1918: DEFINING VICTORY

A RESOURCE NOT TO BE SQUANDERED: THE CANADIAN CORPS ON THE 1918 BATTLEFIELD

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To most, the First World War conjures up images created by poets, romanciers, and film directors. *All Quiet on the Western Front*, whether as a novel or a film, *Paths of Glory*, or recent efforts such as *Legends of the Fall* and *Gallipoli*, portray that conflict mainly in terms of hopelessness; participants could do little but try to accommodate themselves to their eventual fate, one over which they had no control. There is much truth to this scenario, the infantryman especially spending most of his time waiting for others to determine his destiny, but the soldier's experience of the 1914-1918 war was multi-dimensional, and incorporated elements which allowed him, to some extent, to contribute to his continuing well-being. Further, he could look to supporting elements (perhaps rather cynically, one must admit) to increase his chances of survival on the battlefield. Such is most evident as the conflict neared its end, and a study of the Canadian Corps in 1918 will reveal that, though war is mostly about killing, there is more to war than dying.

Preparing for Battle

The Canadian Corps, when it was still the Canadian Contingent, arrived in France in March 1915, expanding to four infantry divisions and supporting arms by the fall of the following year. The battles on the Somme having proved a brutal experience leading to the loss of over 24,000 Canadian soldiers, the formation looked to changing its procedures and adopting new technologies in the winter of 1916-17, before it again engaged in offensive operations in the spring. Then came the battles of Vimy Ridge in April, Hill 70 in August, and Passchendaele in October and November, all of which served to confirm, at least in the minds of commanders, the tactics that had been developed after the Somme. The latter relied on the platoon of about 30 men, grouped into four sections, as the basic unit of manoeuvre.[1] Led by a junior officer, it was organised into two half-platoons, each under the command of a sergeant and formed of two sections, one of Lewis gunners and another combining riflemen and rifle grenadiers.[2] Though lacking a water jacket to cool the barrel, so that it could only be fired in bursts rather than streams, the Lewis gun had the advantage of weighing less than 30 pounds (compared to 48 pounds for the Vickers' tripod alone), while rifle grenades, with their parabolic trajectory, could be fired into trenches from ranges of a hundred yards or more.

The experience of the Somme had taught commanders, staff officers, and instructors that the men who used these weapons could not be sent across no-man's-land in lines or bunched-up groups, but had to spread themselves out to minimise casualties from enemy artillery and machine gun fire, and somehow bring themselves together again whenever teamwork was needed to deal with an enemy position. 'Notes on Training' of November 1917 related that, at Passchendaele, 'A recent development in the method of attack has been the advance by Section rushes from cover to cover behind a slow-moving barrage (eg 8 minutes to 100 yards). This and also the advance by Section Columns over very broken ground should be thoroughly taught'.[3] Though not self-sufficient for combat, sections would move separately to avoid heavy casualties from enemy fire, though bringing the different elements of a platoon together to attack a strong point would require first-rate leadership abilities on the part of platoon commanders.

In the course of an attack, these small units were expected to advance from one tactical point to the next, leap-frogging at pre-arranged boundaries, a tactic by which a given unit was only to advance so far before being relieved by another before exhaustion rendered it incapable of operating effectively. Critical was the need to follow closely on the heels of the artillery's creeping barrage (of which more below) to ensure enemy machine gunners were unable to emerge from their protective dugouts and prepare their weapons before the Canadians were upon them. Scouts would lead, followed by advance platoons, themselves followed by the

rest of the company, all under cover of rifle and Lewis-gun fire. In training, platoon commanders were encouraged to get ahead and reconnoitre, so they would know where they were in relation to their objectives; troops meanwhile practised rapid section deployment not only to avoid the effects of enemy fire but also to encircle strong points before the enemy could react.[4] Once slowed by enemy counter-attacks or defences, they would dig in, the latter positions chosen to ensure front and flanks could be swept by their own machine guns; infantry would thus not fight counter-attacks by putting platoons in the enemy's path, but by keeping his routes of advance covered with automatic weapons.[5] Fire control was of course crucial, otherwise small enemy groups could slip into one's hastily prepared defences. The emphasis on firepower in the defence was an open recognition of the effectiveness of German assault tactics, but the Canadians (and many of their allies) went even further, adopting and adapting those very same techniques. As each Canadian brigade left the line to go into reserve it trained as a formation for six weeks, the basic principle of operations being for each platoon to be allotted its objectives and areas where it was to fight the enemy. It would then proceed directly towards these, avoiding obstructions on the way, whether they be wire obstacles or strong points, taking advantage of local topography and advancing under cover of its weapons and those of nearby platoons. The Canadians would thus advance by infiltrating through enemy defences, much as the Germans had bypassed strong points in Operation Michael the previous March.[6]

According to the doctrine of the time, the main support arm for these units was the artillery, which in the Canadian Corps had increased its ratio of guns to troops from 6.3 per 1000 infantrymen in 1915 to twice that. Also, after the Somme, artillery shells able to explode within barbed wire, microphone arrays able to determine the location of enemy batteries, and other such 'gadgets' aided gunners in increasing accuracy and effectiveness. In set-piece battles such as Vimy and Passchendaele artillery support proved reasonably effective, though casualties among attacking troops were still heavy. In attempting to reduce them, gunners played a four-fold supporting role: they attempted to destroy known strong points and barbed wire; they suppressed, harassed, or destroyed German artillery; they interdicted lines of communication and assembly areas; and they provided a creeping barrage designed to keep enemy troops in their dugouts and shelters until Canadian infantry could move up to attack. To prepare for such tasks, in the summer of 1918 batteries sent a section at a time for six weeks' instruction at the Canadian Corps Artillery School at Permes, then began training for what was called 'open warfare', gunners practising moving from position to position, often digging in their own sites before settling in to shoot. For increased accuracy, they also learned such arcana as the effects of atmospheric conditions on the flight of projectiles.[7]

Fulfilling a similar role were the heavy Vickers machine guns of the Canadian Machine Gun Corps which, unlike the lighter Lewis guns the infantry carried into battle, acted more like artillery in supporting troops with long-range and even indirect fire. In training, these specialists were judged according to their ability to prepare their guns for action, rapidly select and occupy favourable positions, open fire according to previously issued orders, and maintain as high a rate of fire as long as necessary. The influence of Raymond Brutinel, a French proponent of using machine guns in an indirect support role who had chosen to serve with the Canadian Contingent when war broke out, was evident in the emphasis on firing at targets the machine gunner could not see. Brutinel believed that in upcoming offensives such techniques might well be the only support his branch could offer the infantry, though as we shall see he was being somewhat pessimistic.

Still, if they were to support advancing infantry the machine guns would have to move, heavy as they were, with each section officer accompanying the infantry battalion to which he was attached, the Vickers following by leap-frogging their way forward so some would be able to provide fire support for the infantry while others located new positions.[8] Movement required much hard work, however, the gun weighing 28.5 pounds empty and 38.5 pounds with a full water jacket, while the tripod, as already mentioned, weighed 48; a box of 250 rounds of ammunition ready for use weighed 21 pounds.[9] Bringing the three main elements of gun, tripod, and bullets together when needed required careful choreography, a process that required weeks to learn. First, the Number 1, or team leader, an NCO, indicated where he wanted the tripod; then the Number 2 put the gun on the tripod, after which Number 1 locked it into place; Number 3 brought up 250 rounds of ammunition, Number 2 loaded the web containing the bullets into the weapon, and Number 1 cocked it. It was then ready to fire.[10]

Also in support, and gaining an ever-higher profile in doing so, were the Corps' field engineers, their role encapsulated by a few words in Lieutenant-General Arthur Currie's later report on the 1918 offensives: 'I am of the opinion that much of the success of the Canadian Corps in the final 100 days was due to the fact that they had sufficient engineers to do the engineering work and that in those closing battles we did not employ the infantry in that kind of work. We trained the infantry for fighting and used them only for fighting',[11] rather than for pick and shovel work. Or, as Brigadier William Lindsay put it, in more technical terms, 'In any offensive the work of the engineers must be *communications',*[12] burying cable so it would be resistant to artillery fire, building infantry and mule tracks with duckboards, as well as constructing tram lines and corduroy roads, to name just a few of their tasks. To ensure that engineers would have the resources necessary to complete such work, they were reorganised in the first week of May 1918. The three field companies per division were reformed and expanded into a single brigade of three battalions, with its own headquarters, pontoon bridging, and transport unit. Each battalion, like the infantry, was formed of about 1000 men, who were collected from the four disbanded pioneer battalions, the 1st and 2nd Tunnelling Companies, and the three field companies of the 5th Division, which was still training in Britain at the time. Thus, instead of dealing with infantry brigades, engineer companies had their own chain of command, with their own personnel and logistical support to keep them going in the field and on the job site. In fact, the Canadian Engineers Motor Transport Company, formed as part of the Canadian Army Service Corps in July, was the largest MT Column in the Canadian Expeditionary Force.[13] An engineer company commander would therefore not have to go through an overworked and hence uncomprehending infantry battalion headquarters to get the stores he needed to support that very same infantry battalion.[14]

Though reorganised, engineers had been familiar to the Canadian Contingent and its successor the Canadian Corps since mobilisation, but the same could not be said of the recently developed tank. In this regard the Canadians were less open to change than, say, the Australians, but in the spring of 1918 training nevertheless included work with the tracked, armoured vehicles. If the latter were to be useful on the battlefield liaison was of obvious importance, one British report insisting that 'It must never be forgotten by Tank Commanders that their role during an advance is not only to get their Tanks to the strong point, but to get the infantry there with them'.[15] Of the four vehicles in a group, one was designated to force its way into the Germans' rear, two supported the infantry assault, and the fourth held itself ready to help mop up or replace casualties.[16]

Ideally, infantry platoons would get into position to make a final rush on a position, waiting for the two accompanying tanks to create an opportune moment with their fire-power of 6-pounders and heavy machine guns, and, when the infantry rushed forward, the tanks would bring maximum fire to bear to support the advance; alternatively, armoured vehicles could attack from a flank while the infantry entered behind them, then both could mop up together. The tank was thus a system little different from the Lewis gun section or rifle grenadiers, though its proponents felt it would be more effective in dealing with strong points than vulnerable infantrymen. That still left the issue of coordinating the two infantry scouts riding in the vehicles serving as a communications link; flags, interestingly enough, seemed to work best, since the two arms had to remain within sight of each other anyway (the tank had been developed in part by the British Admiralty, after all).

Training was not, however, very methodical, though at least Canadian infantry learned not to get in the way of the mechanical monsters.[17] It would be the Australian Corps that would put tank-infantry cooperation to the test in a limited attack at Hamel, on 4 July. The previous April Brigadier Hugh Elles, commanding the Tank Corps, had convinced the Australians his arm could give them effective support; armoured vehicles would capture ground while infantry helped overcome strong points, mopped up defences, and consolidated any gains. Training was vital if infantry and armour were to work well together, and Lieutenant-General Sir John Monash, commanding the Australian Corps, insisted his troops undergo extensive rehearsals. As for the attack itself, the tanks followed the creeping barrage as closely as possible, their armour nearly immune to the odd shrapnel shell that might explode short. One of many designed to slow the enemy's advance by threatening him on other sectors of the front (this was in the midst of the German summer offensives), the assault then followed a pattern that

would become familiar to colonial and British troops alike in the campaigns to come; tanks and infantry went straight to their objectives, leaving strong points to others, demonstrating not only the tank's potential but the possibilities offered by infiltration tactics.[18] In his evaluation of the battle, Tim Travers places surprise first in order of importance to explain its success, but next suggests that 'the previous training of the Australian infantry with tanks and the impact of the new tanks on enemy machine gun resistance' was also part of the recipe for victory.[19]

The Australian example in regards to armoured vehicles is important because it seems the Canadians did not follow suit; instead, after two years of extensive work making artillery more effective, in the summer of 1918 the Canadian Corps focussed on quick-movement drills for the guns. Such training increased in scale over time, batteries, brigades, and whole divisions rehearsing their technique, until in June 1918 the guns joined the infantry, tanks, and aircraft on large exercises. It was not easy for the gunners to adapt to intensive mobile training, however, John Swettenham noting that 'The first manoeuvres found batteries extremely awkward at the unaccustomed style of fighting. After long months and years of engaging the enemy from static sites, it was strange indeed to set out in the morning and take up three or four positions in succession, practising various methods of attack throughout a long, tiring day before returning to billets',[20] the Canadians already learning the important role fatigue could play in open warfare.

Trying to keep everyone working towards the same goal, as determined by the Corps Commander, meant relying on communications technologies that had changed little in the course of the war. As we have seen, visual signalling proved useful in ensuring armour-infantry cooperation, wireless being too bulky and difficult to maintain to be useful outside of higher headquarters; the latter also relied heavily on telephones, which were portable, but required extensive wiring and cables, which were not. Platoons and companies thus had to use various visual means, such as flags and mirrors, as well as a technique known to the ancient Greeks, runners, to send back information or implore aid. In a sense, the tactics of 1918 reflected the difficulties soldiers faced trying to keep in touch with their commanders. Battalions had to move according to an artillery timetable, since there was no way to guarantee communications would remain open to allow schedule changes should disaster strike or opportunity arise; for the same reason platoons needed their own fire support of rifle grenades and Lewis guns, or tanks if they were available. Thus, perhaps ironically, the fire and movement tactics of 1918 combined rigidity at battalion level with initiative within the platoon to break into German defences and, some hoped, into the countryside beyond.

Whether capped with success or failure, there would be a price to pay, hence the need for medical practitioners to deal with the aftermath of combat. It should be noted, however, that whether they be stretcher-bearers, surgeons, or nursing sisters, they played a dual role: first; they tried to prevent disease through sanitation inspections, water and food testing, checking clothing and blankets, seeing to the provision of bath houses and delousing stations, vaccinating troops, and isolating those who came down with infectious diseases; second, they focused on corrective measures, such as surgery to remove bullet or shrapnel from soldiers' bodies, or convalescence to allow them to recover from infected wounds (almost inevitable in the manure-rich lands of north-west Europe). A new wrinkle in medical treatment as Canadians prepared to go on the offensive was the Rest Station, where medical practitioners sent 'Cases of minor disease, where unfitness would extend over but two or three weeks, especially those who could be up and about; cases of skin disease and scabies, cases requiring correction of vision',[21] so they would not be sent to a Casualty Clearing Station or a General Hospital even further to the rear, where they could be lost to the Corps for some time. Keeping less serious sick and wounded closer to the front increased the chances they could be returned there soon. In combat the line of evacuation began with stretcher bearers picking up wounded on the battlefield, carrying them to a Regimental Aid Post, where they received basic treatment, before being taken by field ambulance or other conveyance, in succession, to an Advanced Dressing Station, Main Dressing Station, Casualty Clearing Station (where surgery was first performed, and the furthest forward nursing sisters could be posted), and General Hospital, though nodes in the system could be bypassed depending on circumstances and geography.

While organising and preparing for the offensives of 1918 the medical corps found itself in the midst of one of the greatest epidemics of human history—the influenza scourge of 1918-19. Killing millions, in absolute terms it compared with the plague of Justinian of the sixth century or the Black Death of the fourteenth, but though 30-50,000 Canadians would succumb to the disease, the very great majority of them were on the home front. (According to the official medical history, the Canadian Expeditionary Force suffered 395,084 casualties due to disease, 3825 of whom died—776 of influenza.) The Canadian Corps still had a problem on its hands, however, as the illness 'flooded the rest station and camps with sick' in the summer of 1918, and 'while exhibiting the symptoms of influenza, it ran its course in a week or eight days. It spread rapidly and necessitated the promulgation of extensive and stringent precautionary orders to prevent its spread. All public places such as Unit Entertainments, YMCA Cinema Shows, Estaminets & etc were closed for a time. In the latter places it was permitted to serve drinks at tables outside the buildings'.[22] This first wave subsided, coincidentally in time for the summer offensives to begin, but serving as a reminder to medical practitioners that, while supporting a campaign against the Kaiser's Germany, they also had to fight an ongoing war against germs. As previous conflicts had demonstrated, failure to do so effectively could mean military defeat.

Into Battle: Amiens

Such was relegated to deep background when combat was engaged, however, the training the fighting arms had undergone in the summer being first put to the test in the Battle of Amiens, which opened on 8 August. German defences relied heavily on a vast number of machine guns hidden in great depth across the entire front; they were not to reveal their positions until attackers were within range, thus avoiding much deliberate shelling before the battle began. Canadian gunners, however, were under orders to dispense with such preparations in any case in hopes of attacking with the benefit of the element of surprise, their most important task being to suppress enemy artillery. With 646 guns of various calibres at their disposal, they left little to chance; to give just one example, to check their guns for wear gunners fired projectiles through two screens placed several feet apart; an electric circuit between them measured the shell's speed and allowed the gunners to calculate muzzle velocity and thus the gun's exact range.[23] As for putting them to use, instructions to the artillery were that 'During the phase in which Infantry ... are advancing to their first objective it will necessary to subject all known and suspected hostile batteries to an intense neutralizing fire'.[24] The gunners would maintain such bombardment until the assaulting battalions were almost under the field artillery barrage or had advanced to a point where they could machine gun enemy artillery. To make up for errors arising from the lack of preparation, guns from different batteries would fire at the same target, while guns from the same battery might fire at different targets; so if one battery was inaccurate, others might compensate.[25]

The Australians, who had occupied the area the Canadians were now about to attack from, provided much detail about enemy positions, and to update counter-battery and other information Canadian gunners relied on the intelligence gathering system developed in late 1916 and early 1917; aerial photographs, aircraft patrols, listening-posts, observation posts, and sound-ranging batteries provided a picture of how German artillery was deployed, though because the Canadians were not allowed to give away their positions raids and patrols were out of the question.[26]

Information gathered in such fashion was used not only for counter-battery operations but for the wider artillery plan as well. Field artillery, supplemented by heavy guns, would attempt to protect infantry battalions as they moved forward, as at Vimy and Passchendaele the previous year, with a moving barrage that periodically lifted in accordance with a prearranged schedule. Artillery was also to harass all approaches the Germans could use to ferry up reserves, ammunition, or supplies, and long-range guns were responsible for shelling detraining stations, rest billets, and similar facilities in the enemy's rear to disrupt his defences in depth.[27] In the battle to come the artillery's importance would be exemplified by the experiences of the 8th Battalion; those machine gun nests the gunners had shelled in the opening hours of the battle fell almost immediately, while those that had avoided shelling thanks to their concealed positions inflicted heavy casualties.[28]

The task of actually capturing such defences of course fell to the infantry, and though the experience of battle at Amiens was not uniform from unit to unit, the progress of the centre division was sufficiently typical to serve as an example of the corps as a whole. (The Canadian Corps committed three divisions to the battle while the 31st French Corps attacked on the right and the Australian Corps assaulted on the left.) Infantry companies moved forward under cover of mist, smoke, and artillery barrage in the formations they had practised during the summer, advancing by infiltrating their way past strong points and machine-gun nests directly to their objectives. Units of the 3rd Brigade attacked four areas in depth simultaneously, some of them hundreds of yards behind German forward positions, advanced waves moving steadily on to their targets and leaving any trouble areas they found along the way to comrades coming up behind.[29]

Following each battalion's attack and looking for positions from which to fire at German defences was a battery of eight machine guns of the Canadian Machine Gun Corps, and these proved useful in a battle where the enemy had hidden many of his support weapons. The 14th Battalion, for example, used L Battery to good effect, breaking up concealed machine gun posts as it skirted a wood. Though Raymond Brutinel had insisted that their main role was to fire over the heads of attacking platoons at targets beyond, at Amiens machine guns often became involved in skirmishes in the mist. Regardless of how they carried out their support function, they adopted formations similar to those of the infantry; picking their way across no-man's land and captured ground as spread out as possible to reduce casualties to enemy artillery, keeping direction with compasses and air photographs. Like those of the infantry, their losses mounted, however.[30]

Similarly, trench mortars followed the infantry, two of them, for example, attempting to support the 14th Battalion's advance, though theirs was no easy task as crews moved 6-inch mortars across rough terrain. Even though they could be broken down into three main parts, weight was still a factor, the base plate weighing 29 pounds, the mounting 35 pounds, and the barrel a back-breaking 49 pounds.[31] Each was thus set up on a mobile platform, which also carried 20 bombs, pulled by two mules in tandem, and a wagon carrying 30 more rounds followed behind. The 14th Battalion, for one, was impressed with the potentials of the trench mortar, along with the machine gun, for destroying or capturing strong posts. When listing the lessons learned from the attack, battalion officers replied: 'In assaulting Machine Gun nests our Heavy Machine Guns and TMs can, and should be used with the greatest boldness. Volume of fire is the essential factor to allow Infantry to get to assaulting distance, [for] over flat country, a well placed enemy Machine Gun, manned by determined gunners is a considerable obstacle, and can hold an advance up at a range of 500 yards, thereby putting our rifle grenadiers out of range'.[32]

An example of how the experiences of one battalion could differ from another was the 13th's mention of trench mortars, which made little impact and appear only once in its narrative. Tanks were a different matter, however, the unit reporting that the surprise of seeing these mechanical beasts emerge from the smoke and mist, which may have masked the sound of their engines as well as their movements, was enough to make some garrisons surrender. Infantry sections usually preceded the tanks, which moved ahead of their charges only when needed; after completing a task, such as destroying a machine gun nest or clearing a section of trench, they returned to their positions behind the first wave of advancing infantry. The 13th Battalion found them most useful when, as it approached a wood, it came upon barbed wire, very rare at Amiens, and ordered a tank through it; on another occasion tanks encircled a small wood while an infantry company, with two more tanks, mopped up.[33]

Armoured vehicles, however, faced a well-trained enemy using a variety of anti-tank weapons, notably artillery pieces whose crews had been indoctrinated to just such a purpose. The 8th Battalion summarised the experience of the first days of the offensive in a short but revealing paragraph. 'During the first phase of the attack on the 8th August, our tanks, both light and heavy, did very effective work, but on the second day, they were not so effective. On the latter day they were late in getting into position and did not appear to know the correct direction of advance, thus delaying what might have been a more rapid advance and a greater reduction in casualties.'[34] In all fairness, by the second day the tanks were facing an

enemy no longer confused by surprise, still high in morale and fully equipped. On the entire British front, the number of tanks available fell from 342 on 8 August to 145 on the 9th, 85 on the 10th, 38 on the 11th, by which time the crews were completely exhausted, and only six on the 12th.[35]

It was thus perhaps with good reason that the Canadian Corps continued to rely on artillery as its main supporting arm, though as we have seen the nature of communications systems limited the gunners' flexibility once battle was joined. Nevertheless, artillery officers accompanied the attack to ensure well-trained technicians could call for fire support, and these forward observation officers, usually battery commanders, had instructions to observe enemy activity and pick out targets of opportunity. The latter, however, had to be somewhat static, a pillbox being a good example, since observers had to communicate firing data through the infantry's signals network (to be described below), which may or may not have been set up when the target was first discovered. Forward observers were accompanied by small teams of signallers, who could use visual means such as lamps, flags, or mirrors as alternatives to patching into the perhaps incomplete telephone system, but such techniques obviously required clear weather to be successful.

As for the guns themselves, in open warfare they had to move forward to prepare to support the next phase of the offensive, so artillery patrols, as they looked for points from which to observe the battle, sought out future sites for their batteries and looked for captured enemy positions they could turn to their own use, though gun pits faced the wrong way. (If the guns were still in them and operational, however, the Canadians could use them to further disorganise the enemy.)[36] At the same time, their comrades attempted to move up Canadian guns as soon as the advance had outranged them, a task no easier than getting 6-inch mortars across the battlefield. Artillerymen had to limber up their field pieces, load ammunition onto wagons and trucks, and load themselves up or prepare to walk; they then moved forward through areas that may not have been completely mopped up, located the positions laid out for them by artillery patrols, unlimbered the guns, and unloaded the ammunition; finally, they had to lay on and prepare to fire.[37] The 10th Battalion, for one, praised the gunners 'for the rapid manner in which they moved forward, and for their speed in taking up positions and coming into action'.[38]

Perhaps the ultimate expression of close artillery support were the composite batteries, whose operations were, somewhat ironically, more akin to those of Waterloo or Balaclava than the technically-oriented procedures of 1918. Such a battery was made up of several sections, each of two guns, the designation 'composite' relating to the fact that each pair came from a different unit. Their arrival on the scene of action could certainly be dramatic, 'with horses straining low against their breastcollars', according to one account, coming into action 'with lighting speed'. The section in question engaged at least two machine gun positions in succession, using shrapnel to destroy them or force them to retreat.[39] Their effectiveness is impossible to determine, but that in itself is significant, commanders and staff officers applying firepower in such quantity and variety, including machine guns, trench mortars, and field artillery, that there was not then nor is there now any way of distinguishing one's impact from another.

Trying to keep these varied elements in touch with one another were a legion of signallers, operations to maintain communications evolving throughout the battle. Brigade headquarters personnel established an advanced report centre close to the front, using just about every technique possible, including runners, mounted orderlies, visual signalling, telephones, pigeons, and aircraft-signalling panels. Battalion headquarters had the same communications organization as the advanced report centre, and after the battle started signallers followed closely behind the infantry and tanks, turning houses along the line of advance into nodes in the system, which was used to keep in touch with a given unit's flanks as well as its parent formation. As the advance progressed, signallers formed subsequent advanced report centres and successive battalion headquarters, and when the infantry and tanks reached their final objectives, patrols laid down telephone wire to keep the battalions in touch with their forward companies. In the course of the battle itself runners, as before, kept the battalions informed of what was happening.[40] Results were mixed. For example, the first day of the

offensive at Amiens the 5th Battalion reported that the signals section, closely following the advancing infantry, established its first station soon after the attack, then set up a second station when the advance continued 90 minutes later; on neither occasion, however, could it contact brigade headquarters with lamps. After another few hours the infantry's success forced it to set up another station, but again it could not contact the brigade.[41] A forward observer moving with the 14th Battalion had different luck; he saw the unit held up by machine guns in a wood and reported that 'I had perfect communications and perfect observation, but was unable to use Artillery' as the infantry was too close to the objective.[42] The copse was captured in a flanking assault.

While signallers attempted to maintain the flow of information, medical practitioners performed a more poignant task, the advance proving as costly as it was successful. Horsed ambulances followed the attacking infantry to collect the wounded, while stretcher bearers faced a new feature at Amiens; Regimental Aid Posts, normally the first stop in the system where casualties received treatment, had been dispensed with, stretcher cases instead being collected at protected points marked by strips of white bandage from which ambulances could remove them to the Advanced Dressing Station. The next stop, for those wounded able to survive the journey, was the Main Dressing Station, which thanks to favourable weather was able to use an open field for its work on the first day of the campaign. Such was fortunate, since it had to be mobile, a tent section moving up as the Corps made progress to turn the Advanced Dressing Station into an MDS, so the latter would always be within useful range of the fighting. The Main Dressing Station received 2622 wounded the first 24 hours, then 1334, 2544, and 1615 on subsequent days, casualties dropping to 702 on the fifth; 30 motor lorries were made available to carry casualties from the MDS to Casualty Clearing Stations further back.[43]

According to the official history, which measures casualties in relative terms, such losses were light compared with the amount of ground captured, and, in fact, casualties were lighter than all the Corps' previous battles. By the end of the first day 1036 Canadians were dead, 2803 were wounded, and 29 were prisoners of war. The total for 8 August, 3868, was lower than for Vimy Ridge, the Canadian Corps' greatest success to that time, where 7707 men became casualties, of whom 2967 died, in the two days necessary to capture their main objectives. The second day at Amiens, casualties mounted by 2574, while the Corps advanced three miles (one-tenth the number of soldiers lost on the Somme while capturing the same amount of ground). Casualties for the entire battle, from 8 to 20 August, totalled 11,725, similar to the 10,602 of Vimy Ridge.[44] Gains were thus expensive, but to commanders who had seen far worse, the figures were grounds to breathe a sigh of relief, though this author is willing to admit that their troops may have had a different perspective.

Into Battle: The Hundred Days

An important lesson of Amiens was thus that gaining ground cost lives regardless of the technology and tactics used; another, to be confirmed in the battles that followed, was that a weapon's utility was in inverse ratio to its weight. The bayonet, the lightest fighting tool the infantry carried, saw little use in spite of much rigorous training emphasising such drill manoeuvres as thrust, parry, and slash; as the 78th Battalion's commanding officer pointed out, 'I doubt if much attention is paid to drill movements when the moment comes for the man to use it.'[45] At the other end of the scale the Vickers machine gun and the trench mortar, whose rate of fire and substantial bursting charge, respectively, made them excellent support weapons, were also difficult to move around a battlefield in the midst of an assault. As we have seen, they were much praised when they were available, but they were not available all the time. Somewhere in between bayonet and mortar/machine gun were the Lewis guns and rifle grenades the infantry carried with them.

Tanks were a different matter altogether, having proven their usefulness and mobility at Amiens, but having demonstrated a certain vulnerability to anti-tank weapons as well. Thus at the Battle of the Scarpe, which began near Arras on 26 August and included the breaching of the Drocourt-Quéant Line, the Canadian Corps continued to use tanks cautiously, they being ordered to remain behind the infantry except to take on specific strong points.[46] The pattern

set at Amiens repeated itself, armoured vehicles being successful in the first hours of combat but running into more and more trouble as German defences hardened. According to the 1st Canadian Division, 'The Tanks worked well and assisted the Infantry very materially in capturing the Drocourt-Quéant Line, breaking paths through the wire and reducing the enemy's resistance. Upon the cessation of the protective barrage, however, all the Tanks became casualties, and were unable to assist in the subsequent advance, where they would have been most useful'.[47]

Thus the tanks, like everyone else, operated best when they could count on artillery fire, but at Arras gunners, given less time to prepare, sometimes had trouble playing their supporting role effectively. Lieutenant-Colonel JL Hart of the 46th Battalion later related how 'the artillery were supposed to have cut the wire for us out here in front of Drury and they didn't get it cut, because we were going so fast that the artillery couldn't be brought up and keep in touch and they were not getting a chance to set their guns, just shooting, encountering a lot of shorts weren't too pleasant, we had some casualties from our own shorts but that was part of war'.[48] The infantry had to place its trust in its own resources, one example being a lance-corporal who worked his way forward with his Lewis gun and opened fire at a machine gun nest from short range; another instance was a similar position falling to a barrage of rifle grenades.[49]

An important reason why the infantry had to become even more self-reliant was the inability of communications technology to keep up with the pace of battle. Behind the front, telephone lines remained open for the most part, though after Drocourt-Quéant battalion commanders stressed the importance of keeping copious amounts of cable on hand to repair breaks caused by friendly and enemy artillery. Some units used pigeons, with mixed results, while visual signalling with forward troops was often a problem on a battlefield where infiltration tactics temporarily left many strong points behind to act as snipers; lamps made excellent targets. All in all communications were patchy, and though battalion commanders and their superiors wanted to know what was happening at the front, as the campaigns of 1918 progressed it was becoming more evident that they had little input into the hour-by-hour management of battle.[50]

Similarly, medical practitioners, having put plans into place to deal with the wounded, could then do little but wait for battle to be engaged and hope their preparations would be up to the task. At Arras, the first day of battle seemed to indicate that medical treatment would be carried out at peak efficiency; according to Number 10 Field Ambulance, 'The wounded began to arrive in steady numbers at about 6.30 am on the morning of the attack and from then onward both dressing stations were kept busy. Everything worked with smooth precision. At one end of the admission room records were kept and anti-tetanus serum administered. The wounded were then carried through a hall into the dressing room. Here 8 stretcher cases could be "dressed" simultaneously, after which they received hot drinks and then loaded into cars of the motor ambulance convoy and were swiftly conveyed to the casualty clearing stations',[51] though only for the first few days. On 29 August, the unit had to report that:

> The continued fire on the roads unfortunately had effect on the ambulances. A shell near the walking wounded post destroyed two cars, wounding some of the drivers of Nos 8 and 9 Field Ambulances, also Pte Phillips of this Unit. At night hostile bombing set an ambulance on fire just near the ADS at Bourlon. The car had a load of 4 stretcher cases and 2 sitting cases aboard. The bomb killed a wounded prisoner who was being conveyed in it, and two of the other stretcher cases died later. Sgt ME Markle and Pte JW McLean who were driving, were slightly wounded and burned, but the escape of any was miraculous as the car was blown completely over and the hood stripped from its framework. The work of rescuing the patients and extinguishing the fire was rendered more difficult owing to the overturned condition of the car and the congested nature of the road, the same bomb having killed 4 horses and wrecked a wagon, this completely blocking the roadway.[52]

Like the plans of any other military institution, those of the medical corps could begin to unravel once combat was joined.

After Drocourt-Quéant the Canadian Corps had a few weeks to recover before engaging in the Battle of the Canal du Nord, which it entered on 27 September as part of the assault on the Hindenburg Line. Events generally followed the pattern outlined above, except in one important respect, the need for engineer bridging parties, their work vital if ammunition, artillery, tanks, and other combat necessities were to cross the waterway and keep up with the infantry. Where the canal was filled with water the troops themselves needed bridges to get over the obstacle; first, platoons that had crossed in dry areas swung around and captured a bridgehead, then the engineers put up foot bridges, made of cork slabs baled with wire netting, to allow units like the 42nd Battalion to make their way to their assembly areas on the other side of the canal.[53] The engineers' second task would then be to prepare crossings for field guns and transport, using pontoon or prefabricated trestle bridges. Finally, they would assemble strong, but also prefabricated, Inglis bridges (named for the inventor) for the larger trucks and guns, while the tanks would be ramped across the dry portion of the canal in the southern area of the Corps' front.[54]

When the creeping barrage began to move forward, sappers followed directly behind assaulting troops to repair roads and canal crossings, the 3rd Battalion being the busiest of the engineer units that day. Its A Company helped the 1st Divisional Artillery get its guns forward, with one subsection attached to each of the four forward batteries. For example, the 3rd Sub-Section, accompanying the 5th Battery, bridged a small stream, crossed the canal at a site prepared by other engineers, and cut a passage through barbed wire obstacles. B Company built two crossings for the guns to move forward, though one crew working on a pontoon bridge was hampered by machine gun fire. C Company was closest to the fighting, since it put four infantry foot bridges across the canal for the 15th Battalion; after the first was in place, sappers rushed across to capture a machine gun so the next three could be built. The company was also responsible for six light transport bridges made of prefabricated materials called Weldon Trestles; wagons brought materials forward, often under sporadic machine gun fire. D Company built a heavy bridge for the tanks, starting six hours after battle was engaged.[55] The operation was thus a foreshadowing of the next war, when engineers in many theatres would be hard-pressed to keep tanks, artillery, and truck-borne infantry moving over rivers and across rough terrain.

Also worthy of note in discussing the Canal du Nord was how the artillery attempted to provide continuing support even though the infantry's advance was planned to outrange field guns. In the fighting from 27 September to 1 October Canadian gunners used 'relay' barrages; of ten brigades supporting the 4th Division, for example, only six fired the barrage up to the first objective, while the other four moved forward. Eight brigades fired the barrage to the second objective, four from their original locations plus the four that had just moved up. Meanwhile, two brigades joined the latter, and these six then fired the barrage to the third objective.[56] Also, Amiens and Drocourt-Quéant had made it clear that artillery could be useful in an even closer support role, especially given anti-tank guns that made armoured operations particularly hazardous (the tanks' success at Canal du Nord was similar to that of previous engagements). Thus pairs of guns, each with 176 rounds of ammunition and the protection of Lewis gunners, moved off to support the infantry advance as best they could.[57]

Such efforts, however, could not prevent the assault from often turning into small actions—stand-up battles between Canadian Lewis guns and rifles advancing from cover to cover and German infantry and machine gunners in defensive positions sometimes protected by barbed wire. It was only in the Corps' last set-piece battle of the war, at Valenciennes, that the system of combined arms came close to realising its full potential. Taking over from the British on 31 October, the 10th Canadian Infantry Brigade assaulted into the outskirts of town the next day before entering Valenciennes itself. Meanwhile, the 38th and 72nd Battalions of the 12th Brigade attacked directly across a canal and into the town, though all units were understrength after the autumn's fighting and the usual depletions caused by illness and injury.[58] The gunners' plan was a simple one, to saturate every known German artillery position, every possible approach for German troops, and every likely assembly area for German reserves.[59]

As at Amiens, gunners did not preregister but relied on their maps, the science of calibration, and the skill of survey sections in gathering information and of battery officers in fixing gun positions, lines of fire, and targets.[60] The Canadians had 104 heavy artillery pieces, and field artillery contributed 24 batteries for the 10th Brigade's creeping barrage alone, which meant that 144 18-pounders and 48 4.5-inch howitzers would be firing; the 18-pounders alone delivered seven tons of explosives, per minute, on a front of less than a mile and a half. The infantry requested a slow rate of advance and the artillery complied; platoons were then able to manoeuvre around buildings, reasonably secure behind a dense wall of shrapnel, smoke, and dust. The smoke by itself was a complete success, blown by the wind into German positions, blinding them, and in the course of the advance the 3rd Brigade Canadian Field Artillery followed the infantry to supply closer support as soon as it had completed its barrage tasks.[61]

Supply conditions were far better than they had been in previous campaigns; for senior Canadian gunners sensed that the war was nearing its end and did not baulk at expending vast quantities of ammunition. There was much talk of peace in the air, and the gunners knew it. 'It was therefore the proper time to neglect economy and to exert every possible effort by means of supporting mechanical weapons to break down the enemy's resistance and thus, as far as possible, minimise the infantry casualties.'[62] Ammunition expenditures were phenomenal; 18-pounders and 4.5-inch howitzers combined fired 56,200 rounds, or 620 tons of shell, and heavy artillery fired 31,500 rounds, or 1520 tons, for a grand total of 87,700 rounds, or 2140 tons. McNaughton compared the bombardment with the 2800 tons of shell both sides fired in the Boer War and the 37 tons expended at Waterloo, exclaiming that 'there had been nothing like it the whole history of war for intensity'.[63] (Though 27 years later the first atomic bomb would prove over eight times more powerful than all Canadian artillery ammunition expended at Valenciennes.)

Infantry went into the attack accompanied by machine guns and trench mortars, as in previous actions. Nine batteries, or 72 Vickers machine guns, thickened the artillery barrage in the early stages of the assault, many placing themselves on the Canal de L'Escaut, firing at German positions until Canadian troops moving across their front were almost upon them. A battery of eight guns accompanied each attacking battalion and took up defensive positions after the objectives fell, and a few 6-inch Newton mortars followed close behind; in one case two mortars fired 80 rounds in 20 minutes, destroying or silencing several machine gun posts. All in all, the 10th Brigade, which bore the brunt of the fighting, lost 60 men killed, 380 wounded, and 61 missing out of the approximately 1200 available for battle.[64] An armistice being declared a week later, the war ended for the fighting branches of the Canadian Corps.

But not for its medical practitioners. Influenza flared up again, and though some cases were mild, exhibiting fever for four to six days before recovering, others caused pneumonia and death; the total number of ill soldiers eventually reached over 45,000, equalling battle losses.[65] Poignantly, some men may have unwittingly condemned themselves in their understandable wish to get home after the war, No 3 General Hospital reporting that 'Most of the patients gave a history of having felt poorly while in their forward areas but had not reported sick for fear of having their demobilization delayed'. Interestingly, 'The same attitude of concealment of illness was noticed amongst the Released Prisoners of War soon after the Armistice.'[66] There is no evidence, however, that early detection increased one's chances of survival, and the flu epidemic of 1918-1919 added several hundred names to the CEF's Book of Remembrance.

Le Bilan

Though the battles of the Hundred Days tend to be looked upon favourably by historians, that has been mainly because of the way they ended—in an Armistice still commemorated by many countries on every 11th of November. In terms of casualties, however, Amiens, Arras, and the Hindenburg Line differed only in degree from previous campaigns; the first offensive of 1918 to involve the Canadian Corps entailed losses of 11,700 men, compared with the 13,400 casualties of Vimy, or a rate of 13 per cent compared to 16. Crossing the Canal du Nord cost over 13,000 men, compared with the 16,000-plus of Passchendaele, but the

Canadians lost the same ratio of troops in both these battles, about one in five. In terms of casualties, then, the chronological dividing line between abysmal and simply heavy came earlier, after the lessons of the Somme had been absorbed in time for the assault on Vimy Ridge. Second Ypres, a defensive battle in the spring of 1915, where the Germans used poison gas on a large scale, cost the Canadian Contingent a third or more of its strength; the Somme demanded only a little less with over 30 per cent losses.[67]

Still, it would be easy to exaggerate the differences between 1915 and 1918. If one measures infantry casualties as an average per division engaged in a given month, April 1915, the month of Second Ypres, still stands as the worst, with 5026 infantrymen of the 1st Division killed, taken prisoner, missing, or wounded severely enough to require evacuation. But the second-worst figure is for September 1918, when the 1st, 3rd, and 4th Divisions lost an average of 4914 riflemen, Lewis gunners, and rifle grenadiers. In September 1916, the only full month the Corps spent on the Somme, the 1st, 2nd, and 3rd Divisions each suffered an average of 4407 infantry casualties, but August 1918 was only slightly better, each of the Corps' four divisions losing an average of 4397 infantrymen. The main difference between the earlier and the latter battles was that troops were capturing more ground for the blood they had to shed.

Though at the risk of overtaxing the reader's patience, further statistical analysis, a look at the worst months of the war for individual divisions, can also be instructive (see Tables below). The 1st Division at Mont Sorrel, though losing almost a brigade in a German attack in June 1916, then suffering further casualties in the counter-attacks it launched subsequently, experienced only the tenth worst month of the war, with losses of 4239. Worst of all was the same formation in September 1918 as it fought at Arras and the Canal du Nord, suffering 7352 casualties in the process. Next came the 2nd Division in August 1918, with its 6020 losses at Amiens. Second Ypres figures third, fighting on the Somme in September 1916 (within 2nd Division) fourth, and the 1st Division at Amiens fifth. The latter battle's low casualty percentage, compared with earlier engagements, thus had much to do with the large number of supporting troops involved, the 2nd and 3rd Divisions suffering their worst months of the war in August 1918. The 1st Division, as mentioned above, suffered its worst month in September 1918, its second worst at Ypres in 1915, but its third worst in October 1918. Thus by any measure the Hundred Days were costly, most especially in infantry.

In any discussion of losses and gains, Valenciennes is of particular interest. In an operation heavily involving six battalions, or about 3600 troops, 380 became casualties, a rate identical with the 15.5 per cent loss taking the Drocourt-Quéant Line. As long as the enemy was willing to fight back, there was a limit to how low casualties could be, which for the Canadian Corps in the First World War seemed to hover around 12 or 13 per cent—a sobering thought which raises the issue of sustainability. In the period 8 to 22 August, which encompassed the Battle of Amiens, the corps lost 11,725 men and received reinforcements of 12,200; then it started to suffer heavier casualties than it could replace, the deficit amounting to 1580 from 26 August to 9 September (Arras and the Drocourt-Quéant Line) then to 3968 in the period 27 September, to 10 October (the Hindenburg Line). It was only in the last month of the war, with the German Army in general retreat, that the Canadian Corps managed to make up its losses, 5761 more troops arriving from reinforcement camps than were lost in battle, through sickness, or to accident.[68] The figures, of course, give no indication as to the level of training new arrivals brought with them, and as we have seen indoctrinating experienced soldiers in the spring of summer of 1918 had been a complex task, so it is reasonable to speculate that the reinforcements of October 1918 were considerably less skilled than the casualties they were replacing. If one may be allowed to use modern terminology, the Canadian Corps that had proven so successful at Amiens was a non-renewable resource.

For that very reason, the engagement at Valenciennes is of further interest; knowing that the war was close to its end, the Corps' commander and his staff were willing to pull out all the stops on ammunition expenditure; in effect, they attempted to reduce losses by increasing fire power. They failed, but clearly they did not consider heavy casualties to be a necessary price for victory. Perhaps then, one should not just look for lessons learned when studying the battles of 1918; it may also be useful to look for a moral as well. Sometime during the First

World War members of the Canadian Corps ceased to be men to be sacrificed in a gallant cause and became technicians working in teams to defeat an army in the field; they had gone from being a symbol to becoming a means to an end. In our current era, where 'personnel departments' have been replaced with 'human resources', there might be something to learn in such a process—that a soldier is a resource not to be squandered.

Average Losses per Division
Sample Months

Month	*Average Losses/ Div*	*Comments*
April 1915	5026	1st Div only
September 1918	4914	3 Divisions
September 1916	4407	3 Divisions
August 1918	4397	All 4 Divisions

The Ten Worst Months of the War
Canadian Divisions

Month	*Division*	*Losses*	*Operations*
September 1918	1st	7352	Arras, DQ Line, Canal du Nord
August 1918	2nd	6020	Amiens
April 1915	1st	5026	Second Ypres, Defensive Ops
September 1916	2nd	4843	Somme, Courcelotte
September 1918	1st	4750	Cambrai, Bourlon Wood
September 1916	1st	4748	Somme, Pozières, Thiepval
August 1918	3rd	4716	Amiens
June 1916	3rd	4580	Mont Sorrel, Defensive/ Offensive
April 1917	4th	4401	Vimy
June 1916	1st	4239	Mont Sorrel, Defensive/ Offensive

Endnotes

1. The purist would note that battalions are units while platoons are sub-sub-units, but the author has chosen to use a simpler vocabulary.
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3. RG 9, v 4064, folder 15, file 6, Canadian Corps, Notes on Training—November 1917, NAC.
4. RG 9, v 4188, folder 5, file 6, 3rd Division, 22 April 1918; 58th Battalion to 9th Brigade, 4 May 18; 116th Battalion, 25 April 1918; MG 30, E100, Arthur Currie Papers, v 37, file 167, 11 CIB Training Instructions, NAC.
5. Ibid.
6. MG 30, E100, Arthur Currie Papers, v 37, file 167, 11 CIB Training Instructions, 5 May 1918, NAC.
7. GWL Nicholson, *The Gunners of Canada* (Toronto: McClelland and Stewart, 1967), 209, 321-322; RG 9, v 4301, folder 9, file 18, Notes of Training, 2nd Canadian Divisional Artillery, 14 December 1917, NAC.
8. RG 9, v 4049, folder 14, file 4. Notes for the Information and Guidance of all Officers Regarding the Organization of Machine Gun Battalions and their Employment, 30 April 1918; v 4199, folder 6, file 12, Tactical Notes on Operations on the Somme, March and April 1918, Obtained from Canadian Motor Machine Gun Brigade, 1 May 1918, NAC.
9. DHist, 87/152, Handbook for the .303-In Vickers Machine Gun, 1917.
10. RG 9, v 4049, folder 14, file 1, 2nd Army to GHQ, Machine Guns, NAC.
11. GWL Nicholson, *Canadian Expeditionary Force* (Ottawa: Queen's Printer, 1962), 384.
12. MG 30, E100, Arthur Currie Papers, v 35, file 161, Canadian Corps CE 7/23, NAC.
13. Neal Porter, 'From Trench to Open Warfare: The State of Logistics in the Canadian Corps, Amiens, August 1918' (unpublished paper, University of Ottawa, 1998), 7.
14. AJL Kerry and WA McDill, *The History of the Corps of Royal Canadian Engineers* (Ottawa: Military Engineers' Association of Canada, 1962), II: 159-67; RG 9, v 4188, folder 5, file 6, 3rd Division, Engineer Sub-Section Organization, 5 June 1918, NAC.
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16. Ibid.
17. RG 9, v 4201, folder 11, file 15, Canadian Corps, 24 July 1918, NAC.
18. Ibid, 245, 247, 267, 330. John Terraine, *The Smoke and the Fire: Myths and Anti-Myths of War* (London: Sidgwick & Jackson, 1970), 196; PA Pedersen, *Monash as Military Commander* (Melbourne: Melbourne University Press, 1985), 226.
19. Tim Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front 1917-1918* (London & New York: Routledge, 1992), 112.
20. John Swettenham, *McNaughton*, 3 vols (Toronto: Ryerson Press, 1968-9), I: 130-1.
21. AE Snell, *The CAMC with the Canadian Corps during the Last Hundred Days of the Great War* (Ottawa: Acland, 1924), 9.
22. RG 9, III, v 4715, 107-20, Passchendaele to Gouy-en-Artois, June 1918, NAC.
23. Charles Lyons Foster and William S Duthie (Canadian Bank of Commerce), *Letters from the Front: Being a Record of the Role Played by Officers of the Bank in the Great War, 1914-1919* (Toronto: Southern Press Ltd, 1920), 306.
24. RG 9, v 4052, folder 22, file 4, Canadian Corps Artillery Instructions, 4 August 1918, NAC.
25. Ibid.
26. Swettenham, *McNaughton*, I: 139, 143.
27. RG 9, v 4052, folder 22, file 4, Canadian Corps Artillery Instructions, 4 August 1918, NAC.
28. RG 9, v 4052, folder 22, file 4, 8th Battalion, Narrative No 2 from 12.00 Midnight 8/9th August to 5.00 pm 10th August 1918, NAC.
29. MG 30, E100, Arthur Currie Papers, v 37, file 167, 14th Battalion Report on Operations of August 9th 1918, NAC.
30. RG 9, v 4163, folder II, file 4, Report on Operations, Demuin-Le Quesnoy, August 8th-10th, 1918, MG 30, E100, Arthur Currie Papers, v 37, file 167, No 3 Company 1st Battalion CMGC Report on Operations August 5th to August 12th, 1918, 14th Battalion Report on Operations of August 9th 1918, NAC.
31. DHist, 87/191, Light Mortar Training, June 1918.
32. MG 30, E100, Arthur Currie Papers, v 37, file 167, 14th Battalion Report on Operations of August 9th 1918, NAC.
33. MG 30, E100. Arthur Currie Papers, v 37, file 167, 3rd CIB Report on Operations August 3rd to 20th 1918; 4th Tank Battalion, Report on Operations with 1st Canadian Division, Luce Valley, August 8th 1918, NAC.
34. RG 9, v 4052, folder 22, file 4, 8th Battalion, Narrative No 2 from 12.00 Midnight & 8/9th August to 5.00 pm 10th August 1918, NAC.
35. Terraine, *The Smoke and the Fire*, 154.

36. RG 9, v 4052, folder 22, file 4, Canadian Corps Artillery Instructions, 4 August 1918, NAC; DHist, Biog File, Catchpole, Leslie Arthur, Memoirs, 210; *The 60th Battery Book, 1916-1919* (London: Canada Newspaper Co, 1919), 73.
37. RG 9, v 4052, folder 22, file 4, Canadian Corps Artillery Instructions, 4 August 1918, NAC.
38. RG 9, v 4052, folder 22, file 4, Narrative of Phase A—Operations Taken Part in by the 10th Canadian Infantry Battalion from the Night of 7th/8th-8-1918 to 9-8-1918, NAC.
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42. Royal Montreal Regiment, 14th Canadian Battalion, August 12th 1918, Report on Operations of August 8th, 1918, MG 30, E100, Arthur Currie Papers, v 37, folder 167, NAC.
43. RG 9, III, v 4551, 1-13, Medical Arrangements Canadian Corps during Second Battle of Amiens, August 8th to 20th, NAC.
44. Nicholson, *Canadian Expeditionary Force*, 407, 261, 413, 419, 465; RG 24, v 2844, GAQ 11-11B, Casualties, NAC.
45. RG 9, v 4239, folder 4, file 10, 78th Battalion, 22 August 1918, NAC.
46. MG 30, E100, Arthur Currie Papers, v 37, file 168, 1st Division, Report on Arras Operations, Drocourt-Quéant Line, August 28th-September 4th, 1918, NAC.
47. MG 30, E100, Arthur Currie Papers, v 37, file 168, 1st Division, Report on Arras Operations, NAC.
48. RG 41, v 13, 46th Battalion, JL Hart, NAC.
49. MG 30, E100, Arthur Currie Papers, v 37, file 168, 10th CIB Narrative of Operations, Battle of Arras, Appendix H; Appendix I, 3rd CIB Report on Drocourt-Quéant Operations—September 2nd 1918, NAC.
50. MG 30, E100, Arthur Currie Papers, v 37, file 168, 10th CIB Narrative of Operations, Battle of Arras, Appendix H; Appendix I, file 167, 3rd CIB Report on Drocourt-Quéant Operations—September 2nd 1918, NAC.
51. RG 9, III, v 4715, 107-20, The Battle of Arras, August 1918, NAC.
52. Ibid.
53. RG 9, v 4158, folder 2, file 6, 42nd Battalion Narrative of Operations 25th-30th September 1918, NAC.
54. Kerry and McDill, *The History of the Corps of Royal Canadian Engineers*, I: 189-90.
55. RG 9, v 3873, folder 120, file 10, Interim Report on the Operations of the Canadian Corps during the Year 1918, v 4995, War Diary, 3rd Battalion CE, Appendix, Narrative of Bourlon Wood Operations, September 27th-28th-29th, 1918, NAC.
56. RG 9, v 3912, folder 42, file 10, Artillery Notes on Operations of the Canadian Corps, September 27-October 1, 1918, NAC.
57. RG 9, v 3912, folder 42, file 9, Notes on Recent Fighting No 21, NAC.
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60. Ibid.
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66. RG 9, Ill, v 5035, War Diary, No 3 Cdn Gen Hosp McGill, A Report on the Influenza Epidemic January to March, 1919, March 1919, NAC.
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68. RG 24, v 1883, file 27, Statistics-Cas, NAC.