Paper II.—ARTILLERY RETROSPECT OF THE LAST GREAT WAR.

By Lieut.-Col. T. B. STRANGE, Dominion Artillery.

(*Read before the Society, April 3rd*, 1872.)

"*Pends-toi, François; nous nous sommes battus et tu n'y étais pas,*" was the laconic letter of the royal soldier *Henri Quatre* to his comrade—the same soldier-king who gave the right royal response, when asked for a standard:

"Where'er ye see my white plume shine,
"Amid the ranks of war,
"Then be your oriflamme to-day
"The helmet of Navarre."

A great war—alas! I fear, by no means the last great war—has passed into history; and as I was not there to see, how can I venture on a retrospect without craving your indulgence?—which you may be more likely to give when I tell you that, to gratify no idle curiosity, but simply as a soldier to learn, I asked and obtained the sanction of H.R.H. the Duke of Cambridge to join either of the contending armies, but was given to understand that political reasons forbid me or any of my brother-officers availing ourselves of the permission, even at our own risk and cost.

Permission was subsequently granted to a few as newspaper correspondents; but no English artillery officer was present at the great drama of the Prussian siege of Paris. We were disappointed; but, not inclined to follow the advice of Henri to his friend, we did not hang ourselves. At the conclusion of peace I visited the remains of both armies and many of their battle-fields. I had some friends among the officers of the French artillery, acquaintances made in happier days at Châlons. I never saw them again; and in spite of the contempt heaped upon the unsuccessful by the unthinking, I cannot but feel, from what I saw and heard from their enemies, that they did their duty.

Without further apology, I will aim at my object, and try, like a good gunner, to hit it. My subject divides itself into—

1st—Salient artillery operations in the field, and the lessons we may draw from them;

2nd—The sieges and their lessons;

3rd—The artillery *personnel* and *matériel* of the contending armies;

4th—The general deductions we may draw.

SALIENT ARTILLERY OPERATIONS IN THE FIELD.

It is commonly supposed that the superiority of the Prussian artillery was the principal cause of the German success and, indeed, the Emperor Napoleon himself attributed his final disaster at Sédan to the preponderating influence of the German field-artillery; but it was not altogether so: the artillery was but the keystone of that arch of triumph under which the German Emperor marched to victory.

It is easier to blame the grooves of a gun than the heart of a great nation. The French people (for I hold people responsible for their government) preferred a standing army and a system of substitutes to a national force and universal service; therefore, they were utterly outnumbered; and their centralized system of dealing with war material, of which the English control is a copy, rendered it impossible for them to equip and mobilise their armies as quickly as the Germans, who habitually decentralize and delegate the responsibility of equipment to the commanders of their local *corps d'armée;* and lastly, they were out-generalled, because their *etât major* and system of military instruction were inferior to the Prussian. Notwithstanding the war-cry, "*à Berlin*," they found themselves on the defensive, extended over a long arc from Thionville and Metz to Strasbourg;

while the Germans operated on the shorter cord of that arc by the valley of the Säar and Wissenburg. The French advanced posts, too far from their supports, hugging the frontier, yet not feeling beyond it, knew not of the vast German concentration in the wooded country close to their front. It is very difficult to unravel the thread of artillery action from the tangled web of battle, because artillery plays a double part in the great game—1st, divisional or merely supporting and acting with the other arms; 2nd, concentrating and striking terrible and decisive blows as a separate arm. Moreover, the first accounts of battles reach us from the pens of journalists, generally men of great energy and ability; but tall talk is their *metier*, and they are obliged to supply public demand for blood and thunder at so much a line: even soldiers, themselves engaged, are the poorest narrators of the outline of an action, being so entirely engrossed with what passes in their immediate front. Waterloo veterans still wrangle as to whether the final repulse of the last French column was due to the advance of the 52nd or the Guards. Comparing small things with great, I have been unable to recognize the official accounts of actions in which I had the honor to be engaged.

The first great battle of the last great war was at Wissenburg. We cannot linger over the historic reminiscences of the old fortress that once rolled back the tide of war under Marlborough.

In the same locality, the Crown Prince of Prussia, with more than forty thousand men, surprised and destroyed the corps of General Douay, only 8,000 strong. While the French were cooking their morning soup, the mass of Prussian guns having gained the heights of Schweigen, suddenly opened a heavy fire on the enemy's camp and the village of Wissenburg. With the old impetuosity of their race, the French sprang to arms, but were ordered by General Douay to remain as much as possible behind Wissenburg. The precaution was useless: the Prussian guns, from their commanding position,

rained death upon them, whether they advanced or sought shelter. The French artillery, consisting only of three light field-batteries and one of mitrailleurs, was soon overwhelmed; and, according to the German official account, "the mitrailleurs fired only a few rounds, and were easily silenced by the Prussian guns." The overwhelming numbers of the Crown Prince outflanked and took the hill of Geisburg; the outnumbered French, still pursued by the deadly Prussian shells, and harrassed by the Black Brunswick Hussars, turned retreat to rout. Wissenburg was quickly followed by Wœrth. The French position was salient, almost semicircular; thus offering to the Prussians the opportunity ever coveted by artillerists, viz., the chance of enfilading both wings from a point nearly opposite the centre. The Prussian guns were thus massed on the heights south of Gorsdorf and north-west of Gunstadt, and, as usual, they were felt before they were seen. Those on the Gorsdorf heights commenced the action by enfilading the whole French left, and compelling Marshal MacMahon to change the front of the first division: the manœuvre was brilliantly executed by the French. Later in the day, fourteen German batteries (84 guns) near Gunstadt, were launched upon the French right wing, enfilading it in the line of its greatest depth; and not only the fourth division, but also the unfortunate second, which stood behind them, and had already borne the brunt of battle at Wissenburg. A battery of the 5th corps, north of Spachbach, occupied the French guns; these latter are said to have been well served but poorly handled, for the gallant French artillery seem to have forgotten the tactical lessons of their great artillery chief, Napoleon I.; they, however, nobly sacrificed themselves at the close of the action in endeavoring to save their broken infantry. At this battle, also, the French were greatly outnumbered, and failed to receive assistance from De Failly's corps. MacMahon's position was strategically good, as fairly covering the two important railway communications with Strasbourg through Hagenau, and with Metz *vid* Bitsche. On the same day that the Crown Prince thus severed the French

army and cut off its right wing, some forty miles distant, in a north-westerly direction from the field of Wœrth, the first Prussian army, under Steinmetz, assisted by part of the second, also cut the French line at Spichern, thus hopelessly dividing MacMahon and Bazaine. The ridge of Spichern overlooks the village of Säarbruck, the scene of the *baptême de feu* of the Prince Imperial. As usual, the French were surprised by the opening of the Prussian artillery, six batteries, from a hill overlooking the valley from which a part of Frossard's force had not been withdrawn. The leading artillery features of the battle are, the rapid bringing-up and concentration of guns, in some instances galloping along the roads to the front, while the infantry of their divisions were partially sent on by rail. This mobility of field-artillery is possible only to the Prussians—not to the French, from a defective system on which I shall touch. It is said that the Prussian guns, after advancing over the plain, produced little impression, firing up-hill on the French infantry extended on the ridge, from the fact that shells fired with percussion fuzes either buried themselves in the face of the abrupt slope or flew harmless over the heads of the defenders.

The French guns massed on the left to oppose the flanking movement on Stering, dislodged the mass of Prussian cavalry who were sent under cover to the other flank: this should have been a great gain, because the road to Forbach was the strategic line of French retreat and support. But the crowning artillery achievement was the daring advance of two batteries of German guns up a steep mountain-track, on to the summit of a ridge on the French right, where they enfiladed the whole line. I was informed, through a Prussian general, that the French line, who had resisted so gallantly, were first shaken by this fire, which drove them from their entrenchment, and rendered possible the final advance of the German infantry, whose previous losses, while supported only by direct artillery-fire, had been terrible; also, at this critical juncture a mass of German guns advanced, and, firing across

the road and rail, enfiladed the French left, and threatened to cut off the line of retreat. In the earlier part of this battle the French had the superiority in numbers and position; but they were left by their generals with a most inadequate supply of artillery—one of those unaccountable mistakes which marked French generalship. While Frossard's force fought splendidly all day, seven divisions of Bazaine's stood inactive ten miles from the valley of the Säar. The Germans, having turned the French left by Forbach, the 2nd division, sent by Bazaine, could not cover the retreat of Frossard's utterly disorganized force, which retreated to the south-west, leaving open the road to St. Avold and Metz. Then the German armies, with a cloud of cavalry in their front, gradually brought up their left flank. The small fortresses of Phalsburg and Bitsche, especially the latter, whose guns commanded the line of rail to the west, compelled them to make a considerable *détour*, and leave behind a masking force. They held out for a long time, and shew the advantage of even a small fort on a strategic line of road or rail. The French commanders proposed to abandon the line of the Moselle, leaving a garrison in Metz with orders to defend or die,—the scattered divisions, concentrating at Châlons (the only safe point for concentration) there to fight on their well-known exercising ground, where, history tells us, the fate of France had before been decided in her favor. With Paris as a base, and reinforcements to swell the army, the result of the war might have been different; but politicians stepped in, and decreed her ruin. Bazaine, appointed to the chief command, remained at Metz (where the Emperor also lingered), hoping to fall upon the divided German armies crossing to the north and south of Metz; but their whole force passed to the south at Ars and Pont à Mousson, while Steinmetz had occupied the attention of the French by the battle of Courcelles. This was an obstinate soldiers' battle, without any particular display of tactical skill. Bazaine committed an error in fighting at all: having previously determined to retreat towards Verdun, he

should have done so, and left the protection of his rear to the fortress, instead of fighting a battle with his army astride of the Moselle, and an enemy whose object it was to detain him. The French engineers had unaccountably neglected to blow up the bridges over the Moselle, to the south, though they destroyed some in their own line of retreat. Bazaine's first march was a very short one, and impeded by an enormous quantity of baggage: he gives a further reason for delay in the fact that the French intendence, or control department, had stowed away six million of cartridges without telling him where to find them, and, moreover, had themselves forgotten their whereabouts. This gave the Germans time; they pushed forward as far as Mars-le-Tour with cavalry and guns, and struck the head of the French advance, also cavalry, apparently without guns. The French prepared to charge; but the German cavalry, who masked their guns, wheeling right and left, opened out and left the guns to work their deadly destiny, and thus turn the tide of French retreat.

At Vionville and Rézonville, in a somewhat similar manner, the French columns were fiercely struck, and held by cavalry and artillery until the infantry came up. The success of the final infantry onslaught is attributed by Captain Hozier to the Prussian artillery being, as usual, massed on their enemies' flank. The extraordinary mobility of the Prussian field-artillery, principally due to their system of carrying sufficient men on limbers and gun axle-seats, rendered possible their style of vigorous artillery action, impossible to the French with their antiquated system of carrying gunners on the waggons, or leaving them behind out of breath.

The Prussian cavalry sacrificed themselves with the same heroic gallantry as the English at Balaclava, with the difference that their self-sacrifice had a strategic object and result, viz., holding the French for their comrades to come up. One terrible charge was made through two French

batteries with bodies of infantry in their rear, to be finally met by the hostile cavalry. A little more than a fourth of the horsemen responded to the regimental call at that night's bivouac.

The French fought with the determined fury of their race, and inflicted terrible losses on their enemies, considering that they had gained a victory; but as corps after corps came into position on the left, and wheeled up, the German army, which at first looked northward, finished the fight with its front to the Rhine; while Bazaine had been compelled to fight with his face towards Châlons, and Paris his line of retreat, just a fortnight from the opening affair at Säarbruck. After these bloody struggles at Mars-la-Tours, Vionville, and Rézonville, Bazaine took up a position at Gravelotte. He had been nearly taken prisoner by the rapid German advance, whose guns had actually opened fire on the rear of the Emperor's escort as he left the army with his son. The tactical advantages of Gravelotte as a defensive position shewed skill in the selection of ground, for which Marshal Bazaine is famous. It is a long ridge, the top of which forms an open natural glacis; the crest was strongly intrenched, and his artillery there posted; the left rests on densely-wooded ravines, running down to the Moselle; and one of these, parallel to the face of the position, is difficult to cross except by the road running at right angles to the French front, which was swept with guns and the fire of a fortified farm-house. The Prussians lost terribly in repeated attempts to attack by this road. The difficulties of assault on the left of the position rendered it almost entirely an artillery action, where 84 Prussian guns were deployed by a most spirited manœuvre. They galloped up a lane through one of these ravines, which concealed them till they reached the *plateau* south of Gravelotte. The guns were crowded, to avoid drawing fire by extending in front of the village, which was used as a field-hospital; and the loss of the Prussian artillery here is evident from the mounds of earth that mark their resting-place—"man and horse in one

red burial blent." The three leading batteries were met by the fire of four *mitrailleurs;* but, concentrating their whole fire on the nearest, there remained nothing but wreck after a single round. The second and third were treated to a similar dose of concentration, and the fourth retired precipitately to avoid annihilation.

This concentration of fire, to be produced in the heat of battle, must be inculcated and practiced in peace. The whole 84, thus concentrated on the French guns, silenced them in succession. This sort of advance of the right men, at the right time, to the right place, was, in a great measure, due to the excellent maps served out to artillery-commanders by the Prussian War-office. I was favored with the loan of one of these that belonged to a Prussian captain of artillery: it was a photograph-copy of the map of the French survey. They were turned out in Prussia by thousands long before the war; and, though it folded up so as to fit the pocket, it was so clear that by its aid any average artillery-commander could act with trenchant certainty. Among the sayings of soldiers worth remembering is that of Marshal Saxe, that "the first requirements of an army were legs, the 2nd legs, and the 3rd legs." It is equivalent to that of Wellington, who reiterated "boots;" with us it might possibly be "snow-shoes." Prussian officers reiterate "maps"—accurate maps distributed to squadron-leaders and battery-commanders. The infantry, working in larger units, do not require so many, except on outposts. The French resisted every assault, until, as usual, outflanked by the Prussians—the Guards and Saxons—whose artillery, occupying the hill of St. Privat, at right angles to the French position, enfiladed it, and rendered possible the steady advance of the infantry. It is worthy of note that the isolated attempts of German artillery to advance in the open to close range, 600 yards, against infantry in shelter trenches, resulted in artillery destruction. On one of these occasions, a single gun, one officer, and three gunners alone remained; and when ordered to retire, the young subaltern's reply, from the midst of his dying comrades, was:

"Tell General Steinmetz that where guns have advanced, there also can infantry: let him send supports to me; I will not retire to them; rather will I die on my gun-carriage, and rest here with my comrades." He was as good as his word: he did not retire from his position until he had expended his last shot, and brought his gun, which he had worked with the assisiance of his three gunners, safely out of action, for the infantry did not come forward here until much later.

The final catastrophe of Sédan was the greatest triumph of the German artillery. When that fatal morning dawned, the unfortunate French saw, from every gentle hill of the amphitheatre that surrounded them, the white puffs that shewed the trial-shots of German guns. Their concentrated fire was unendurable, and enfiladed each face of the old fortress situated in a basin; and thus a fortress and army fell before the field-guns of an army wielded with strategic skill. Of course, we must not forget that it was political interference that dictated a movement on a line that ended in a fight with a neutral instead of a friendly territory in the rear.

Not much artillery incident of value is to be gained by following the struggles of the brave but ignorant and undisciplined levies, *en masse*, who, organized by eloquent *avocâts*, tried in vain to oppose the national army of a people who for half a century had patiently practised the art of war in peace, and were not too effeminate to ignore the duty of personal service, without exception, for peasant, peer or prince.

Now for the artillery lessons we have to learn. The efficiency of artillery must be considered as *Scientific*, *Technical*, and *Tactical*.

SCIENTIFIC.

Comparing the French and German artillery officers under the first head, I am inclined to think the French artillery officer, being a competitive *élève* of the *école Polytechnique*, was more highly trained to pure mathematics than the German, to the exclusion of more practical artillery knowledge; for an instance is recorded of an artillery-officer of the French Imperial Guard expressing himself ignoran

of the fact that rifling produced derivation or constant deflexion on the projectile of his piece. This neglect of practical artillery is further shewn in the fact that the French artillery drill-books contain no gunnery rules, while the Germans are carefully instructed. We may infer, therefore, that there may be high scientific training in pure mathematics without corresponding practical training; indeed the means is often substituted for the end. Mathematics may be looked at as a species of mental gymnastics; yet some professors would lead us to suppose they are the end and aim of life, civil and military.

TECHNICAL.

From a technical artillery point of view, we must consider both the gun and the gunner.

The much-abused rifle-gun of France, it must be remembered, is the oldest in Europe. The march of the artillery of the first Napoleon was muffled from Austrian ears by hay-bands round the wheels. The astute nephew introduced rifle guns, and after passing them over the Alps in packing cases, marked "glass with care," startled Europe and shattered the Austrian reserves at Magenta and Solferino. There was some excuse for reposing on laurels thus gained; and we must not forget that the last British muzzle-loading rifle field-gun, the hardest-hitting, farthest-ranging, most accurate gun in the world, is but a modification of the French system applied to steel and wrought iron instead of bronze. The magnitude of misfortune must not lead us to ignore the military sagacity of Napoleon III. and the French artillery in the earlier days of the empire. It only shews that laurels are not to be rested upon; and there is, alas! no truce to preparation for the great game of war.

It was principally a matter of economy that compelled the officers of the French artillery to rest content with their old guns (in very many instances smooth bores rifled up), without ever being recast.

And when re-cast, our experience at Woolwich would tend to shew that the older bronze is better than the new. Like

many ancient arts, it has fallen into inefficiency from disuse. The metal was soft, and was said to wear so quickly as to produce inaccuracy; using up some of the old guns possibly necessitated a larger calibre than the length of projectile admitted. We see from the following table, taking the ordinary field-gun of both countries, that the

French 4-pounder—calibre, 3.41"—gives an area of 9 square inches, nearly, resistance to air; initial velocity, 1066 feet per second.

Prussian 4-pounder—calibre, 3.089"—gives an area of 7 square inches, nearly, resistance to air; initial velocity, 1184 feet per second.

Therefore, the French shell, which offers more resistance to the air, starts with less velocity than the Prussian, and a higher trajectory, which means less accuracy or margin of error, less range, less striking power.

It must be borne in mind, in considering the following table, that the nomenclature of rifled field-guns in England differs from that of other countries. We speak of the gun by the actual weight of the elongated projectile it throws, while foreign artillerists designate the rifled piece by the weight of spherical projectile fitting the bore. Comparing the calibre and weight of projectiles, it will be seen that the Prussian and French 4-pounder correspond with the English 9-pounder, though the weight of the English gun is 8 cwt. against 5½ cwt. of the Prussian gun and 6½ cwt. of the French. This would, at first sight, seem a disadvantage; but English horses are more powerful than continental horses, and two or three cwt. on wheels, divided between six horses, is not a matter of much moment. The disadvantage is more than compensated for by the increased charge and power of the English gun: indeed, many British artillerists regret that the projectile was not elongated so as to weigh 12 lbs., which would give a much more effective capacity of shell; and though the initial velocity would be less, yet the terminal velocity would be greater at 2000 yards and upwards, even if fired with the same charge,—because the 9 and 12-pounder shells exposing only the same sectional area of resistance to air, the latter has greater weight to overcome that resistance. The Prussian gun which throws a 15-lb. shell, and only weighs 8⅓ cwt., was found an effective and mobile gun; the French 12-cwt.-gun, throwing a 25-lb. projectile, being cumbersome in the field.

I fear the English Field Artillery will be too heavily handicapped with their new 16-pounder of 13-cwt., which is a powerful gun; but the weight of shell being great, very few rounds can be carried into action.

The Prussians, during the war, confined themselves to the use of common shell. The practice of the quack, who uses only one kind of pill for the destruction of men, is admitted by the Prussians themselves to be

inapplicable to the varying circumstances of war, which demand the occasional use of shrapnel as well as common shell. With the introduction of the former, for which a time-fuze is most suitable, the Prussians must follow the English through the difficulties they have overcome.

Table of Comparative Ranges of British and Foreign Field Guns.

Nation.	Nature of Gun.	Calibre.	Charge.	Nominal weight of common shell, filled.	Initial velocity.	Ranges, in yards.											
						10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
		inches.	lbs. ozs.	lbs. ozs.	feet.												
BRITISH.....	16-pr. M. L. of 12 cwt...	3·6	3 0	16 0	1365	726	1160	1580	1920	2210	2560	2840	3120	3400	3660	3920	4150
	12-pr. B. L. of 8 cwt.....	3·0	1 8	12 0	1170	680	1004	1396	[illegible]	2045	2340	2600	2840	3065	3280	3490	3690
	9-pr. M. L. of 8 cwt.....	3·0	1 12	9 0	1380	660	1125	1490	1810	2095	2350	2605	2830	3040	3235	3420	3606
PRUSSIAN.....	6-pr. B. L. of 8·3 cwt...	3·604	1 4·8	15 3	1057	410	779	1107	1410	1673	1935	2197	2446	2678	2896	3104	3304
	4-pr. B. L. of 5·5 cwt....	3·069	1 1·6	9 6	1210	492	940	1:90	1634	1927	2198	2460	2690	2924	3144	3362	3567
FRENCH.....	12-pr. M. L. of 12 cwt....	4·776	2 3	25 6·4	1016	443	820	1115	1403	164[illegible]	1845	2047	2237	2405	2570	2720	2860
	4-pr. M. L. of 6·5 cwt..	3 406	1 3	9 0	1006	416	766	1047	1305	1531	1725	1910	2080	2245	2406	2545	2685
BELGIAN.....	6-pr. B. L. of 8· 5 cwt....	3·622	1 5·6	15 0	—	476	875	1246	1585	1914	2215	2488	2756	2996	3215	3434	3653
	4-pr. B. L. of 5·7 cwt...	3 071	1 2·7	9 3·2	1:20	602	1022	1891	1723	2024	2326	2570	2822	3040	3256	3478	3675
AUSTRIAN.....	8-pr. M. L. of 9·8 cwt....	3 83	2 0·75	14 8	1105	510	830	1130	1410	1675	1920	2150	2365	2565	2750	2921	3075
	4-pr. M. L. of 5·2 cwt...	3·08	1 2·5	8 0	1054	525	835	1120	1366	1585	1785	1990	2180	2355	2520	2671	2815
RUSSIAN.....	9-pr B. L. of 12·3 cwt..	4·2	2 11.3	24 6	1050	470	835	1185	1506	1810	2095	2370	2630	2880	3120	3345	3560
	4-pr. B. L. of 6 3 cwt....	3·42	1 5·6	12 10	1004	410	755	1075	1370	1645	1930	2170	2410	2635	2845	3045	3230
AMERICAN...	20-pr. M. L. Parrott of 15·7 cwt.....	3·67	2 0	19 8	—	420	840	1260	1680	2100	2350	2600	2850	3100	3350	3565	3780
	10-pr. M. L. Parrott of 8 cwt.....	2·9	1 0	10 0	—	400	800	1180	1550	2000	2250	2600	2900	3200	3200	3400	3600
	3-inch M. L. ordnance of 7·3 cwt.	3·0	1 0	11 0	—	640	1010	1310	1625	1835	2100	2325	2400	2700	2910	3110	3270

The Prussians used only a percussion fuze requiring no adjustment. The French time-fuzes were almost invariably short-set, and the projectile comparatively harmless.

But I am of opinion the main difference lay in the man and his training. Was the French gunner educated up to his weapon? The Prussian system of universal service forces into the ranks of their artillery a very large proportion of highly-educated, intelligent men. It was an easy task to select those who combined intelligence with natural quick sight and steadiness of nerve, and entrust the pointing of guns to these men only.

The French army, like the English, being recruited mainly from the poorer and less-educated classes, it is more difficult to get this selection of marksmen. In the British service it has not yet been attempted, and thousands of pounds sterling are fired away by men who may be short-sighted or too illiterate to read the figures on a tangent scale or time-fuze. In the French service there was an effort to remedy this by selecting *pointeurs;* but the character of the modern French seems to place them at a disadvantage in the use of arms of precision, and the old *Fureur-Française* of historic chivairly has a tendency to waste ammunition.

If I may venture to form an opinion, and be permitted to express it, it appears to me that the French *habitan*, whether it be that he is more directly descended from the old Norse Norman type, or that two centuries of residence under the rigours of a climate as severe as that of Scandinavia, the original cradle of his race, have cooled down his excitability and given him the character as well as something of the *physique* of the Teuton,—whatever be the cause, I believe he makes an excellent gunner; and I cannot but have confidence in the military future of a force in which are happily blended the descendants of those who fought under Wolfe and Montcalm. Past fields of victory, gained by combined French and English Canadians on this continent, point to the same conclusion.

TACTICAL.

The first Artillery tactical consideration is mobility, without which there can be no application of tactics in the field.

The French had no practical mobility, for they had no means of carrying the gunners (except for the few horse-artillery of the guard). Their light guns well horsed could move with facility; but the men were carried on ammunition waggons which had to be left far in the rear out of fire. A gun without a gunner is a body without a soul.

Until the present year, the English and French were the only two powers who retained this antiquated system. The Prussians carry sufficient gunners to work the gun on axle-seats and limber-boxes. Even if it were agreeable to a mixed audience, time will not permit me to go into details of artillery tactical lessons; suffice it to say, generally, that the last is the only war in which both sides have been completely armed with breech-loading small arms and rifled cannon. Previous struggles show us chiefly what to avoid; and though general principles remain unaltered, their application must not be fettered by the old stereotyped idea that artillery must conform to its infantry—for, as a rule, the limit of infantry-fire is the commencement of modern artillery efficacy.

Its double action, as divisional or supporting, and reserve or striking, in obedience to a master-mind, must never be lost sight of. Artillery-action, therefore, more than ever requires an artillery head. The dictum of the first Napoleon, that "the general engagement once begun, he who has the address to bring, suddenly and unknown to the enemy, an unexpected amount of artillery to bear upon the most important points, is sure to carry them," remains unchanged, but is to be acted upon, not in a spirit of servile imitation, by an agglomeration of guns at close range, but, when practicable, by a dispersion of batteries and concentration of fire.

Everything points to the fact that field-artillery is not a force to be extemporized on emergency; and Prussian

experience of artillery failure in 1866 (for there has been Prussian failure as well as French failure) shews, in the words of Captain Hozier, "that a large infusion of raw elements into Field-Artillery, to strengthen it suddenly, defeated its object by crippling the efficiency of batteries." This paper may appear meagre: the subject has already been over-written; but I have sifted my facts on the very ground of the theatre of war, among the very actors themselves; and I have not neglected to avail myself of pamphlets and books—amongst others, that of Captain Hozier, formerly of the Royal Artillery, and a work full of interest that lately came into my hands in this city—"The Franco-German War," by Elihu Rich. The subject of modern sieges is too large to be included in this paper, which must already have taxed your patience. I think the last and most important lesson we have to lay to heart, as citizens and soldiers, is, that neither science, strategy, technical or tactical skill, can avail anything to the armies of a people who subordinate these things to the necessities of political faction.