The Pennsylvania Rifle: A Social Interpretation of Changing Military Techniques

The methods of warfare, like all activities of mankind, are ultimately governed by social traditions. Machiavelli voiced the statement, "civil and military life are necessarily connected and united together" and Clausewitz expressed the same thought in his often quoted definition of war: "War is only the continuation of policies used in peace with other means." Developments of strategy and tactics can therefore be recognized as translations of changes in the social realm into the terms of warfare.

The development of siege artillery, for instance, is intimately connected with the political change from feudalism to strong centralized governments. The castles of the nobility which were almost immune to mediaeval siege technique crumbled under cannon balls. Artillery was very expensive and economically not feasible

---

3 Cannons were first used at the siege of Cividale in 1331. See H. Delbrück, *Geschichte der Kriegskunst* (1920), IV, 29; and Charles Oman, *A History of the Art of War in the Middle Ages* (Boston, 1923), II, 205 ff.
for the single nobleman to use, thus military striking power was concentrated in the hands of the great lord. Similarly, the use of firearms was limited to the requirements of the established social structure. Artillery served the purpose of the centralized governments, therefore efficient siege artillery was developed. Tacticians, up to 1800, when speaking of firepower, first of all have artillery in mind and not the small firearms of the infantry. A society which accepted a division in social groups unequal in rights and duties, did not encourage the development of the firepower of small arms which were obtainable by the many.

The two great revolutions at the end of the eighteenth century were fought with a new conception: the equality of men. This change of social attitudes developed the potentialities of infantry fire and basically changed field strategy. Up to that point, the basic rules of strategy consisting mainly “of the body of stratagems and tricks of war—ruses de guerre by which a general sought to deceive the enemy” had not changed much since the late Roman empire. The three “battles” so familiar to the leader of the medieval host still appeared in the ordre de bataille of the eighteenth century. A typical battle of the period proceeded as follows: The armies engaged in parallel order and the action was rapid and decisive. The cavalry on the wings charged and the melee lasted only a quarter of an hour. Meanwhile the infantry of the center advanced. The fire of the advancing skirmishers was intended merely to annoy the enemy, the slowly moving field guns rarely did much harm, and the main force of the infantry attack depended upon the bayonet. But against enemy cavalry bayonets could be used only defensively. Victory, therefore, depended on the success of the cavalry charge. Two hours after the first shot the battle was over. The defeated cavalry generally escaped, the infantry was destroyed. All artillery and baggage trains

4 It is interesting to note that the aristocratic prerogative of filling officers' commissions in the army was first broken in the artillery regiments. Till the end of the eighteenth century the greatest percentage of untitled names occurs among the officers of the artillery and of the engineers corps. This phenomenon is paralleled by the great number of bourgeois scientists who studied ballistics.

5 Frederick Karl, Prince of Prussia. The Influence of Firearms Upon Tactics (London, 1876). “It was predominantly cannon which brought modern infantry into existence.”

were captured. Obviously the invention of gunpowder did not have the effect of giving a decisive role to the infantry's firepower. Although equipped with guns, the infantry did not get any particular profit from them, and European armies generally continued in their preference for shock tactics with some famous exceptions, like the final phases at Hastings and Crecy, which are especially numerous in English military history.

The infantry received its name from the Italian word infante, the servants (knaves) of the mounted knights. As an independent branch of the service with its own offensive power it originated in Switzerland at the end of the Middle Ages. The mountainous terrain of that country was not well suited to cavalry action. Moreover, being a strongly democratic nation, the Swiss army was free from aristocratic influences, and from the outset the conception of infantry was linked with the people as a whole.

At first the main infantry weapon was the pike and the successful "push of pike" was the only tactical goal. The introduction of firearms did not change this objective. Part of the troops were armed with guns but the majority had pikes. Toward the end of the seventeenth century the two weapons were combined by introducing the musket with attached bayonet. Pikes were not discarded without sharp criticism by professional soldiers, however, and demands for the reintroduction of this weapon were voiced until the beginning of the nineteenth century. As the infantry had no efficient fire power one can well understand the preference for the pike.

Shooting is efficient only if one hits the target. And that was exactly what eighteenth-century infantry did not do. Aiming, strange as it may seem, was strictly forbidden. The only matter of importance was that the volley sound like one shot. The tactical goal of the infantry remained attack by bayonet. Frederic the Great continuously emphasized the importance of charging with l'arme blanche. One of his generals, Moritz von Dessau, asked for the

---

7 To the two basic rules of strategy as defined by Delbrück—annihilation and exhaustion—we may add two basic rules of tactics—shock and missile.

8 The bayonet is first mentioned in 1671. The name comes from the town Bayonne, where this weapon was manufactured.

9 Delbrück, op. cit., 308.

10 His remark in the Testament Militaire: "Victories are won by the superiority of fire" refers to artillery.
privilege of leading an infantry charge without the assistance of firearms. This point can easily be documented by dozens of other examples from eighteenth-century military history. The Russian general Suwarow said, "The bullet is a fool, the bayonet is the whole man." A French ordinance of 1755 made it evident that the infantry was expected to fight with the bayonet without shooting. The connotation that the fight with the bayonet was a manly deed but shooting cowardly and unworthy, was still held as late as 1830. The Fourth Regiment of Volunteers in the Polish Revolution of 1830 gave a solemn oath to use only the bayonet in the war of liberation. The regiment was annihilated. Only ten men returned.

The training of infantry in the eighteenth century consisted only in precise marching and in the delivery of volleys. Needless to say, the men were not taught how to aim—it was sufficient if they "levelled their pieces at a proper height." Incidentally there was nobody who would have been capable of being the instructor. The general verdict about the French infantry of the period is: "Hardly ten officers in the army understand the construction of the gun. No soldier knows how to take aim." Due to this ineffectiveness of fire power, the target could be made fully visible. Colorful uniforms, flying banners and rattling drums made defense and attack equally conspicuous. The army in battle array was surely a brilliant picture but from the point of view of tactics it was the triumph of esthetics over efficiency.

The Continental Army was trained in the same spirit. Infantry fire is mentioned twice in Steuben's règlement. Chapter VI states: "The officer must observe that the soldiers step off and place their feet as directed in the manual exercise and that they level their pieces at a proper height." Chapter XIII directs the volley: "If there be more than one battalion to fire they are to do so in succession from right to left." It was in full agreement with the European tradition that General Wayne took Stony Point, July 15, 1779, by a bayonet assault with unloaded muskets!

11 Colin, L'infanterie au XVIII siècle. La Tactique (Paris, 1907), 54: "Enfin le propre de notre infanterie est de combattre l'arme blanche sans tirer."
12 Colin, op. cit., 118.
13 J. M. Palmer, General von Steuben (New Haven, 1937), 151: "The use of the bayonet was particularly stressed by the Baron. As soon as the men were sufficiently drilled in the manual of arms they were practiced in bayonet fighting every day."
After 1779 most troops of the Continental Army used the French Charleville musket, model 1763, the regulation weapon of the French army. The English army used "Brown Bess." Both weapons were about equal in value. The caliber was 0.69 and 0.75 respectively, the French weapon being the smaller one. The bullet used was 1/18 of a pound of lead. A perfectly drilled and calm company could fire four to five volleys a minute, without aiming, of course. There were many mechanical handicaps, however. The barrel was fouled frequently from powder combustion, which necessitated swabbing it with the ramrod. Fouling of the flashpan required the use of a small iron brush. Loading was complicated. The soldier poured powder down the barrel, then dropped in a lead ball and rammed both down with the iron ramrod; he filled the pan of the lock with fine powder and finally the musket was ready. On the command, "fire" he released the trigger. The hammer, with a piece of flint between its jaws, was brought down. By striking the steel of the frizzen, sparks were sent into the pan and ignited the powder. The fire passed through the touchhole of the barrel to the charge inside. The bullet then went wobbling on its way. At a distance of three hundred yards hardly one bullet out of twenty would hit a target eighteen feet square. The old English longbow had a much higher shooting accuracy. It had a deadly range at 240 yards, the longest shot ever fired covering 482 yards. No wonder that Benjamin Franklin suggested reintroducing bow and arrow into the armament of the army!

The two most important single items of a gun are lock and barrel. The technical skill of the period could not improve the lock, but it was well known that the use of a rifled instead of a smooth-bored barrel was advantageous. Rifling gives the bullet a spin during its flight, the result being a very great increase in range and accuracy. According to a tradition which we cannot verify any longer, the grooved barrel and the effect of spiral motion was first observed in Russia. It is now generally acknowledged that rifles were used at a

14 The barrel was stained in brown.
15 G. Shaw, Devil's Disciple, Act III. Burgoyne declined Richard's request to be shot instead of being hanged: "Have you any idea of the average marksmanship of the army of his Majesty King George the Third? If we make you up a firing party, what will happen? Half of them will miss you; the rest will make a mess of the business and leave you to the provost marshal's pistol."
16 Walter M. Cline, The Muzzle-Loading Rifle Then and Now (Huntington, W. Va., 1942), 9.
shooting-match in Leipzig in 1498, the Viennese gunsmith, Caspar Zoellner, being credited with the invention. Riffing was rarely used for military purposes, however, because professional soldiers strongly objected to it. In fact seventeenth-century military ordinances forbade expressly the use of rifled barrels, "because of the undue advantage it would give." By the eighteenth century some "Jaegercorps" which were used as light infantry were armed with rifles.

While professional soldiers sneered at the new weapon the common people fully realized its advantages. It was frequently used for the Schuetzenfeste of the townspeople and became the favorite weapon of Alpine hunters who could not rely on the inaccurate musket in pursuing their game. Emigrants from Switzerland and the Palatinate brought the rifle to America at the beginning of the eighteenth century.

The European rifle, although superior to the musket, was by no means an ideal weapon. The barrel was short, about twenty-five inches, and of the same caliber as the musket's (about 0.75). Because of its clumsy construction, European rifles were too unwieldy for long journeys. Moreover they were hard to load and rather noisy. In America the rifle was speedily changed to fit the requirements of the new surroundings. Hunting was no pastime here, but an important economic activity. The fur trade provided for many American frontiersmen the only possibility of getting cash; and venison was their most important single foodstuff. The American needed a rifle which would be economical in the use of powder and lead, for the country was thinly populated and supplies were difficult to obtain. The rifle must also be as noiseless as possible because it was dangerous to make oneself too conspicuous. Finally, it was essential to have a weapon which could be quickly reloaded and which guaranteed the utmost in shooting accuracy.

The Kentucky rifle fulfilled all these requirements. From the historical point of view "Pennsylvania rifle" would be the correct term, but ever since Daniel Boone's hunting trip to Kentucky the

17 M. Thierbach, Geschichte der Handfeuerwaffen (Leipzig, 1899), 169.
other name has been the generally accepted one. This rifle had an octagonal barrel more than forty inches long which muffled the noise of the explosion. It was economical to use because the caliber had been reduced by more than one third, to 0.45. The rifle was sturdy because the barrel was partly protected by the maple stock. The trigger guard was smaller but heavier, and instead of the iron ramrod a more easily replaceable hickory rod was used. Bullets were cast smaller than the bore and smeared with soft tallow. Before loading the piece the bullet was enveloped in a "patch," of which a large supply was kept in a box fastened to the right side of the stock. This box was about five inches long, by one and one-half inches wide and had a brass-hinged lid and brass trimmings. The "patch" was a round piece of dressed and heavily greased buckskin, about the size of a fifty-cent piece, which cleaned the barrel and by expanding into the grooves prevented lead contact and the escape of unused powder gases. If the constant wear and tear forced a freshing out of the bore with a consequent enlargement thereof, a thicker patch was taken, so that the same size bullets could be used. This patch enabled the American hunter to load faster and to fire longer without cleaning his rifle. It was the distinguishing difference between the American rifle and the European.20

The importation of the rifled barrel was one of the great contributions made by the colonial Pennsylvania German to his new fatherland. But the fully developed Kentucky rifle cannot be credited to Americans of German descent alone; it is the direct product of the American environment. The ancestry of the skilled gunsmith and of the crafty hunter—be it German, French or Scots-Irish—is a matter of purely genealogical interest. But in terms of technological development it was their combined skills and experiences which shaped the new weapon.

During the colonial period rifle production was almost a Pennsylvania monopoly, centering in Lancaster and Berks counties. Marin Meylan erected the first boring mill for gun barrels in Lancaster County in 1719.21 Peter Leman followed him two years later. Several famous gunsmiths appear in the next decade: Roesser, Feree, Stenzel,

20 According to Cline, op. cit., patches are mentioned by the Spanish writer Alonzo Martines de Espinar in 1644. Undoubtedly they were rarely used in Europe.
21 I. D. Rupp, History of Lancaster County (Lancaster, 1844), 74.
IO FELIX REICHMANN January

Albright, Folecht and Lefevre, but the Henrys have undoubtedly the longest family tradition in rifle manufacturing. William Henry learned the trade from Martin Roeser from 1744–1750; his own gunshop existed for about one hundred and fifty years.

The efficiency of the Long Rifle was well known from border warfare, and from the earliest days of the Revolution the Continental Congress was very anxious to enlist riflemen. On June 14, 1775, a resolution was passed that "six companies of expert riflemen be immediately raised in Pennsylvania." The tactics of these troops, influenced by the fighting methods of the Indians, differed basically from the established rules of warfare. English regiments, advancing erect and in close formation, met the opposition of a swarm of skirmishers who, taking cover behind every elevation of the terrain, constituted an almost invisible target which poured a deadly fire on the helpless enemy. The English were geared to a bayonet charge with scanty support by volleys; the Americans reversed the picture and shifted the tactical importance to the preceding use of firearms. They outshot and outmaneuvered their opponents to such an extent, that the English parliament inquired "about those strange rifled arms used with such deadly certainty by several regiments of the American army."22 The contributions of the rifle companies towards the final victory are well known and need not be recapitulated. Probably the most important shot of the War of Revolution was fired from a long rifle, when Tim Murphy from Northumberland County, a member of Daniel Morgan's Rangers, killed General Fraser from a distance of three hundred yards, thus accelerating the demoralization of Burgoyne's army at Saratoga.

To counterbalance the American firepower the English government stipulated that Jaeger regiments should be included among the Hessian mercenaries. These regiments had rifles, but the German soldiers trained in the traditional linear tactics were no match for the American line of sharpshooters. Only one English-made rifle appeared in the American theatre of war. An English major, Patrick Ferguson, received a patent December 2, 1776, for "a rifle gun on a new construction."23 The remarkable feature of Ferguson's invention

22 C. W. Sawyer, Firearms in American History (Boston, 1920), III, 211.
is that the rifle was loaded at the breech and not at the muzzle. With one revolution of the trigger guard the breech plug was lowered, the bullet was dropped in the breech part of the barrel and powder poured in to fill the chamber behind the bullet. Another revolution of the trigger guard closed the breech and the weapon was ready for priming and firing. During the first years of the war, Ferguson commanded a small unit of picked riflemen under General Howe. He was severely wounded at Brandywine and Howe used this opportunity to discharge his command and to store the rifles—another small incident which shows the animosity of the professional soldier of this period against marksmanship and the rifle. Ferguson afterwards commanded an English and loyalist scouting force in South Carolina. On October 7, 1780, his force of eleven hundred men camped on the heights of King’s Mountain. There nine hundred Allegheny mountaineers, all armed with the Kentucky rifle, annihilated his unit in less than one hour. American losses were twenty-eight dead and sixty-two wounded.

In spite of its proved merit no eighteenth-century European army was prepared to accept the introduction of the rifle. The English generals who had suffered defeat from the American fire, the French officers who had learned to respect the rifle companies—all went back to Europe and forgot about the rifle. Even a military genius like Napoleon overlooked it. The reason for this lies primarily in the social philosophy of old Europe. Only the aristocrats were deemed full human beings—the common people were considered immature and in need of guidance. The social cleavage was intensified in army life, because the entire middle class did not serve at all. The era of mercantilism considered commerce and industry too important to be sacrificed for the army. The officers were noblemen or gentlemen, but the soldiers were taken from the riff-raff. The French minister Comte de St. Germain expressed this very clearly in 1775: “We would destroy the nation if we would put the best elements in the army. As things are the army must inevitably consist of the scum of the people and of all those for whom society has no use.” If the recruiting officer failed to get enough able-bodied men, generally with the help of strong liquor if not by outright kidnapping, insolvent debtors and criminals under sentence were enlisted. The Landgraf

of Hesse sent to his regiments all criminals under sentence of death, and a Prussian cabinet order of 1780 states: "Unauthorized writing is to be punished by military service, in case the convict could not prove that he was able to earn his living honestly." The treatment of enlisted men was inhuman. Punishments even for minor offenses were brutal, of rights there were almost none. The pay which was scanty from the outset reached their pockets after many deductions. During the American war the British private received sixteen cents a day, but food and supplies being deducted little if any cash was left for payday.

No man can do an independent job if he is not treated with consideration. The European soldiers, regarded as slaves, objects, not human beings, could only perform the task of an object. They were good merely as part of a group, never as independent beings, they had no freedom before the battle and they could not be trusted with freedom of decision during the battle. Therefore not independent single fire, but volleys; close formation not flexible lines; and as the final goal, the charge given by the group as a whole. All initiative was taken out of the men, they had to behave like machines on the drilling ground and under fire. This in the eyes of eighteenth-century society was by no means a liability but rather it was an asset, because independence shown by the common man would have meant the beginning of the final abolition of quite a few privileges. The English officer who considered the development of marksmanship in a rifleman as tantamount to a social revolution was right. He refused to teach his Irish soldiers to shoot accurately, "or within a week there would not be one living landlord left in Ireland."

Here in America a different social set-up had developed. The mere size of the country opened possibilities for everybody undreamed of in Europe. He who had been a servant in the Old World became an independent landowner in the New. The frontiersman who, relying solely on his axe and his rifle, carved his homestead out of the forest, the farmer and the small craftsmen who lived in the safer belt near the Atlantic seacoast all enjoyed great personal freedom. Man rises with his opportunities. Freedom and independence brought wealth and strength to the colonies. In 1700 this country produced about

one and one-half percent of the world's output of iron, by 1775 it produced fourteen per cent, a figure which was to rise and rise in the years to come.\(^27\) Europe with a great part of its population underprivileged and oppressed, had an increasing crime frequency. The American, "that new man" as Crèvecoeur called him, might have crude manners, but his morality generally surpassed that of his European fellows. Highwaymen, for instance, the scourge of eighteenth-century Europe, were almost unknown in colonial America. Immigrants built America, but America made a new man out of the immigrant:

[The newcomer] embarks on a design he never would have thought of in his own country . . . he is an American who leaving behind him all his ancient prejudices and manners, receives new ones from the mode of life he has embraced, the new government he obeys, the rank he holds.\(^28\)

Such men could not be beaten into lifeless automata by the stick of a drill sergeant. The American people, trained for independent action and teamwork, had to create tactics which were congenial to the social structure of the country. The Declaration of Independence and its belief in the equality of men translated into terms of warfare is the American rifleman.

Europe was too immature with regard to the political freedom of her people to adopt the American methods. The outward appearance of the new tactics was imitated, but the essential was overlooked. Light infantry and skirmishers were used in ever increasing number and brought a flexible order to the battlefield instead of the old linear tactics. Offensive firepower, which had to be based on a rifled ordnance, was not desired. Even a man like Clausewitz could not see the difference between American sharpshooting and the perfectly drilled volleys of the Prussian infantry:

The Prussian Army has brought the fire to such a perfection at Moellwitz (1740), that there has been no improvement thence. Only the use of skirmishers has been introduced more recently.

About the middle of the nineteenth century European infantry finally exchanged their muskets for rifles. Unlike the American rifle, the new gun was not a creation by the people, but was introduced by governmental order. In accordance with the technical


\(^{28}\) Crèvecoeur, quoted by Adams, *op. cit.*, 172.
developments of the period, all these rifles were breechloaders. Europe therefore has no historical tradition linked with the muzzle-loading rifle, but for the American people it is a symbol of its successful fight for political freedom. Perhaps this accounts in part for the persistent use of the muzzleloader into the early years of the Civil War.

In analyzing modern warfare the great technical developments in firearms have to be taken into consideration. In the twentieth century it is not possible to use the conceptions “shock tactics” and “missile tactics” with the same connotations that were justified before 1800. Artillery barrage and infantry fire was widely used throughout the First World War, nevertheless the final infantry assault did remain the decisive factor. That war was basically an European war, fought with European tactics. In the war which is being fought today the influence of American military thinking is much more obvious. It might be feasible to recognize the old American preference for using fire tactics and for placing individual responsibility on the smallest fighting unit in the precision bombing of our air force and in the tendency of our ground forces to dominate terrain with fire power instead of actually occupying it. On the other hand we might be justified in characterizing the German “Blitzkrieg technique” as shock tactics. The German Army spends little time on the rifle range. The tactical plans are based on superior fire power; accuracy of fire is of secondary importance. Thus to this day, one can observe some survival of contrasting European and American traditions in the use of firearms.

Carl Schurz Memorial Foundation

FELIX REICHMANN