, multiplying the distances then used roughly by ten right through, we should have attained almost at once to an ideal form of infantry attack. As far as the exceedingly inferior rifles and muskets then in use would allow, they did make very good shooting, and there can be no doubt the effect of their fire was perfectly appalling. There is nothing in modern war to approach it. I have worked that out ever since General Bingham first remembers my taking the question up, and my one

object has been to see the good old British line restored to its place. Our war-trained troops did not find it stiff or unmanageable. With regard to what Captain Stewart Murray says, we are so entirely in agreement, that there is little I need say on the points he raises. He calls attention to the moral effect of a fire from an invisible enemy. No doubt that is very bad, but it was very bad in 1870 too, and also in the Turkish War, because the ranges were nearly as extreme. I do not think it matters much to a man who is hit when behind a hill by an enemy he cannot see, whether the enemy is 500 yards off or 1,500, but the number killed in long-range firing has not been excessive hitherto.