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Evening Meeting.

Monday, April 19th, 1875.

COLONEL H. C. FLETCHER, Scots Fusilier Guards, in the Chair.

NAMES OF MEMBERS who joined the Institution between the 5th and 19th April, 1875.

LIFE.

Stanton, F. Robt., Capt. late Royal Scots.
Domville, W. C. H., Lieut. R.N.
Fraser, Thomas, Capt. R.E.
Markham, Edwin, Major R.A.

ANNUAL.

Trevelyan, H., Lieut. 32nd Regiment.	Mansell, A. B., Lieut. R.N.
Northey, W. B., Lt.-Col. late Cold. Gds.	Robertson, Murray, Capt. West Kent Militia.
Marriott, W. F., C.S.I., Major-General.	
Colquhoun, J. A. S., Capt. R.A.	Abbott, James, Major-Genl., R.A., C.B.

"THE GATLING GUN; ITS PLACE IN TACTICS."

By Captain E. ROGERS, F.R.G.S., Staff Officer of Pensioners, Chester.

WAR has become so terrible from the increasing powers and accuracy of fire-arms, that a proportionately keener interest is manifested in movements technically termed tactics, which tend to secure a certain degree of safety in the field whilst inflicting the utmost amount of injury on the foe in the shortest possible space of time; for the ancient conditions of fighting are reversed, and instead of movements leading up to some grand and supreme effort whereby the enemy, gradually intimidated, was finally crushed by an overwhelming advance in compact columns, modern tactics seem to court immediate contact in the loosest formations—and the sooner the better.

Now as the Gatling, like all mechanical contrivances, seeks to supersede manual by self-acting labour, or in other words to economise the human life that must be sacrificed at the outset of a battle or campaign carried on by an enterprising General desirous of sudden success, the question of tactics is for it of paramount importance, and demands special consideration, inasmuch as I venture to contend that by a judicious employment of this means to the end, the hitherto awful loss of men in primary actions will be brought within a minimum compass on the side of the combatants availing themselves of such retaliating substitutes. I was present in this theatre two years ago, when Major Henry Brackenbury delivered a most impressive and exhaustive lecture on the "Tactics of the three Arms," and we might naturally have expected then to hear something reliable as to the action of automatic fire-arms in warfare, but on that point he was silent; and although I was invited by the Chairman of the Council to provoke discussion on so important an omission, it was impossible under the circumstances to avail myself of the opportunity. And yet the gallant lecturer as well as his equally distinguished

brother, who was present and took part in the discussion, could on that occasion, as at other times before and since, have spoken to the powers of machine guns and descanted on their utility for service with perhaps more authority than most living Englishmen; for one of them at least personally witnessed the startling performances of an inferior nature of mitrailleux, handled with little judgment and opposed to a foe tactically as well as numerically superior. It may be said that the question of the employment of mitrailleurs in modern warfare, ably handled as the subject was by Dr. Gatling, Major Fosbery, U.C., and Colonel Fletcher, Scots Fusilier Guards, has been already discussed within these walls, and an open verdict given on their general adaptability; but it is because the lectures alluded to were delivered at a time when the system was not thoroughly understood that once more the question is submitted to your judgment; and moreover we have added the sober reflections of three years to our knowledge of the gun.

I have, therefore, compiled this paper not as an exposition of dogmatic theory (however enthusiastic it may appear), but with a view to elicit the experienced opinions of others, and thus to gain for the members of this Institution and for the Army at large, the most authentic observations on an increasingly interesting subject. The title of my lecture will accordingly be pretentious in so far only as you respond to or decline the invitation. To effect this object I propose to consider present tactics as enforced by the experiences of modern warfare, interpolating suggestions as to the position of Gatlings, and thus with your assistance and corrective criticism to arrive at some conclusion affecting their status; for, individually, I hold that the Gatling battery should be regarded as an entirely separate and unique organization; as, in fact, a fourth arm of service. But before entering on the vexed question of tactics, I may be permitted to make a slight historical retrospect, so as to lay before you the facts connected with the introduction of the Gatling gun into modern armaments, a weapon, be it remarked, thoroughly and essentially different in all its distinctive features from all other firearms. It was the introduction of rifling, coupled with the uncertainty of fuzes, that brought about the necessity for an intermediate arm of service. "By depriving it of its most destructive projectile, canister," says Captain Henry Hime, in his *Artillery* prize essay, "rifled small arms have inflicted a heavy blow on field artillery, but the evil is not irreparable, for the mitrailleux is capable of delivering a fire of case far more extended and deadlier." The year 1869 was marked by unusual activity among nations in the investigation of rival systems of multiple guns.

But it is not my purpose to weary you with descriptions of the different mitrailleurs (as they came to be called, a generic term which by the way is apt to mislead) that were then previously or subsequently brought forward. No doubt they each had or have some speciality worthy of the inventor, and a principle may be correct which is simply spoiled in application; but my contention being that this "principle" has reached its culminating point in the Gatling

gun, I must confine myself thereto. In July of that year (1869), Gatlings of the larger calibres were experimentally reported upon both on the Continent and in America, and verified their unique character for continuity, rapidity, and accuracy of fire at long and short ranges. These were excellent results under the circumstances, and with the poor and imperfect ammunition of the period. It has, indeed, been to the simultaneous improvement of metallic-case cartridges that machine guns owe their present marvellous rapidity and certainty of discharge. In the following year it was ascertained by a special Committee, from a comparison of a series of trials carried out at Shoeburyness, under various conditions in regard to time and distance, that the destructive effects of a Gatling of small-arm calibre would be nearly three times greater than that of the 9 lb. field gun at troops in the open up to 1,400 yards. Moreover, the experiments clearly showed the deadly effect of this small Gatling up to 1,500 and even 1,600 yards, whilst the larger and medium sized Gatlings made good targets at 2,000 yards. These, however, were broad results of trials on level ground, without the distracting elements of strife, and could not be said to affect the particular hypothesis that machine-guns skilfully, courageously, and intelligently manipulated, would prove themselves unrivalled as death-dealing instruments amid the confusion and excitement of the battle-field. A second Report was therefore drawn up by the Committee on the 21st November, 1871, when the evidence of eyewitnesses to the action of mitrailleurs could be brought to bear on the question of their employment.

But the war that raged in the interval was not particularly conducive to the practical development of machine guns, because of the fact that no special preparation or tactical training had been devoted to the subject by the French Artillery Executive. The mitrailleur so mysteriously unveiled at Saarbrück effected but little to establish its reputation; and although on several after occasions, good service was performed by mitrailleur batteries, as at Wörth, Gravelotte, Beaugency, Sedan and Metz, the general results fell far short of Napoleon's, and, may I not add, of the world's expectations? It has, however, been remarked by more than one writer on the Franco-Prussian war, that French gunners were the least likely to do justice to a novel weapon of the kind, and to work it with calm intelligence. Be this as it may, the guns were not Gatlings, but mitrailleurs.¹

On the other hand, the Prussians were content with their superiority in numbers and discipline, and dispensed with machine guns, except in the Army of the Bavarian Contingent, by whom a nondescript species of revolving cannon was nevertheless at times used very effectively.²

¹ A few Gatlings were, it is true, employed in the campaign of Le Mans, and at the siege of Paris, but they must have been of a crude and obsolete pattern, for the Emperor had some time previous to the war refused to purchase 100 Gatlings of an improved model offered to him by the Gatling Gun Company.

² "It produced a marked result at the affair of Coulommiers; one battery of four pieces causing, firstly, a battery of guns to retire when at a distance of from 900 to 1,000 yards; and further, repelling three times the attacking columns of the enemy."—Report of the Swedo-Norwegian Artillery Commission, 1872, translated by Captain King Harman, R.A.

The Prussians also captured a large number of the French type of mitrailleuse, and when some of these were subsequently tried at Berlin, in competition with Gatlings and Montigne mitrailleurs, they were pronounced superior to either;—"an admirable conclusion to arrive at, so far as economy is concerned," observes Captain Owen, in his recent pamphlet on Machine Guns, "but one scarcely borne out by unprejudiced evidence." Major Charles Brackenbury may also be quoted on this head. He says:—"The Prussians alone, so far, deny their value in the field, though they admit it for sieges. But the Prussians never admit the value of anything that costs money, until they possess it; and I can vouch for the fact, that the soldiers held the French mitrailleuses—unwisely used though they were—in more dread than the French Artillery." As however, it has, more than once, been broadly asserted, that mitrailleurs are regarded by Prussian Officers as superfluous engines of warfare, it may here be well to quote as evidence to the contrary, a few passages from the official work on the Franco-Prussian war, edited under the supervision of Count von Moltke, as translated by an Officer of the French Staff. In the great tactician's account of the battle of Gravelotte, he states:—"While the action was thus developing upon the principal line of battle of the 3rd division, three battalions of the advanced guard were having a partial engagement in the vicinity of Chautreune. Two companies of the 36th regiment had been led from Chautreune to the slope which rises from the east, but, as in the wood, they did not succeed in pushing further forward, for the open ground was entirely under the fire of the French infantry, posted in the same wood and in the cluster of trees west of La Folie and Montigne-la-Grange; from this point notably, a battery of mitrailleuses swept the border north-west of the cluster of trees, and another battery from the south angle of this cluster, held under its fire the clearing which separates it from the Wood des Genivaux. In a short time, General v. Blumenthal saw the impossibility of an attack upon La Folie. * * * * The position of the 36th Regiment on the open ground, afforded it very little shelter against the enemy's musketry and mitrailleuses, so its losses gradually reached a very high figure, while the French generally kept themselves defiladed, or outside of the zone of action of the needle gun." Further on he says:—"At this moment the Artillery in position on the ridge to the south of the Wood de la Cusse, was placed in an extremely critical situation. A battery of mitrailleuses had debouched in front of d'Amanvillers, and fired directly and with excellent range upon the extreme left of the line of Prussian Artillery. This point was occupied by the fourth heavy battery, already seriously injured by musketry; in a few minutes the fire of the mitrailleuses so decimated it that several Officers, 5 chiefs of pieces, and 40 men were disabled, and nearly all of the horses were killed or wounded. Such was the situation when suddenly large detachments of the enemy's infantry rose from the ravine in front of the ridge, and threw themselves, with surprising swiftness, upon the defenceless battery. Its chiefs already wounded, succeeded, with the few horses still untouched and after desperate

"efforts, in getting two pieces back to the border of the wood; but the remainder of the pieces fell into the enemy's possession."

Now, the foregoing is, I take it, a very suggestive quotation, and it is clear that on this occasion the French displayed exceptional good judgment. It will, however, be sufficient to draw attention to the fact that the 36th Regiment suffered losses from the mitrailleurs at distances beyond the effective range of the needle-gun, and also that guns of heavy calibre, in position, were completely snuffed out by volleys from another mitrailleuse battery, stationed on an exposed ridge.

In accordance with the advice of Colonel Wray's re-assembled Committee, two natures of Gatlings were tentatively admitted into our service, namely, the one of '65 calibre, for naval purposes and coast defences, and the '45-inch, or ordinary Gatling, for field service. The Committee could, indeed, find no real fault with the former gun as a far-reaching and excellent machine for field service when opposed to artillery, but they thought that the weight of ammunition required to produce the highest results, under exceptional conditions, rendered its adoption inexpedient. Of course, so heavy a gun would, like the French mitrailleuse, require more than two horses for its draught; but, in this connection, it is proper to remark, that the improved American Gatlings of large calibre, weigh considerably less than they did in 1871, that of '65 calibre being 450 lbs. only. The difference of range between the small-arm gun and those of large calibre firing heavy projectiles, should also be borne in mind, when it is considered that our Gatlings may be opposed in the field to long-range mitrailleurs, such as the French ones, and not being able to reply to them, would be as discouraging as to be subjected to a distant cannonade from shell guns. It is, in fact, no longer possible to ignore the existence of mitrailleurs with the armies of all countries, every State in Europe having adopted some type of machine gun. Other nations have anticipated us in the extensive adoption of the Gatling for field service. Even Turkey and Egypt, China and Japan, Tunis, and Morocco, have procured armaments of this description, but Russia in particular possesses a formidable array. 400 Gatlings formed into batteries of 8 guns each, attached to the artillery branch of service, are, according to the information of our Intelligence Department, distributed as follows:—328 are stationed in European Russia, 48 protect the Caucasian territory (one of the batteries being assigned exclusively to the Cavalry) and 24 are placed in Eastern Siberia and Turkestan.¹

¹ Why the Gatlings in Russia were named "Gorloff's" had better be explained, and indeed I have been requested by General Gorloff to disclaim, on his part, any pretention to the title of inventor. There is a rule in the Russian service that the name of any official superintending the casting or construction of a gun must be engraved on it. Hence the erroneous notion that General Gorloff altered in any way the mechanism of the Gatling. While at Hartford (United States of America) superintending the construction of the Gatlings for his Government, he experimented largely with the cartridges of the Berdan rifle (which is in partial use in Russia), and he succeeded in effecting an assimilation of ammunition (an important and economic provision which we would do well to imitate), but he did not tamper with the gun. Considerable changes, but no radical one, have been introduced in

During the Khivan Campaign, two Gatlings only were employed, but that they did good service may be judged from the following among other instances related by the Russian Officer, who had direct charge of the subdivision of the battery, as quoted by General Franklin, late U. S. Army, in a pamphlet lately published in America:—"About 3 p.m.," says Captain Litvinoff, "parties of horsemen commenced to make their appearance from different sides; they approached us nearer and nearer, and behind them we could descry larger masses. They commenced to engage our picket line with great determination and daring. One of these pickets, composed of 1 Officer and 5 Cossacks, sword in hand, threw themselves forward against an approaching mass of Turcomans and were completely cut to pieces. Two companies of the 3rd battalion of sharpshooters, two of the 8th battalion of the line, and two battery guns (Gatlings) were ordered forward to drive away these bands of Turkomans. The road we had to follow was very difficult even for infantry and cavalry, as at every step we had to cross wide ditches, dug for irrigation, which had abrupt sides; *for artillery the road would have been impassable.* Our light battery guns went on this road with perfect ease, the ammunition pack-horses alone giving us some trouble. When we stopped, a line of sharpshooters and battery guns was formed along one of these ditches. First I had to find out the range; for this purpose I fired three cartridges, changing each time the height of the sight; the distance found was between the limits of 1,050 and 1,170 yards." Then he goes on to tell of his dispersing the smaller bands of Turkomans with very few rounds:—"Opening at the first, I fired rapidly 25 rounds; the band immediately dispersed, part of the men joining the second band. Opening from the second gun, I fired 50 rounds without interruption; the second band dispersed at once, and the men betook themselves to broken ground."

However, later they still came on:—"Several times the enemy collecting in masses of some strength moved against us, but was each time driven back by our fire; thus I had several opportunities of firing a succession of 25 or 50 rounds, the direction of guns and their elevations varying somewhat according to circumstances. In the whole, the battery guns fired that day 408 cartridges." Not very many certainly, but the Russians had to be sparing of their ammunition as of everything else on that campaign.

But it is in the United States especially, that, as might be expected, the utility and economy of Dr. Gatling's invention has been appreciated. Two natures of the weapon have been issued to the American Navy, one with long and one with short barrels. Pivot-sockets are fixed in convenient positions on the rails and in the tops of large vessels, to enable the latter Gatling to be fired at an extreme depression for the repulse of boarders and for driving off torpedo boats. When

the construction of the Russian Gatling at the instance of a mechanical genius in St. Petersburg, named Barononski, in whose service are the Nobel brothers (*par nobile fratrum*), whose names have, in like manner, been given to the so-called improved Gatling.

either gun is used as a field-piece ashore, 13 men are assigned to the duty of serving and manœuvring it in action, the ammunition being conveyed in reversible carriages, and the men are drilled to load occasionally by hand, each man carrying for that purpose, 100 cartridges in a "passing box," slung over the shoulders; a rate in firing of 60 rounds a minute can be attained by this process of manual feed, during any interval in the continuity of loading from charged drums or feed-cases. As in our own service, steel screens are employed to protect the crank-men in ships tops, and mountings are fitted to the bows of cutters for the reception of the Gatling when used to cover a landing, or in river expeditions. "The Gatling gun, although an intricate piece of mechanism to put in the hands of seamen," observes Lieutenant Marvin, U.S.N., the compiler of a manual on the subject, "is not liable to get out of order in service or have its parts deranged, if intelligent care be exercised in its use and treatment." In the autumn of 1873, a series of trials to test the strength of the improved cartridge and the endurance of the Gatling, were carried out at Forts Munroe and Madison. The inventor of the gun stood by while 100,000 cartridges were being discharged, 63,000 of them being fired almost consecutively, and at times at a rate of 400 rounds a minute, without waiting to wipe out the barrels. The only mishap that occurred during this unprecedented test of gun and ammunition, was the breaking of an extractor hook, upon which Dr. Gatling at once withdrew the damaged lock; the firing was proceeded with to the close. Further experimental practices, to ascertain the value of the Gatling, in comparison with shell guns and small-arms, and for flank defence of temporary and permanent fortifications, were concluded last year, and the published account of the proceedings of the Committee, forms a complete vindication of the weapon as an auxiliary and indispensable arm for all branches of service. One passage only, have I time to quote:—"In field fortifications," say the Board, "a gun that can deliver a rapid and intense fire, effective at both long and short ranges, is very desirable. Indeed the power of guns to attain an enemy's column at a long distance, obviates in a measure proportional to their efficiency, the necessity for using shell guns, or any other flanking guns, at close range. If, in addition, this hypothetical gun shall have proved itself capable, not only of *delivering* but of *maintaining* uninterruptedly for hours, a most destructive fire at all distances indifferently, from 50 yards up to and beyond a mile; its introduction into the armament of our fortifications, as an auxiliary, would seem to be an obvious necessity. The Gatling gun is such an arm, and is, beyond question, well adapted to the purposes of flank defence, at both long and short ranges." In addition to a large number supplied, as I have said, to their Navy, for boat and shore service, 50 short-barrelled Gatlings have been issued for service with the United States Cavalry. Each gun is mounted on a light two-wheeled cart, so constructed as to answer the double purpose of an ammunition waggon. The cartridge boxes on either side of the gun contain together 40 feed cases, each holding 40 rounds, or 1,600 cartridges in all. Space is also reserved in front of the axle for two boxes

of cartridges, containing 1,000 each, so that the carriage can take with it a large supply of ammunition as well as the gun and a few necessary tools. [The accompanying illustrations (from photographs,) show

FIG. 1.

FIG. 2.

what a handy weapon it is for service in difficult country.] In the autumn of last year, two Gatlings were reported to have done "splendid service" in frequent encounters with the Redskins on the Western Frontier. On one of these occasions, Major Price, of the 8th United States Cavalry, was attacked by 600 or 700 Indians, and he used his Gatlings with such excellent effect as to quite demoralize and drive off his savage assailants. Having thus summarised the history of the Gatling gun, it will be seen that hitherto the improved gun has only been employed against a foe ill-provided with artillery, or with no artillery at all; and let us consider for a moment, the advantage of such weapons for service under similar conditions in our Foreign Dependencies. It can indeed, scarcely be doubted, that as an auxiliary arm, Gatlings are peculiarly adapted to colonial defensive operations, as well as for retaliating demonstrations against troublesome neighbours, in countries where our enemies are numerous but ill-armed, where the roads are few and unsuited to wheel traffic, and where the surprise caused by the overwhelming discharge of a battery would carry with it an irresistible moral effect. More than 150 years ago, an Afghan Chief crossed the deserts of Kerman with an army, for the most part mounted on camels, a number of the latter bearing, in addition to their riders, a swivel gun. Approaching Ispahan, they encountered a Persian Army nearly three times their number and provided in addition with 24 formidable pieces of ordnance. On the Persian Army's approach, the left wing of the Afghans gave way; the former immediately pursued with vigour, but soon their enemies' ranks opened and disclosed a line of 100 camels kneeling down, each with a gun on its back. The fire knocked over the leading ranks of the Persians, and a charge of cavalry completed their discomfiture. Colonel Maxwell, R.A., who recounted this story some years ago to an audience at Woolwich, became, no doubt, unknowingly responsible for the hint as magnified by an American Artist, who has depicted an army of camels with short-barrelled Gatlings duly mounted, deployed for action on a vast plain in double ranks, front rank kneeling. The terrible effects of such a volume of volleys is, in fact, the only thing left to the imagination in the picture! But it was, I believe, at the serious suggestion of this same artillery officer, that Dr. Gatling planned the camel gun, weighing 135 lbs. only, and capable of being worked from a fixed tripod, or from the back of a camel or elephant.¹ Where range is of

¹ "In the mutiny of 1857," says Colonel Maxwell, "in India, and for some time subsequently, two camel corps, on Sir Charles Napier's model, were organised—one company being taken from the Rifle Brigade and another from the 92nd Foot.

"Could such corps, in addition to their power of locomotion, be endowed with increased power of musketry fire, their value, from a strategical and tactical point of view, would be vastly increased. Combined with cavalry, they would be more especially suitable to such operations as reconnaissances, as they would provide the reconnoitring force with precisely the element in which reconnoitring parties are usually deficient—viz., missile power and capacity of resistance in case of surprise; further, for suddenly seizing important strategic points such as the junction of a number of ordinary roads or railroads, fords, bridges; or for making requisitions, covering forage parties, seizing boats in a river, escorting convoys, and the like.

"As we have, in the north-west of India, a splendid breed of camels, it seems de-

secondary importance to portability, such a gun would display very valuable characteristics.

It, in fact, almost meets the requirements of Major Rait, C.B., who has suggested a "pistol Gatling" of 100 lbs. weight, to go on a light simple carriage; but as to this, I am inclined to think with Major Fosbery, that we ought not to sacrifice our command of ground and precision of performance, to the attractions of toy guns and feather-weight ammunition.

The specimen of the Gatling gun, courteously sent by Sir William Armstrong from the Elswick Works, for exhibition on the present occasion, has been expressly designed for the Indian Service, and weighs 150 lbs. It, too, can be fired from either a carriage or tripod, and I am assured it has been proved effective up to 1,400 or 1,500 yards. With the present traversing arrangement, the angle of lateral spread is $6^{\circ} 4'$, and this may be varied from zero to the extreme angle in intervals of 2° ; an improvement will, I believe, be eventually introduced, to render the automatic device capable of any desired angle of spread. As you see, there are only eight barrels instead of ten; the effect of which arrangement is not only to lighten the piece, but to allow of a more rapid and continuous fire, in consequence of the freer circulation of air and radiation of heat. The angle of depression of the muzzles is only limited by the length of the elevating screw, and the convenient manipulation of the piece in action, but there is no difficulty in obtaining a depression of 10° , the carriage standing on level ground. The cartridges used with this light gun are precisely the same as those issued for the service of ordinary 0.45 Gatlings, and they will probably be carried in India on pack animals. No special mountings have yet been designed for the gun, but any ordinary field-carriage is available for the purpose.

The weight of our service Gatling, and the width of its track, precluded its effective use in the Ashantee War. One of the guns sent out was, however, mounted on an extemporized narrow-track carriage, and, although consequently top-heavy and liable to frequent upsets, it was taken to the banks of the Prai to command the bridge in certain eventualities. In bush warfare it is said that the pellet-drift from a Gatling would be ineffectual as compared with the heavier bursting deluge of a shell, but the former has exceptional penetrative capacities which ought to count for something. During the experiments in America last year, it was proved that at 150 yards the Gatling bullet pierced six thicknesses of one-inch plank, while canister balls, from a Howitzer, penetrated three only. Now the killing and disabling effects of a projectile may be said to be proportional to its penetrating power; therefore, in view of ever-recurring "little wars" throughout our widespread colonies, the non-employment of the Gatlings sent to

sirable to adapt their locomotive and carrying power to military purposes, in combination with the latest invention in firearms.

"The Gatling gun having met with the approval of a mixed committee of officers at Shoeburyness, it may be worthy of consideration whether a light gun on this system could not be made of a weight suitable for a camel gun."—"Camel Guns," Lecture by Lieut.-Colonel Maxwell, R.A.

the Gold Coast, will not, it is evident, militate against the future use of the gun before us, as an auxiliary weapon for offensive bush and hill warfare. Major Fosbery, has pointed out, very forcibly, the utility of mitrailleurs for field operations in India, the facility of their transport, the ease with which the great factories there can turn out any quantity of suitable ammunition, and the effects on the superstitious minds of the frontier-natives of an automatic straight-shooting field-piece as opposed to smooth-bore muzzle-loading cannon and inferior muskets; the excessive numbers of an ill-armed Asiatic force would, he urges, present the very conditions of success most favourable to their employment. And, again, in isolated posts and hill forts defended in troublous times by small and perhaps sickly garrisons or in the neighbourhood of large cities infested with turbulent populations, the mere presence of a mitrailleur battery could not, he thinks, be overrated. But as regards the use of Gatlings in European warfare, what are the points to be urged in their favour? Should they be disseminated among field batteries to act as far-ranging case-guns, or should they be applied as a collection of small-arms to the intensifying of infantry fire at critical moments? In other words, ought the Gatling be served exclusively as a field-piece or as a regimental automaton? When, where, and how can they be employed to the best advantage as multiple guns? Can they be used in attack, or must they be confined to defence? Should they be invariably entrenched and masked, awaiting the opportunity that may never arise, or should they risk exposure to be efficient? These are questions that naturally occur at the outset, but which could be answered far more easily from a negative point of view; that is, it would be less difficult to show what is beyond their capabilities. That Gatlings of small-arm calibre are exceptional, in their employment, must be allowed; they are of no avail against entrenched lines nor thick cover of any sort. They possess no incendiary powers, nor can they blow up magazines or smash waggons, nor do anything that the bullet from the best rifle cannot do. The Gatling is, in short, merely a life-exterminating weapon, and should be devoted to that object. Colonel Fielding puts it in a clear, though scarcely forcible enough light when he says:—"The Gatling represents a certain number of infantry for which there is not room on the ground suddenly placed forward at the proper moment at a decisive point to bring a crushing fire on the enemy." Major Fosbery is, I think, more correct and explanatory in his description. "Mitrailleurs," he argues, "are essentially labour and life-saving machines, enabling a few men to do the work of a greater number, and better than the greater number. They will do certain infantry work better than infantry, and certain artillery work better than the artillery themselves." There is, however, a common-sense limit to this definition as supplied by the gallant Officer himself, when he adds the proviso that they should be introduced "neither as artillery nor infantry weapons, but as a class apart, to assist both, but interfere with neither."

The question of organization is intimately bound up with that of the proper employment of mitrailleurs. As to this, Major Fosbery expresses the hope that we will not be persuaded to man and equip our mitrailleurs

as horse-artillery batteries; but, leaving them in their intermediate place, educate a separate class of men for their service, "taking, for instance, drivers from the cavalry and gunners from amongst infantry marksmen." Colonel Wray's Committee deprecated, while they proposed that twelve Gatlings should form a battery, that is to say, such an aggregate was only intended by them to be brought together for purposes of administration. The battery of twelve guns would thus be capable of being broken up into any number of parts to be employed ubiquitously where most required. It was further explained by Colonel Fletcher that two or three Gatlings were looked upon as the largest number that could be brought together in any particular place. In this opinion the Committee were followed by the Swedo-Norwegian Commission on mitrailleurs, who, while proposing that a battery should consist of four pieces, add the remark:—"Doubtless two mitrailleurs could alone strongly reinforce a position; but it would be preferable, in a case of importance, that a whole battery should be detailed, in order that tenure of a position might not be imperilled by the dismounting of one or two of the mitrailleurs by the fire of the enemy." The Committees agree in treating mitrailleurs as defensive weapons only, but the English Committee require, in addition, that they should be invariably entrenched and kept as far as possible masked from artillery fire, while the Foreign Commission recommend that such weapons should be kept with divisional reserves, and not be attached to brigades or battalions except under special circumstances. Colonel Hamley, while pronouncing Gatlings useless for offensive operations, would, for defence, employ a proportion of one Gatling to twelve field guns "to be kept in dépôts and only moved into position when the time for using them had come." Captain Owen, R.A., in consonance with the Foreign Commission, would have four Gatlings to constitute the tactical unit; bringing two of them together, if necessary, for larger administrative purposes under a major, or four under a Lieutenant-Colonel. Captain Henry Hime, R.A., suggests the addition of two mitrailleurs to our present six gun batteries, or the equipment of one of the divisions of our field batteries with Gatlings instead of guns. He also thinks that a certain number of mitrailleurs should be equipped on the horse-artillery system to act as batteries of reserve. Finally, Lieutenant Pratt, R.A., would not form Gatlings into batteries at all, but disseminate them among batteries of artillery. Such are some of the published opinions as regards the organization of these automatic weapons; and, diverse as they seem to be, they will serve to elucidate the text I have submitted to your unbiassed consideration.

It has been remarked that machine-guns seem to require an escort more constantly than field-guns to protect them from flank and rear assaults. If this be so, why, to meet the difficulty, could not a fourth arm of service, in its strictest sense, be organized? It might, in fact, consist of a judicious combination of Gatlings with a corps of mounted riflemen such as proposed by Colonel Wood, U.C., last year in this theatre. These riflemen, a specially trained and picked force, should not only act as escort to the guns, but as instructed Gatlingeers (a term I suggest as an obvious substitute for gunners), ready, on occasion, to fill up the

casualties that may occur among the Gatling Detachment. Combine, at times, a large force of cavalry with Gatling batteries escorted by riflemen, mounted on horseback or carried on long cars as described by Colonel Wood, and it will prove to be a very compact, self-contained, mobile, and effective little army for sudden and distant enterprises. On the other hand, a proposal has been made to attach Gatling batteries exclusively to cavalry. In a memorandum to Colonel Fletcher's lecture on the "Employment of Mitrailleurs," to be found in the 16th volume of our Journal, General Shute, C.B., points out the advantages of the arrangement. The alternatives as to whether Gatlings should be attached to infantry or form a portion of the artillery service are disposed of briefly in the negative; and he goes on to fortify his argument by the consideration that, in his corps, the required farriers, drivers, reserve of horses, and, in fine, the establishment of a battery, are already to hand; whilst he thinks that cavalry Officers who have obtained certificates from the schools of musketry would be competent (as no doubt they would) to command the battery on special service. As to the utility of Gatlings in conjunction with cavalry, he enumerates the several occasions of great moment in which the latter is so dependent on the co-operation of the other arms of service, as when acting as reconnoitring patrols or patrols in pursuit; and, during a retreat, when posted as a rear guard; also when advancing along roads and lanes, the flanks being covered by dismounted men. Besides, the General finally refers to the fact that as cavalry on the offensive manœuvre in open country this would also be adapted to the effective action of Gatlings. Batteries of horse artillery are either employed with advance and rear-guards, or with the cavalry of reserve. But as to this latter service, it is, I believe, undecided whether the guns would not be better employed in taking part in the general fighting, than by being kept back with cavalry, getting no opportunity for action. In such event, however, they would have to expose themselves within close-range to the enemy's infantry and mitrailleuse fire; whereas Gatlings could manœuvre outside the range of the former; while, at the same time, producing far deadlier effects than the guns. So long ago as 1858, the prescient intellect of Sir John Burgoyne foresaw the employment of machine-guns in the field, and he recommended them strongly. He also proposed that the largest proportion of rifled field artillery should be of small calibre, and so reduced in size and weight as to be drawn on two wheels by two horses; in other words, the combination he laid such stress upon, is to be found in the Gatling gun before you.

It must be assumed that all Gatlingeers would be thoroughly conversant with the powers of their gun, for they must be prepared to take part with whatever branch of the Army is immediately in need of their services, and to carry out these duties with that arm with intelligence, care, and skill.

In the early actions of the great war, it is noticeable that the French used their mitrailleurs side by side with shell guns in the field, thereby encouraging the former to sling away ammunition at impossible ranges, and exposing them to the special attention which guns receive

in action. Instances of this fatal error might be multiplied; it will suffice to quote two or three from Captain Clarke's translation of the authentic records. Early in the day at the battle of Wörth, 84 guns of the 5th Division opened fire at from 2,400 to 4,000 paces on the French guns and mitrailleuses, when the latter, unable to reply were forced to decamp. Later in the day, when the 21st Division Artillery engaged at long range five French batteries, one of them being a mitrailleuse battery, it was the latter the Prussians promptly silenced. So also at Spichenen, when Von Goben arrived, his six batteries of artillery directed their fire chiefly on the exposed but distant mitrailleurs of Laveaucoupet's artillery. To destroy mitrailleurs seemed to have been a favourite and not unnatural pastime of the overwhelming and well directed Prussian artillery; but surely this fact indicates the measure of their respect for the weapon, and is a strong argument in its favour, for, as Colonel Hamley enjoins, "guns should bear on that arm which threatens most."

In selecting a position the Commander of a Gatling battery would naturally seek temporary concealment, but to be effective he must emerge from cover, and to be safe, his shelter must not be of a nature to preclude immediate action against an assault. Before the enemy he must manœuvre within the range of artillery, but outside that of effective small-arm fire. Provided the ground in front is comparatively open, other conditions do not appear to be of moment. During the Franco-Prussian war, the best effects were produced when the mitrailleurs were posted on an eminence commanding the slopes of another and the intervening valley, or where stationed at the head of a ravine which had to be traversed by the enemy, or just within the verge of a wood on the flank of a position.

"Mitrailleurs and range-finders are imperatively demanded by 'modern requirements,'" observes Major Brackenbury, "we have the 'only good mitrailleuse—the only range-finder at all; both of them 'should be issued and tried at the Manœuvres.'" But it is not alone at the Autumn Manœuvres, but at private exercises over rough ground under every condition of attack and defence, that Gatling batteries can be prepared for the exigencies of service on occasions pronounced favourable to their effective use, bearing in mind that at distances proportionate to the size of the weapon employed (for Gatlings are of all calibres up to one-inch bore) they are capable of a more certain and continuous fire than any field gun. Among these capabilities may be enumerated the acknowledged power of the Gatling for the defence of entrenched positions and villages; for commanding roads, defiles and bridges; for covering the embarkation and disembarkation of troops, and for the protection of a column moving to its destination by railway; for silencing field batteries or batteries of position; for increasing the fire of infantry at critical moments, and finally for supporting field batteries and protecting them against cavalry or infantry charges. Lieutenant Prati, when treating of the difficulties connected with the artillery of advance guards, adverts as follows to this latter duty of Gatling batteries: "where batteries of artillery 'have to advance rapidly to the front to gain a good position it is

"evidently necessary for them to have a mounted escort; when they have gained their position, infantry support is required. Advanced batteries, then, require a double escort both infantry and cavalry to be efficiently supported. By using a hybrid force, like the old dragoon or the mounted rifleman of the future, the difficulty is partially obviated."

But he has a complete and instant remedy to propose: "Suppose one of these," he subjoins after describing our service Gatling, "drawn by two horses, was attached to a battery, it would be escort enough in itself. Where more than one battery is in position effective cross-fire could be maintained. With two-horse waggons for ammunition, the additional *impedimenta* to an army would be trifling; and I think this weapon, owing to its mobility and efficient defensive power, would be the most effectual escort to the artillery of the future." The commander of a Gatling battery should know from habitual experience how best and most judiciously to give effect to the general directions he may receive for his guidance, but he should endeavour to keep out of fire until the moment for action is evident to his trained senses. Finally, he must, while seeking all immunity from the fire of artillery, in reality so despise it as never to be diverted from the main object of his presence on the field of battle, namely, the prompt slaughter of men and horses.

"This arm is chiefly of a defensive nature," report the Swedo-Norwegian Committee on mitrailleurs, "which, nevertheless, does not diminish its importance or merit, even in field warfare;" and, as corroborative of an assertion made earlier in this paper, they add elsewhere, "We cannot too strongly insist on the importance of not confounding mitrailleurs with artillery, as much on account of their effect as the proper nature of their employment." Another point to which this Committee advert is the fact that the rapidity of fire produced by breechloading rifles has hitherto been utilized not so much in open combat as in the seizing of positions, villages, heights, edges of forests, &c., and a position attacked and taken one minute should the next be capable of defence against renewed efforts of the enemy to retake it. "However," remark the Commission, sententiously, "as regards the United Kingdoms, this quality of the mitrailleuse, that of taking part chiefly in defence, should not be considered as a fault but rather as a reason for its introduction amongst us." Is this not equally applicable to *our* United Kingdom? But, on the other hand, we should remember General Eardley-Wilmot's warning on this head, when he says, "If the system is to be looked upon for defence alone it is likely there will arise difficulty in its application, as it will come to be considered a mere reserve and will not be available at critical moments."

As fearfully and conclusively proved in the latest contest, infantry will more than ever be employed in skirmishing order, for the breech-loader and the mitrailleuse have forced close columns to deploy. Yet so lately as in the early part of 1870, Louis Besançon advised the deployment to be the primary formation of infantry at 1,200 yards and the distance not to be reduced, "except under the presence of

"superior power, so as to gain the full advantage from the Chassepôt." Had he been speaking of the mitrailleuse he would in this have expressed its exact and rightful position, but of nervous, uncertain, excited riflemen, surely the idea is preposterous!

The effective sphere of infantry fire has been variously estimated as lying between 400 and 1,000 yards, but when we consider the many deterrents to good shooting, such as a moving object, smoke, fatigue, excitement, and attention to orders, the majority will be of opinion that 600 or 700 yards at the utmost is the reliable zone of accurate infantry fire action.

On the other hand, field guns, such as ours, would deal effectively with masses at ranges of from 3,000 to 4,000 yards, but they are as liable to error at short as at more extensive ranges. Hence it is Major Fosbery is of opinion that when posted in a defensive position there exists a distinct measurable space between the effective sphere of infantry fire, and the best effects of rifled field-guns which ought to be, confided to the special care of machine-guns, as superior to either for the purpose. This area he fixes as lying between 600 and 1,200 yards. Thus an enemy advancing to the assault would have to pass through an organized fire action.

At the outset, shattered by the far-reaching fire of artillery with ascertained range and adjusted fuzes, as first line, second line, and reserves come successively into view, the enemy would have to pass into the zone of the mitrailleurs' fire, and finally be received by riflemen (with full pouches, strength, steadiness, and nerve, carefully reserved) within their most fatal distance. For the defence of such prepared positions, Gatlings have indeed been pronounced by the United States' Committee of last year, "superior to any species of artillery against troops exposed to view;" and remember, too, that from its lightness the Gatling gun can be readily withdrawn from any point exposed to an overpowering or disabling fire, and be replaced in battery to meet the critical moment of assault. Of course, to be effective against field guns, the larger Gatlings would have to be employed, but even these ought never be opposed to artillery when there is more chance of being dismounted themselves than there is of preventing the service of the guns. This, however, is a moot point worthy of discussion. The Prince of Hohenlohe-Ingelfingen, himself an artillery officer, deprecates the exalted opinion of artillery fire formed by outsiders, "errors," he says, "of which artillerymen themselves are not innocent, because proud of their arm, they are prone to ascribe higher qualities to it than it really possesses." The French mitrailleuse, composed of 25 large-bore encased barrels required the same number of men and horses as a field-gun, and yet Colonel Reilly, R.A., witnessed on one occasion one of these 6-horsed mitrailleurs standing in the open, exposed for 4½ hours to the much-vaunted fire of the Prussian artillery, unscathed and defiant. Artillery can smash the Gatling and blow up its limber, it is true, but how, if the gunners and horses be disabled during the attempt?

The course of a battle has been minutely described with reference to the action of the three arms by Prince Kraft of Hohenlohe, in his

pamphlet, as translated by Captain Clarke, R.A. Let us consider it for a moment, with this exception to the Prince's description, that we will credit both sides with acting on similar antagonistic principles up to a certain point.

In the offensive form of battle, the change from the march to the combat, occurs naturally enough. The advanced parties, whether cavalry or infantry, fall in with one another and commence the business, feeling each others pulse, as it were, and noting any indication of making a determined stand. The officers in command of the advanced guard on either side, then call for artillery, which immediately enter on a duel, occasionally sending shot or shell, at the rapidly reinforced first lines of infantry. Seeing this state of things, additional guns are ordered up on both sides, so as to delay the action for the arrival of the main body of infantry, and while the latter form up for attack, the guns are moved forward to closer quarters against that portion of the opposing line where the decisive assault is to be attempted. "If the form of the ground and the situation of the fight are such that the chief blow must be struck in quite a different direction to where the advance guard is engaged," says the Prince, "then the artillery of the advance guard will be charged with supporting the latter in the local objects of the fight, while the reserve artillery will unite with the artillery of the main body to prepare the principal blow." So soon as the position is sufficiently shattered and demoralization sets in, the main body of the infantry is pushed forward to close quarters, keeping up an incessant fire in conjunction with the artillery, until the latter is masked by the former and is obliged to turn its attention to some other object; to the enemy's guns or to any reserves in sight, or perhaps the great risk is run of continuing to fire shot and shell over the heads of the advancing mass, until the endangered region is reached. But here we must pause; for conjoint action is no longer possible. One party must win the day, and immediately the artillery of the conqueror moves forward to the captured position. Then cavalry and horse artillery follow up the discomfited foe and complete his ruin. Now this, I presume, is a fair exposition of the modern offensive combat, and let us see where Gatling's could be utilized during it. If cavalry move in front of an army and meet infantry, they are compelled to fall back for protection, whereas if associated with a Gatling battery, and its attendant mounted-rifleman escort, as suggested, important positions could not only be seized, but retained. If, from the closeness of the country, a body of infantry forms the advance guard, it too would frequently require the friendly aid of a Gatling battery to strengthen its fire at critical points, and in either case two or more Gatlings would prove efficient auxiliaries to the field batteries usually so employed, on the acknowledged principle that with advanced guards the most reliable gun is that which is most effective against troops and which can carry most ammunition; for it has to go into action first and remain there longest.

But then as the action develops into a serious general encounter, a further call for artillery is customary, and a duel is entered on, which,

according to the Prince, must be carried on within 2,000 yards, "with any prospect of success," so that, if we employed such weapons, Gatlings of the larger size might then take part in the combat and be found useful to divert, disconcert and even silence the opposing field batteries. But by this time, as we have seen, the infantry have become engaged, and while the rapidly-reinforced first lines press forward, might not the Commander of a Gatling battery find a nook for the service of his guns on the flank of the supports nearest to the selected point of attack, ready to intensify their fire, and that of the main body when it arrives? or, if this would not be feasible, might not the Gatlings, at a later stage of the fight, and while the deployed battalions of the main body are marching forward to the assault, be moved into a position, however exposed, so as to continue their concentrated fire-action to the latest possible moment of final contact, the chief aim of tactics being to obtain the utmost development of accurate fire as the surest way of breaking down the enemy.

Again, it not unfrequently happens that the first assault of a position fails, or the enemy has only made a pretence of maintaining the defensive so as to put an end to attack by a vigorous counterstroke; confusion and perhaps retirement follow. This, then, would be the opportunity for a well-posted Gatling battery, and its timely aid might turn defeat into victory, for a sudden and well-sustained cannonade from an unexpected quarter will often change the fate of an engagement. Finally in the pursuit of the demoralised foe the Gatling battery might, in conjunction with horse artillery, convert the retreat into a complete rout. There is another phase of the offensive combat which seems to offer facilities for the action of Gatling batteries, namely, turning movements. "It seems not unreasonable to infer," observes Lieutenant Maurice, R.A., "that the whole defence will collapse as soon as small bodies of assailants appear on the extreme flank." Thus it is likely that the General will profit by the mobility of Gatlings superior to that of field-guns to assist in such outflanking manœuvres. It is, therefore, in the spirit of the foregoing considerations that I venture to ask, would not Gatlings, under exceptional circumstances, contribute very powerfully to offensive tactics? Inseparably connected with the employment of Gatlings in the open, must ever be kept in view the conjoint use of tools for extemporising cover. In the Russian Service a few fascines are, I believe, carried on the limber, which may be readily arranged to mask the gun. If a wall or building be available, the Gatling can be worked from behind a loop-hole, and thus a few men would be enabled to keep a host at bay. In close country, such as surrounds the metropolis, interspersed with villages, parks, farm buildings, &c., there would be numberless opportunities for the right employment of Gatlings in this manner. In siege operations it is admitted that both for besiegers and the besieged, machine guns are most useful auxiliaries. During the siege of Metz, some Landwehr regiments were stationed in defence of the intervening villages of Ladonchamps and Tapes, against whom a sortie was made by the French. When the assault began, part of the 10th Army Corps was directed to advance to the relief of their comrades, which they did in

skirmishing order, and in columns of companies. "But," says the correspondent of the *Daily News*, from whom I quote, "the mitrailleuse" "venomously sounded its angry whirr, making the skirmishers recoil "nervously as they crossed the line of fire, and leaving chasms in the "front of the solid masses of which they were the forerunners." The French columns were, however, ultimately driven back. As usual, neither mitrailleuse nor chassepôt (although they used the former "with rare judgment and effect") were of long avail against the overwhelming hosts of stern and stubborn Prussians. And herein lies the moral that Gatlings, however invaluable on occasion, must at all times be backed by a stalwart soldiery, reliable and invincible. The true strength of a nation is its manhood.

There is one other obvious opportunity for the right use of this weapon in the field to which I must allude in conclusion. To repel night attacks on camps or bivouacs, the Gatling gun is thoroughly reliable. A practical instance of its good service in this respect is related by the same authority from whom I previously quoted. During the Khivan Campaign, the column to which the Gatlings was attached moved forward on one occasion, leaving all its baggage packed in charge of a small detachment provided with the two Gatlings. At nightfall it was ascertained that the enemy lurked in large numbers in the vicinity of the camp, and accordingly the Officer in command took every precaution to prevent surprise. The baggage-waggons were collected into a square, and in a corner formed by the front and right sides he placed the Gatlings. At 3 o'clock in the morning the attack of the Turcomans commenced. "At the first howls of the "enemy," he says, "I hastened to form a cover for my guns. I put "on the right wing 10 privates, on the left 15 sharpshooters, and 12 "men of my battery guns command, with whom I could dispense for "the present. These men were also armed with rifles. Leaving thus "with the battery guns only the most indispensable men to assist in "firing, I took myself the crank-handle of the first gun, and invited "Captain Cachourin to take the handle of the other gun, and enjoined "on all my group not to commence the fire before the word of com- "mand was given. The guns formed an obtuse angle with one another, "as it was necessary to direct them to the precise spot where the "shoutings of the enemy were heard, and whence they were approach- "ing us. We had not long to wait. The cries of the Turcomans who "had succeeded in breaking through the lines of our detachment and "turning their flanks, suddenly rose from all sides, and became deafen- "ing. Though it was dark we perceived in front of us the galloping "masses of the enemy with uplifted glittering swords. When they "approached us within about twenty paces, I shouted the command "'fire.' This was followed by a salvo of all the men forming the "cover, and a continuous simultaneous rattle of the two battery guns. "In this roar the cries of the enemy at once became weak, and then "ceased altogether, vanishing as rapidly as they rose. The firing at "once stopped, and as no enemy was visible, I ventured to get a look "at the surrounding ground, availing myself of the first light of dawn. "At some distance to the right of our square stood the 8th Battalion

"of the line. Between it and us, at every step, lay prostrated the dead bodies of the Yonoods, their hats being pushed up to their eyes. *"I saw no wounded.* They were probably all carried away according to the usual Turcoman warfare." This is a significant and terrible, because simple account of facts, and fully bears out the destructive character of the gun. Mark, too, the immediate moral effect produced by this automatic manslayer. Its very snarl hushed the war-cries of the savage foe. It caused the Yonoods to reel in the saddle and wheel their fiery steeds back once more into the desert; all, that is, who did not bite the dust. I cannot fancy that they returned for wounded men, I cannot fancy that there were any to take away.

Surely, then, it may be conceded that Gatlings have a just claim on the attention of tacticians, and that the sooner its place be authoritatively assigned, the sooner will our men be skilled in its inevitable uses; for no foreign Army will in future take the field unprovided with a complement of machine-guns, and we must be prepared to meet them with at least equal weapons and superior tactics.

The days of obtaining any number of mercenaries to supplement our little Army, in case of European complications, have passed away. Nations are too jealous of their wants to overlook the exodus of any portion of their recruit-giving population. How then are we to fill the gaps created by the primary actions of a campaign; and how in future can we most promptly and economically prepare to resist invasion at home, while our ever-victorious Army is obtaining satisfaction for us abroad? Said the *Times* lately, "Conscription in any country and in any form is the most cruel of all taxes, because it is a forcible interference with the natural course of existence. If it can be avoided, any system is cheap which avoids it." Well, Sir, one object of my presence here to-night is to proclaim part of a system which shall meet the difficulty. Both the English and American Committees declared one Gatling to be equal on occasion to a company of average marksmen, that is, that two batteries of Gatlings, well served, are as effective as an entire battalion of infantry.¹ Is not the reasoning sound? it is at all events an *argumentum ad hominem*, for it dispenses, in a great measure, with his presence. We are burthened with an extensive coast line both at home and abroad, and for the defence of its integrity, Gatlings are, as an auxiliary arm, preeminently fitted. But is this all they are capable of—can they take no special part in active hostilities in the field?

We have, as you may see in the specimen before you, a light and perfect weapon of its kind, and which might well be issued for service in Europe as well as in India. Formed into batteries of six guns each, in the proportion of one battery of Gatlings to a brigade of artillery, and provided, in addition to their limbers, with two ammunition carts per battery, carrying in all an average of 4,000 rounds per gun, these guns, if placed not alone with the general reserves of an

¹ "Reckoned simply by the number of hits in the target, one 0.42-inch calibre Gatling, using the oscillator, is equal to 70 Springfield rifles firing against time, and 52 rifles firing deliberately. Without the oscillator, every shot from the Gatling should strike the target."—Extract from Report of United States' Committee, 1874.

Army, but on occasion with the artillery of the advance guard, or with a cavalry brigade to act in conjunction with horse artillery, would be available for service, at all events against cavalry and infantry within a range of 1,200 yards, and for critical opportunities at all times. "Many cases must arise in war," says Colonel Hamley, "in which the long range of the field-gun would be superfluous, while the mitrailleuse could be employed under its own conditions of effectiveness. "In all countries not absolutely flat, troops may often engage with no greater distance than 1,200 yards between the hostile forces."

There is yet another mode of utilizing to the utmost the powers of the Gatling gun. I have before now proposed that some regiments of our artillery auxiliary forces should be trained to their use for interior field operations, as well as for coast defence; and I venture on this occasion to renew the suggestion, not because I think Gatlings are weapons simple in manipulation, for they are not so; nor yet because they are likely to afford moral and material support (which is stated to have been the motive of the Austro-Hungarian Government for supplying mitrailleurs to their regiments of militia), but because Gatlings require the utmost intelligence, the most skilful handling, the readiest resource, the highest courage, and the best tactical genius that can be drawn to their service.

In much of what I have put forward in this paper, I have advisedly taken the unpopular, and according to the majority, the impracticable view of the mitrailleuse question, inasmuch as I have suggested a claim for the Gatling to occupy a place in the preliminary phases of a battle. I do so, I can assure you, in no captious spirit, nor unmindful of the fact that any departure from defensive operations has been pronounced outside the province and mission of machine-guns, but perhaps you will think it only fair to discuss the doubtful as well as the certain contingencies affecting the possible status of Gatlings. No doubt each arm of service deems itself the exponent of the nation's prowess, and each in turn will claim the foremost place in the brunt of battle. It is a generous rivalry, a wholesome competition; but may it not be pushed too far, for in this contention it is likely that so valuable an auxiliary as the Gatling will be overlooked by each and all?

Distribute Gatlings permanently among divisional field batteries, and they will often be committed to engagements at ranges beyond their powers, and their very existence may be forgotten on occasions most favourable to their small-arm rifle character. Attach Gatlings exclusively to cavalry and they will sink into an inferior class of horse-artillery, again losing distinctive characteristics. Finally, post Gatlings in fractional sections to infantry, and, in addition, to difficulties of organization and administration, they will become a stumbling-block and perhaps a snare, for they may come to be regarded either too dependently or not at all. Depend upon it, if an hermaphrodite position be assigned to these weapons—if the pieces be dispersed capriciously as described, the Gatling will become not an auxiliary-arm but the scape-goat of the services. On the other hand, if distinct organization and latitude of action be allowed to them, so also, as I have endeavoured to point out, should the military education and tactical training of

Gatlingers reach the highest possible mark. Yet even then it is to be feared that this application of the science of tactics, however varied and habitual, will fall far short of that practical experience and indefinable mastery of situations as they arise, only to be gained amid the smoke and carnage of the battle-field.

The CHAIRMAN: We have all listened, with great interest, to Captain Rogers' paper on the Gatling gun, and I would invite gentlemen who may feel disposed, to make any remarks that may suggest themselves to them upon the subject. I would specially call attention to the concluding observations of the lecture. Captain Rogers wishes it to be understood that he has advanced no special theory, but has stated the subject fairly, in an unprejudiced way, and is particularly anxious to invite criticisms and discussion on the matter.

Captain J. F. OWEN, R.A.: I am sure we all owe Captain Rogers very much for bringing this subject so clearly before us. He has collected the very latest facts which bear upon the Gatling gun, and, however we may differ from him in his mode of applying these weapons in the field, we all, I am certain, shall agree in one thing, that, if they are to be employed, it would be advisable to settle what organization should be used with them, as soon as possible. It seems to me that Captain Rogers has somewhat exaggerated the importance of this weapon, as to field warfare. We are here to-night to discuss the tactical use of Gatlings in the field, and not the use of machine guns in fortifications, or on board ship. With respect to that, I think there can be no difference of opinion. With respect to fortifications, for instance, the space in front of these guns, or any other ordnance that you have, is already cleared; but, in the field, we must remember that the least obstacle in the way renders such guns perfectly useless. It is not often that you have in the field a space prepared for the fire of a machine gun, as you have on the glacis of a fort or on a smooth beach, where you have to fire against troops who are trying to prevent a landing from boats. In such cases, the advantage of Gatlings is enormous. These weapons have little or no recoil, so that, both in boats and caponnières, where the space is restricted, the importance of their employment can hardly be exaggerated, though merely as a supplement to the heavier ordnance. In the field, however, the case is very different, and the question is, whether the disadvantages do not more than counterbalance the advantages of taking any number of Gatlings with an Army in the field? In a battle, for instance, it would be a great advantage to the artillery to have a very heavy gun to reach the enemy's reserves, and to silence his field guns at great distances, but we know we cannot take heavy guns of that description into the field, the impedimenta are too great. The question for us seems to be, are the advantages of the Gatling such as to counterbalance the disadvantage of taking extra impedimenta into the field? Their range is very limited; between 650 and 1,000 yards, Captain Rogers lays down as the distance where their fire would be effective. That is a very small space. Beyond that they would be of little or no use, while artillery is not only formidable beyond 1,000 yards, but even within that range its case-fire would be very effective. Still, no doubt, as a supplemental arm to the artillery, the Gatling would have its uses, but I think we should limit its numbers. As to organization. Captain Rogers suggested a very anomalous sort of organization, the absolute establishment of a fourth arm, as far as I understood. I do not think, as a rule, we could agree to establishing a fourth arm, when we have an arm ready to receive such a weapon. It is, in fact, merely a light field-gun, and, in that way it is employed by those powers who use it on a large scale. The French have so used it, the Russians, in their organization, have one battery armed with mitrailleurs in each artillery brigade, and so they have in Spain. One or two other points I should like to allude to, for instance, as to the tactical use of this weapon in the field. Captain Rogers proposes that guns should be protected by mitrailleurs, on their flanks. Surely, we can scarcely feel that a battery of artillery would be safely guarded by a Gatling on each flank. It is very rarely that the space in front is fitted for the employment of such weapons; unless the country is carefully prepared beforehand, it would not answer. Then, how about the enemy's skirmishers creeping round the flanks, under cover? The Gatling would be useless

against them, whereas, if you are protected by an infantry escort, the infantry could throw out skirmishers to meet the enemy. In the Franco-Prussian war, batteries of mitrailleurs were, on several occasions, captured by the enemy's skirmishers reaching round their flanks. If they are not able to protect themselves, they would not be able to protect a battery of artillery. That is quite clear. I cannot agree in the advisability of so employing mitrailleurs. There is still another point I should wish to allude to, viz., the training of the men who are to use these weapons. They should undoubtedly have a special training; and anybody who has examined the mechanism of those pieces will agree with me that it requires skilled men to work them. In whatever way, then, we treat Gatling guns, they should not be placed in the hands of men who are not specially trained for their use, and the reasons are all the stronger for special organization, and for not mixing them up with either infantry or cavalry.

The CHAIRMAN: I would draw attention to the fact that Captain Rogers has denominated his paper, "The Gatling Gun; its Place in Tactics." I think this title includes naval as well as military tactics and I notice, in one or two places in the paper, that he has alluded to the use made of the Gatling in naval warfare as well as in the field; therefore, if any gentlemen will favour us with remarks in regard to naval operations connected with the gun, we should be glad to have the benefit of their views on the subject.

Major HALE, R.E.: There is one question I should like to ask the artillery Officers here present—whether they consider the Gatling gun, at short ranges, superior to their own field-gun? In my humble opinion, it seems out of the question to use the Gatling at ranges beyond effective infantry fire, because, directly the Gatling gun opens on the distant infantry, the enemy's field-pieces could open on your Gatling gun; therefore, the Gatling must be kept under cover until the very last moment. The last speaker talked of it as a field-gun. I look upon it as ten nerveless infantry soldiers. The Gatling gun should be used where the enemy's artillery can no longer attempt to silence it, when the enemy's infantry have got so close to your position as absolutely to mask their own fire, at that point when your own men's nerves begin to fail; that would be in the defence of a position within case-range. Of course, if the artillery think their case-fire, or can prove that their case-fire, is superior to the Gatling, then, by all means, let them use their guns instead of the Gatling; but if the Gatling is superior to the artillery field-piece at close range, then, in defence positions, the Gatling surely should be used. Artillery Officers are particularly anxious to impress upon us that the Gatling is of invaluable service in caponnières, or the defence of ditches. There they quite admit it is far superior even to ordinary field artillery. Whenever a battle is fought, one side is always on the defensive. At some period of the engagement, the enemy are coming quite as close to the defensive side as ever they would be in a ditch of a fortress; therefore, out of their own mouth, do I condemn artillery Officers, and say that there are certain cases on a field of battle on which the Gatling is superior to their own field-piece. Then comes the question, who is to make use of the Gatling gun? The artillery like it and do not like it. They think they must take it, and yet they do not quite like to take it. The cavalry, they have nibbled at it, but I think most of us are of opinion that it is hardly a cavalry weapon. The infantry, I do not think they very much care about it, for the great feature of infantry is mobility. I ask, whether such a weapon will make a battalion particularly mobile in the field? The lecturer has recommended the formation of a fourth arm of the service to take charge of the Gatlings, but there is already a fourth arm of the service, called the engineers, and, if nobody else will take the Gatlings, why not try whether they can take charge of them, rather than let the weapons be lost for want of some one to father them. The engineers are specially defensive; they have got a train already; it is their duty, directly a position is taken up, to occupy a village or the strong points in the position. Why not give a couple of Gatlings to the engineer train? Why not, when a company of sappers or a German pioneer company is thrown into a village for defence, or are told to occupy a wood, why not let them have their couple of Gatlings by them, and put them under cover, in the best possible positions for defence?

General Sir ROBERT PERCY DOUGLAS, Bart.: I think a very important question

is raised by the last speaker, and I should be very glad to hear some military Officer answer it, because in the first part of this paper we heard words, such as "supercession of artillery," and "snuffing out artillery." I was glad afterwards to hear the lecturer say, that this was not to supersede the artillery, but was to be an auxiliary arm. I think it would be very valuable if some artillery Officer would reply to the question put by the last speaker, whether the Gatling would in certain ranges, limited say to between 600 and 900 yards, be as efficient or more efficient than their own case?

Captain OWEN: I feel that I am trespassing very much upon this meeting in getting up a second time, but I do not see any other artillery Officer here who is prepared to do so. Of course we all admit there are occasions on which the weapon before us, may be of great importance. No artillery Officer would deny that there is a certain range, say from 600 to 1,000 yards, in which Gatling guns are very formidable; but the question is—whether their disadvantages do not more than counterbalance those advantages when you consider that the larger an army is, the more difficult becomes the task of the General as to its impedimenta. We can only take a certain number of wheeled carriages into the field. Is it advisable that as many as possible should be field artillery, capable of engaging at any range up to 3,000 yards, or only such weapons as we see here with so limited a range as to be only useful between 600 and 1,000 yards? If we could carry both, no doubt we might do it advantageously, but we are tied down. The question I repeat is, how many pieces of ordnance can we take with advantage into the field? If we could take these guns, and take field-guns and heavy guns as well, and employ them all three, so much the better, but we can only take a certain amount. As to the employment of the Gatling with the engineer corps, of course that is not for me to talk about. It is not, I think, the usual idea that sappers and miners should have a gun of any sort, but I can venture no opinion upon that point. Caponnières have been referred to, and we are told, because an artillery Officer says that a mitrailleuse is a most excellent weapon in a caponniere, therefore he blows hot and cold when he says, that he does not consider it can be used in the field, except in very limited numbers. I think that is a total misapprehension, because in the fortifications, where caponnières occur to protect a flank or ditch, the fire is necessarily limited to a certain range, the very range at which these pieces are so useful, say between 600 and 1,000 yards. A field-gun in such a position would be thrown away. Being only able to fire up to a certain range, what would be the use of having a piece which could fire further; therefore, I say, in a position where you cannot gain any advantage by the longer ranges of a field-gun, it is well to use a lighter weapon of the nature of the Gatling. The absence of recoil also makes it valuable for such uses where your space is confined, though it is a matter of small importance in the field where you have plenty of room. That is one of the reasons why, if I may again say so, artillery Officers are not inconsistent where they do not think it advisable to take a large number of Gatlings into the field, and yet say, that in certain posts for defence they may be of the utmost value, and that undoubtedly in the caponnières and flanks of some fortresses, and also on board boats, where space is limited and recoil of importance, these weapons may be very useful.

Major HALE: Will you tell us, whether they are more effective at case-range than ordinary case?

Captain NOLAN, R.A., M.P.: I saw most of the Gatling experiments at Shoeburyness, and I do not think artillery Officers claim very much for case beyond 130 and 200 yards. I should be sorry to say it is more destructive than one of those Gatlings, but it is destructive up to 130 yards. We, in the artillery, have now lessened the powder-charge that drives the projectile, and when we come to use case, just as firing shot of a fowling-piece at birds, we drive the canister with less force than formerly, so at the present moment the decisive effect of our case has actually fallen off from three to six hundred yards (the range of the old Peninsular case), down to 130. Certainly the Gatlings had quite the advantage over artillery at Shoeburyness between that and 600 yards, and also up to 1,200 yards, but not to such an extent; after that they began to fall off. There are other questions raised. People seem to fancy the artillery must have some special objection to the Gatling because they do not adopt it at once, but the difficulty is this,—supposing you take hal

Gatlings and half guns into the field, what would be the position of the artillery with half Gatlings and half guns? If, on one side, there were 200 guns, and on the other side, only 100 guns, the 200 guns would destroy the 100 guns in about twenty minutes, consequently, any artillery would be very slow to have even twenty guns less than its opponents, if it could be possibly helped, and it would be very difficult to bring the Gatling into the field without displacing artillery. That is the real objection of artillery Officers. It is not that they claim that the guns are more destructive to cavalry or infantry than Gatlings, but because they are of very little use in an artillery duel, and an artillery duel will generally precede every engagement; to have the Gatlings, they must sacrifice the same number of guns, and a few guns, more or less, make all the difference in an artillery duel, where the preponderance goes on in increasing ratio every moment, as some of the pieces of the weaker artillery become silenced. As to the engineers taking over the Gatlings, of course the engineers are quite clever enough to manage Gatlings, and if they choose to take up Gatlings, and to look after the horses, and go to the stables, and everything of that kind, they would no doubt become excellent Gatlingeers—I should fancy they would become excellent gunners, but perhaps they would cease to be engineers. One of the gentlemen who spoke called them pioneers, and he objected to infantry losing mobility as they would do if they had the Gatlings. Now men who are pioneers are supposed to go before the infantry, and consequently, I fancy they would lose their mobility in a still greater degree. There is no doubt if engineers had the Gatling, they might beat the artillery in the long run, but I think in doing so they would cease to be engineers, and would become gunners.

Major HALE: I used the word "pioneer companies," not "pioneers."

Admiral Sir HENRY CODRINGTON, K.C.B.: You put a question, Sir, relating to the Navy. It is difficult to see how this weapon can apply very much to the Navy, that is to say, in a way sufficiently important to make it desirable to have Gatlings on board. The style of fighting our successors will have to go through is decidedly not one in which that sort of instrument would come into play. We are supposed to be fighting now in very thick armour, and not to show ourselves outside that armour. Our dangers are, as our powers are, ramming, or perforating with very large heavy missiles; and that is the only means apparently by which we can act or be acted on, one ship upon another. I do not see, therefore, how an instrument of this sort, however well managed, can be made available in seagoing warfare. Then comes the question, how far it is available in connection with the shore? That is partly a soldier's question. I can perfectly see that putting it into a boat would give that boat the power of very large musketry fire, and so far would help a landing; but I cannot help thinking that one Gatling on the beach would be much more likely to prevent a landing on that beach than one Gatling in a boat would facilitate that landing. I do not therefore see that there is yet very much to be gained in the naval service by having this new arm. I do not know that we want it yet. When we want it we shall ask for it, and perhaps may get it, but I do not see the want of it yet.

The CHAIRMAN: There is one point Captain Rogers alluded to, namely, the use of the Gatling arm in warfare against savage tribes, or any desultory warfare. He drew attention to the operations of the Russian army against the Turcomans. I do not know whether any gentleman would wish to make any remarks upon that portion of the subject.

Captain BURGESS: Captain Tulloch, of the Royal Military College, who is unable to be present, has sent in the following note on the Gatling gun. He says, "The Gatling gun is peculiarly adapted for the use of volunteers on account of the expense of horsing field batteries, and the amount of drill required before volunteers can efficiently man them. The Gatling is well suited for defensive positions, such as would be held by volunteers in the event of invasion. At that time the Royal Artillery would be required elsewhere."

Sir PERCY DOUGLAS: On the question of the use of the Gatling gun and its applicability to warfare against uncivilized people, from my experience at the Cape, I can say it would be very valuable. I have no doubt one gun of that sort, with a very few men, would hold a post against any number of natives. It would have this disadvantage, that it makes such a horrible row in going off that it would frighten

the foe away; whereas, you want them to stand, so as to get hold of them. It would no doubt strike great terror into these people. The only thing I am afraid of is that none of them would stop. For the defence of small outposts, no doubt it would be most valuable. I would also allude to the facility of transport through a country which artillery cannot well traverse. In such cases these guns would be found very useful.

Captain ROGERS: I have very little to say in reply to the remarks that have been made on this occasion. I am greatly indebted to those gentlemen who have taken part in the discussion; and, so far as I have heard, I think the observations brought forward on the subject have been supported more or less by the Officers who have spoken. Captain Owen remarked upon my not saying anything as to the use of Gatlings in fortifications. It was simply because it was a foregone conclusion. His own book takes it as a foregone conclusion that they are of the greatest use in fortifications and for repelling sorties, and so forth. He said, also, that they would afford no protection to guns because of their liability to be attacked by skirmishers. On that point I simply quoted an artillery Officer, Lieutenant Pratt, who thinks that a Gatling gun attached to a battery of artillery would be very useful for driving off skirmishers on the flanks. Of course they must be supported also by infantry or cavalry; and, besides, he mentions that hybrid force, the mounted riflemen of the future. That is a phase of the question that had better not perhaps be brought forward yet, because it is still in the future. Sir Percy Douglas misunderstood what I said about snuffing out artillery. I merely quoted from the official account of the Battle of Gravelotte, where mitrailleurs knocked over so many horses and men that the battery of artillery had to retire.

Sir PERCY DOUGLAS: I misunderstood you: I thought you were making a general application.

Captain ROGERS: I think the other remarks were generally in support of what I brought forward; and, at this late hour, they need not be adverted to.

The CHAIRMAN: I may be allowed to express the feelings of the meeting in returning our best thanks to Captain Rogers for the trouble he has taken in bringing the subject before us. I think the conclusion appears to be very much the same as that at which the Committee on the Gatling gun arrived, namely, that it is inadvisable to reduce the number of artillery; that although fully recognizing the difficulty of increasing the impedimenta of an Army by adding further wheeled transport to that which already accompanies the Army, yet that there is still a place for Gatlings in modern warfare. Of course it is a most difficult matter to ascertain what that place is, or how they had best be used; but the opinion of the Committee certainly was that there were certain positions where Gatlings were useful, and they recommended that a small number of them should be attached to an Army in the field. The whole question with regard to artillery is a most important question at the present time. Only a short time ago I had an opportunity of having a long conversation with General Sheridan of the American Army, who had had great experience in every arm of the service in the late American War, and who supplemented his experience by being a spectator of the late Franco-German War with the German Army. His opinion was, that it would be necessary to reduce the wheeled transport of an Army, and still further to reduce the artillery. He advocated an increase of mounted riflemen. I merely instance this as showing the condition of things with regard to the several arms of the service, that not only with reference to Gatlings, but also the other arms of the service, there are still many doubts as to what proportion they should bear in armies of the future. I trust we may conclude this meeting by expressing our thanks to Captain Rogers for his valuable lecture.

APPENDIX.

It has been thought advisable, and perhaps interesting, to subjoin a short description of the Gatling gun and its working.

The model Gatling exhibited at the meeting consists of eight (usually there are ten) model breech-loading rifled barrels revolving round a central shaft as a common axis. Each barrel is loaded and fired, and the empty cartridge ejected automatically

once during the continuous revolution of the system. There are as many locks as barrels, and the cam (which is a principal feature in the interior mechanism) causes a reciprocal motion of the locks, whereby each in turn moves forward in the act of revolving, and performs the functions not only of an ordinary lock, but also of breech-plug and extractor; thus four locks are in different stages of discharging the cartridges, and four of withdrawing the empty cases during each revolution.

The working of the gun is as follows:—One man pivots a charged drum (as this cylinder is called) on the pintle above the hopper, while another turns the crank-handle. The bottom of the drum is unkeyed, and the cartridges of one division (the drum being divided into 16 perpendicular columns holding 15 rounds each, or 20 rounds as in the American gun) drop successively into the grooves of a carrier-block in front of the chambers of their respective barrels, upon which they are, as it were, seized and acted upon by the locks as described, that is, driven forward into the barrels, discharged, and withdrawn instantaneously.

The drum is revolved by hand (in the Russian service it can, I believe, be revolved mechanically) until the 16 divisions are exhausted. Straight feed-cases are used with the American 0.45 Gatling (see Fig. 2), and with the Russian field Gatling in preference to the drum. These feed-cases, which are recommended for all calibres on account of their facility for packing and transport, contain 40 cartridges. Either drum or feed-case can be promptly withdrawn and another loaded one substituted without interrupting the revolution of the barrels, locks, &c., and therefore the intensity of fire is merely dependent on the activity of No. 2 in manipulating the drum or feed-case; a rapidity of from 350 to 480 rounds a minute has been easily attained, and, as I have been informed by General Gorloff, the Russian Gatling is capable of discharging as many as 600 or 700 rounds a minute; but it is of course the capability of firing at this rate occasionally, that should be considered, rather than the fact that so many bullets can be poured forth in a continuous stream within a given time. The normal rate of firing should rarely exceed 240 rounds a minute, particularly if the front be a narrow one or if the object aimed at be a compact mass. The locks are interchangeable; and, should any get out of order, they can be withdrawn and others inserted in their places through an orifice in the caseable plate within a few minutes, but the absence of one or more locks does not affect the working of the gun, as for each lock removed, one unexploded cartridge merely drops to the ground or into a bag affixed for the purpose.

The automatic traversing apparatus (which I was unable to exhibit owing to the absence of a field-carriage and the extemporized platform not admitting of the fixture being adjusted) is simply a cylinder slipped over the crank-axis having a cam-groove on its periphery into which a circular pin enters, this latter being attached by an arm to the elevating screw. When the crank is turned, the cam-groove travels to and fro on the pin, swinging the gun with it, and thus a dispersion of fire of twenty feet in 100 yards is obtained if necessary, but this lateral spread can be reduced as before described.

One word more. I was asked how, if there were danger of the gun falling into the enemy's possession temporarily, would it most readily be put out of gear, as the drum would be too heavy an article to run away with (its weight, when loaded, is, in fact, 50 lbs.); and I suggested to hammer the pintle on one side, which would have the same effect as spiking a gun; but, obviously, the readiest mode would be to remove the crank handle.

April 27, 1875.

E. R.

P.S.—While the foregoing has been passing through the press, notice of a new American Torpedo vessel has appeared, in the armament of which the Gatling gun forms a prominent feature. This vessel is called "The Alarm," and carries one 20-inch gun in the bow, and when fully equipped she will have four Gatlings on board. We have, as yet, but few Gatlings in our naval service, which, as mentioned in the text, are placed in the "tops" of ships of the "Monarch" class, while a few lighter Gatlings will be mounted for boat service in the bows of cutters.—E. ROGERS.