

Glider assault on Eben Emael as an archetype for the future

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In the wee hours of the morning on May 10, 1940, a flight of 11 German Luftwaffe Ju-52 tri-motor transport planes clawed their way into the dark sky above Ostheim, Germany. Connected behind each transport plane by a towrope was a high-wing motorless aircraft loaded with highly trained paratroopers. These paratroopers turned glidermen would make the opening blow of Germany's plan to seize France via striking through Holland, Luxembourg, and Belgium. Slightly over the Dutch border, the tow planes released their gliders. Nine of the 11 gliders reached their objective. Even though they had trained for months for this attack, none of the glidermen knew their objective by name until they loaded their gliders that morning. In the morning nautical twilight, nine Luftwaffe gliders silently descended upon the Belgian fortress of Fort Eben Emael. Within 20 minutes of landing, the 70 German glidermen rendered Belgium's most modern fortress, garrisoned by more than 800 soldiers, useless. The breach in Belgium's line of defense opened by these glidermen paved an open road for the German panzers to Blitzkrieg into the heart of Belgium.

This event not only marked the end of the Phoney War, but was also the debut of gliders in combat. Gliders were not a new invention; some of the earliest attempts at human flight were made in gliders. At the dawn of World War II, however, the concept of teaming powered aircraft with gliders to deliver combat troops to a specific landing zone in large enough numbers to overwhelm enemy defenders was revolutionary. The western Allies did not pursue a military glider program until after the Germans' success at Eben Emael. However, the Allies quickly exploited and expanded on what they had learned from German glider use at the fort. The German glider assault was a textbook example of the use of surprise in a military assault and served as a template for subsequent airborne operations conducted by the Allies in World War II.

In the larger sense, the attack on Eben Emael was just one small part of the German Blitzkrieg in action. German General Heinz Guderian is credited with developing the Blitzkrieg concept. Guderian's concept revolved around three essential components: attacking enemy command and communications structures, infiltrating past major enemy troop concentrations, and the use of the two-way wireless radio to control friendly attacking traits, according to Len Deighton in his book *Blitzkrieg from the Rise of Hitler to the Fall of Dunkirk*. By examining the components, it is clear that the purpose was to defeat the enemy's command and control structure while avoiding the enemy's heavily defended areas. This left the enemy troops in the field without guidance from their headquarters and undermined their will to fight after being caught behind the German lines, facilitating their surrender. The key elements of speed, combined arms, and wireless communications in conjunction with each other were crucial for Blitzkrieg to be successful. The point of main attack, *Schwerpunkt*, sought out holes in the enemy's defense to maintain constant forward progress in the attack. Combined arms refers to the close coordination of infantry, tanks, combat engineers, artillery, and close air support attacking in concert while maximizing the strengths and

minimizing the weaknesses of each other. In the book *Blitzkrieg: In History, Strategy, Economics and the Challenge to America*, author S.L.A. Marshall highlighted that, "the prime mission of tanks and aviation is to shatter enemy resistance and open the road for the advance of the motorized mass." The breach created by armor and dive bombers would be exploited by motorized and foot infantry, who then take the battle to the enemy. The technological innovation of the wireless voice radio provided the glue that held the two other elements together. Deighton argued that, "Blitzkrieg could not exist without very close cooperation from all arms. In this respect, radiotelephony--transmitting speech, rather than Morse code--was the most crucial element in the new style of war." In a sense, without the radio there would have been no Blitzkrieg.

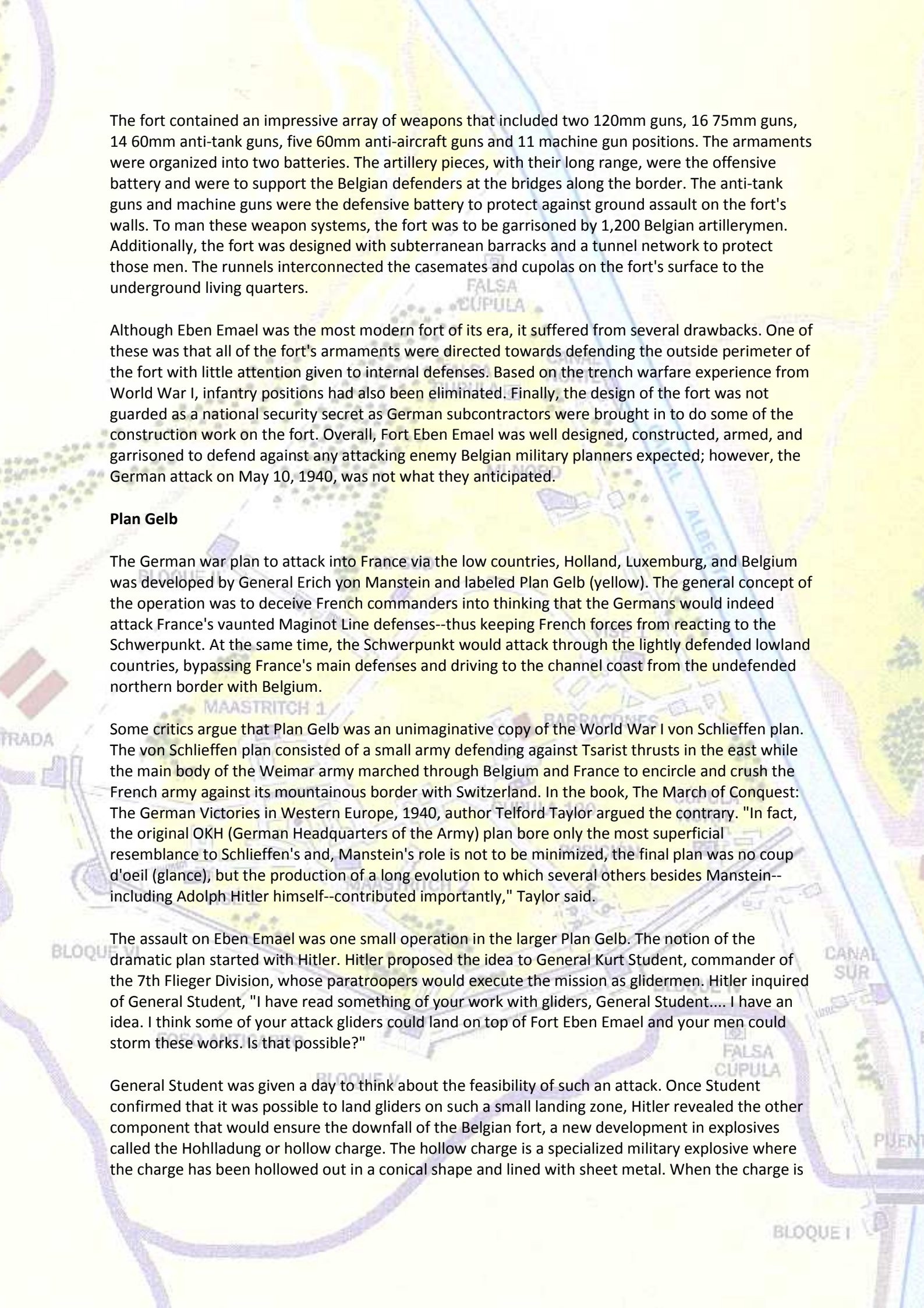
The inherent role of German paratroopers and glidermen made them an ideal force to support Blitzkrieg. These units were able to bypass enemy defenses by flying around them to seize key objectives from behind enemy lines. Two techniques governed the employment of airborne forces--the oil spot and airhead methods. The oil spot technique consisted of dropping small groups of paratroopers or glidermen over a wide area. The advantage to this method is that the enemy is not able to pinpoint the airborne troopers' main objective; however, these small groups could easily be defeated one by one with strong counterattacks. The airhead method consisted of dropping a large number of troops in one area. The strength of this technique is the airborne troops are massed, but this also telegraphed their main effort to the enemy.

The German glider program was a direct result of the harsh sanctions imposed upon Germany in the Treaty of Versailles following the end of World War I. One of the stipulations in the treaty prohibited Germany from having an air force, but did not forbid the development and flying of gliders. This loophole in the treaty gave Germany the ability to train pilots who could readily transition to powered aircraft, as well as sparking aeronautical innovations in powerless flight. One of the offspring from the civilian glider development was Germany's first military glider, the DFS-230. The DFS-230 was a high-wing monoplane, manned with one pilot and capable of transporting nine combat- equipped glidermen or 2,800 pounds of cargo. The development of the DFS-230 provided the Luftwaffe with the means to silently land combat troops on any designated landing zone with a high degree of accuracy.

As a result of the German invasion of Belgium in World War I, the Belgians developed a series of fixed fortresses and defensive lines to protect their neutrality. Fort Eben Emael was one of the new fortresses created to serve that purpose. There were several reasons for the fort's placement at Eben Emael, which included:

- * The construction of the Albert Canal created a ready made site for the fort;
- * The line of sight from the location overlooked the thin strip of Netherlands and deep into Germany; and
- * The site was along the same axis of advance the Germans used in World War I.

Eben Emael's artillery cannons were tasked with covering three bridges crossing the Albert Canal at the towns of Vroenhoven, Veltwezelt, and Canne, which could facilitate or deny any invasion. As historian James E. Mrazek stated in his book, *The Fall of Eben Emael; Prelude to Dunkerque*, "The artillery had to support the Belgian infantry which protected these bridges by preventing the enemy from getting close to or taking them. If the bridges fell to the enemy, the fort's artillery had to fire on and destroy the bridges."



The fort contained an impressive array of weapons that included two 120mm guns, 16 75mm guns, 14 60mm anti-tank guns, five 60mm anti-aircraft guns and 11 machine gun positions. The armaments were organized into two batteries. The artillery pieces, with their long range, were the offensive battery and were to support the Belgian defenders at the bridges along the border. The anti-tank guns and machine guns were the defensive battery to protect against ground assault on the fort's walls. To man these weapon systems, the fort was to be garrisoned by 1,200 Belgian artillerymen. Additionally, the fort was designed with subterranean barracks and a tunnel network to protect those men. The runnels interconnected the casemates and cupolas on the fort's surface to the underground living quarters.

Although Eben Emael was the most modern fort of its era, it suffered from several drawbacks. One of these was that all of the fort's armaments were directed towards defending the outside perimeter of the fort with little attention given to internal defenses. Based on the trench warfare experience from World War I, infantry positions had also been eliminated. Finally, the design of the fort was not guarded as a national security secret as German subcontractors were brought in to do some of the construction work on the fort. Overall, Fort Eben Emael was well designed, constructed, armed, and garrisoned to defend against any attacking enemy Belgian military planners expected; however, the German attack on May 10, 1940, was not what they anticipated.

Plan Gelb

The German war plan to attack into France via the low countries, Holland, Luxemburg, and Belgium was developed by General Erich von Manstein and labeled Plan Gelb (yellow). The general concept of the operation was to deceive French commanders into thinking that the Germans would indeed attack France's vaunted Maginot Line defenses--thus keeping French forces from reacting to the Schwerpunkt. At the same time, the Schwerpunkt would attack through the lightly defended lowland countries, bypassing France's main defenses and driving to the channel coast from the undefended northern border with Belgium.

Some critics argue that Plan Gelb was an unimaginative copy of the World War I von Schlieffen plan. The von Schlieffen plan consisted of a small army defending against Tsarist thrusts in the east while the main body of the Weimar army marched through Belgium and France to encircle and crush the French army against its mountainous border with Switzerland. In the book, *The March of Conquest: The German Victories in Western Europe, 1940*, author Telford Taylor argued the contrary. "In fact, the original OKH (German Headquarters of the Army) plan bore only the most superficial resemblance to Schlieffen's and, Manstein's role is not to be minimized, the final plan was no coup d'oeil (glance), but the production of a long evolution to which several others besides Manstein--including Adolph Hitler himself--contributed importantly," Taylor said.

The assault on Eben Emael was one small operation in the larger Plan Gelb. The notion of the dramatic plan started with Hitler. Hitler proposed the idea to General Kurt Student, commander of the 7th Fliieger Division, whose paratroopers would execute the mission as glidermen. Hitler inquired of General Student, "I have read something of your work with gliders, General Student.... I have an idea. I think some of your attack gliders could land on top of Fort Eben Emael and your men could storm these works. Is that possible?"

General Student was given a day to think about the feasibility of such an attack. Once Student confirmed that it was possible to land gliders on such a small landing zone, Hitler revealed the other component that would ensure the downfall of the Belgian fort, a new development in explosives called the Hohlladung or hollow charge. The hollow charge is a specialized military explosive where the charge has been hollowed out in a conical shape and lined with sheet metal. When the charge is

detonated, the explosion directs the metal liner and the majority of the force inwards. This creates a directed jet of high velocity molten steel and explosive force that is able to penetrate hardened steel or reinforced concrete. Military explosives prior to the development of the hollow charge lacked the ability to deeply penetrate steel and fortified positions.

Student also had to war game between the use of dropping paratroopers and the use of the untried glider in combat. Both means of delivering troops to the objective had advantages and disadvantages that were carefully weighed. One can assume that the silent approach of the glider, teamed with the fact that glidermen were able to unload from the glider ready to fight, were the decisive factors in Student's selection of using gliders.

Student assigned the task to a company of paratroopers reinforced with a platoon of engineers under the command of Hauptmann (Captain) S. A. Koch, forming Sturmabteilung (Storm Detachment) Koch. Hauptmann Koch received his orders November 3, 1939, "direct(ing) him to accomplish three tasks. First, by surprise glider landings, to capture the bridges of Vroenhoven, Veltwezelt, and Canne intact. Second, to destroy with explosives the artillery and works of Fort Eben Emael and, third, to hold his positions at the bridges and the fort until the arrival of German ground forces who were to relieve Koch's units," according to Mrazek. Since it was necessary to attack four different objectives within a seven-mile stretch along the Albert Canal, Koch's company would have to operate as independent platoons.

To accomplish his mission, Koch task organized his Sturmabteilung into four different assault groups, giving a name to each. He tasked Lieutenant Gerhard Schacht, the leader of "Concrete" to seize the bridge at Vroenhoven with 96 men. Next, he tasked Lieutenant Gustav Altmann to seize the Veltwezelt bridge with 92 soldiers called "Steel." Then, Lieutenant Martin Schaechter was chosen to seize the bridge at Canne with force "Iron." The final group, Lieutenant Rudolf Witzig's engineer platoon, was named "Granite." This platoon was composed of 85 men and received the mission of destroying Fort Eben Emael's offensive weapons. Success could only be obtained if the fort's weapons were destroyed and at least one of the three bridges was secured intact. Successfully capturing the bridges if the fort remained in Belgian hands would not be sufficient because they could rain artillery fire down on the bridges. In this manner, Sturmabteilung Koch's objectives were interdependent on each other.

The assault groups had more than six months to prepare for the mission. The long duration created a pressing need to keep the operation a secret. Keeping the name of the objective secret from the glidermen until hours before executing the mission was one measure taken to ensure operational security. Only Koch and the platoon leaders were informed their objective was Fort Eben Emael in the planning and training stage. Each gliderman also signed a pact of secrecy stating he risked death if he spoke of his assignment. Another extreme security measure was to conceal the movement of the gliders from their training base at Hildesheim to their final departure airfield at Ostheim. The gliders were disassembled, transported in covered furniture trucks, unloaded mid assembled under a smokescreen created by smoke generators, which the local papers reported as an engineer unit training to protect Dusseldorf from air raids. These security measures underline the strategic importance of the seizure of Eben Emael and the need to keep the method of delivery secret.

As the glider training started, Koch noted two recurring problems with the gliders and their pilots. The Luftwaffe glider pilots' lack of skill was reflected in their performance by overshooting their landing targets, in order to rectify the training deficiency, Deutsche Forschungsanstalt Fuer Segelflug (DFS), the company that developed and built the DFS-230, sent two veteran glider pilots to train Koch's rookie pilots. Mrazek stated, "This eventually led to many a bewildered sport-glider champion receiving a polite invitation from the Luftwaffe to "volunteer" his services for a "delicate" mission."

These "drafted" glider pilots were integrated into the Sturmabteilung Koch and flew the combat mission.

The other problem with the gliders resulted from conducting practice landings on surfaces identical to the surface on top of Eben Emael. The landing skid on the DFS-230 failed to produce enough friction to slow the gliders down in an acceptable distance. The pilots improvised by wrapping barbed wire around the landing skid, but this still did not shorten the landing distance. DFS was contacted to develop a braking system. After addressing these two issues, the glider component of the operation was ready for action.

The training of Granite was thorough and built on the basic skills of the combat engineer. Rehearsal areas were set up in the surrounding area of Hildesheim that outlined the exact dimensions of the fortifications atop Eben Emael. Once they mastered the general scheme of maneuver, the squads needed real fortifications to train on. Hauptmann Koch had the perfect solution; the Benes line in the German Sudetenland gave the glidermen similar fixed fortifications to develop techniques and procedures to reduce the hardened gun emplacements. The glidermen trained on attacking casemates and cupolas with flamethrowers, bangalore torpedoes, standard demolition charges, and small arms. The only weapon they did not train with was the hollow charge, since this new explosive was also used as the detonator for Germany's atomic bomb. Since it was a closely guarded state secret, Lieutenant Witzig was the only man to see a demonstration of the charge before the mission.

The Attack

On May 9, 1940, at 2130 hours Granite received their orders to execute the mission. At this point the men were finally informed of the name and location of the objective they had trained six months to attack. At 0300 hours, the glidermen loaded into the awaiting DFS-230s. By 0335 hours, the eleventh glider of Granite, Lieutenant Witzig's group, was pulled into the air by the Ju-52 transport plane for the 50-minute ride to the release point in the vicinity of Aachen. Two of the 11 gliders, one of which was Lieutenant Witzig's glider, experienced mishaps requiring them to cut loose from their tow aircraft short of the release point. Mrazek said, "The force, small to begin with, had shrunk to 70 men, 80 percent of it(s) combat power. Ironically, a shot had yet to be fired." Even though the Belgians had even been alerted of German movement along the Dutch border at 0030 hours and the presence of a large formation of aircraft to the northwest of Maastricht at 0410 hours, the appearance of the silent aircraft still took them by surprise. The anti-aircraft emplacement on the fort opened fire as the first glider landed on the fort at 0425 hours. The Belgian anti-aircraft gunners managed to hit six of the nine incoming gliders, but they were quickly overcome by glidermen pouring out of the landing gliders.

The actions on the objective by each squad of the Granite assault force are essentially carbon copies of each other. Although each squad had a different assault objective, each target was reduced in the same general manner. The gliders, one by one, in rapid succession landed on the small surface of the fortress. The majority of the seasoned glider pilots landed their gliders within 20 to 50 meters of their intended targets. The ready-to-fight glidermen disgorged from the gliders and charged toward their assigned casemate or cupola, dragging with them the 50-pound hollow charges.

Once at the casemate, two men assembled the two halves of the charge and placed the charge on the casemate. Then they ignited the demolition fuse and sought whatever cover they could find to avoid the secondary fragments from the exploding charge. After detonation, the squad inspected the damage and if necessary reengaged the casemate with another charge to render the fort's offensive weapons useless. Some squads entered the damaged weapons emplacements to kill the Belgian defenders or force them deep inside the fort. From there the squads attacked secondary targets and,

if needed, attacked objectives of missing squads. Once that was completed, the glidermen assumed hasty defensive positions to defeat any counterattacks by the Belgian soldiers in the fort.

Within 20 minutes of landing, all of the critical offensive weapons of Fort Eben Emael were rendered inoperable; however, this did not mean that there was no longer a threat from the fort or from outside Belgian reinforcements. The Belgian commander, Major Jean Fritz Lucien Jottrand, called for other Belgian units to fire artillery on his fort to kill the German glidermen, which caused havoc on the fort's surface. The incoming fire caused the glidermen to seek cover in the knocked out casemates. The results of the long, hard training paid off as Sergeant Wenzel automatically assumed command in Lieutenant Witzig's absence. He directed other squads to attack remaining targets, organized a hasty defense, and reported the mission's status to Hauptmann Koch. He also directed airstrikes from Stuka dive bombers against reinforcing Belgian units. With extraordinary determination, Lieutenant Witzig was able to commandeer another tow aircraft to recover his glider outside of Cologne after his tow rope broke enroute to the fort; at around 0630 hours Witzig's glider finally landed inside Eben Emael.

The plan called for 'Granite' to destroy the fort's offensive batteries and hold the fort for four hours until relieved by the troops of 4th Armored Infantry Division. Dutch and Belgian resistance delayed the battle handover until May 11 at 0830 hours though--24 hours later than planned. During this prolonged stay on the fort, the glidermen parried multiple counterattacks and managed to keep the Belgian artillerymen contained within the subterranean confines of the fort, as well as keep reinforcing Belgian units at bay from the fort by using air strikes. A total of 78 German glidermen landed on the fort and forced the capitulation of the Belgian garrison of 780 men in the world's strongest fort at a cost of four Germans killed and 12 wounded. Two elements provided the key to success: the combat glider and the hollow charge. Without either of these elements the seizure of Eben Emael would have cost much more in human lives and altered the attack routes and time schedule of Plan Gelb.

Perhaps the success at Fort Eben Emael set a false precedent for the Germans. A year later, the Germans took another huge gamble of sending a large-scale airborne invasion of the island of Crete. "Although 15,000 German airborne troops defeated a force almost three times their number, the Germans lost 5,000 killed and wounded and a large number of aircraft," Mzarek said. This bittersweet victory caused a drastic curtailment of glider and parachute operations. Granted, some glider operations continued such as the rescue of Benito Mussolini at Gran Sasso and emergency resupply operations in Russia, North Africa, and Eastern Europe towards the end of the war, but the Germans never attempted another large-scale glider and parachute attack.

U.S. Glider Development

The highly successful German operation did not go unnoticed by the Western Allies; both Great Britain and the United States did not have a military glider program when Sturmabteilung Koch attacked Eben Emael in 1940. Nonetheless, the Allies learned much from the German assault. One of these lessons was the success of vertical envelopment. Instead of the traditional method of searching for an assailable flank by ground maneuver, aircraft and gliders were used to deliver men, weapons, and equipment from above, opening a new dimension to ground commanders. Second, gliders surprised, shocked, and stunned defenders which gave the glidermen a temporary advantage to overwhelm defenders.

The Allies saw there were limits to glider operations, but a combination of paratroopers and equipment- laden gliders would prove to be highly successful. Next, the Allies built upon the concept of combining airborne forces to seize key objectives and terrain to pave a corridor for follow-on

ground forces. The western Allies mastered this concept on both large-scale invasions and small-scale commando missions. The final lesson was the importance of mission rehearsal exercises. Intensive preparation combined with good intelligence of the objective yielded a higher probability of mission accomplishment. The Allies built upon these lessons to produce a glider program that dwarfed the pioneering German one.

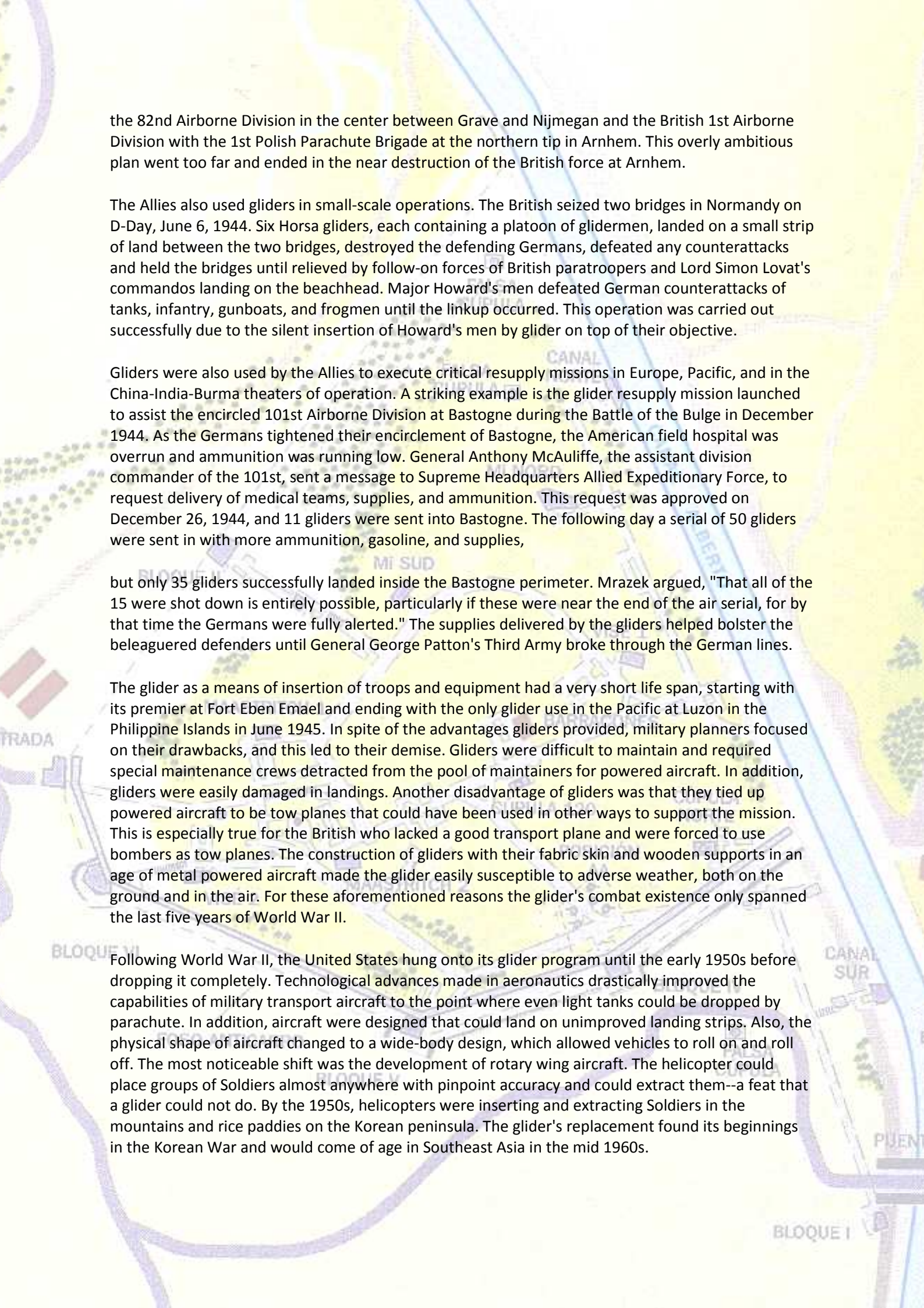
The United States was reluctant to explore the possibilities of using gliders. However, American intelligence agents took close notice of German gliders. A War Department intelligence report dated February 3, 1941, mentioned the sighting of German gliders: "While flying recently at Rangsdorf, near Berlin, an American official observer saw three gliders on the ground, each hitched behind a Ju-52 airplane. The gliders were towed into the air, but they did not return to Rangsdorf, nor were they to be found two days later." The official gave an accurate description of a DFS-230 to which an intelligence officer added, "There has been numerous reports of the manufacture of troop carrying gliders in Germany ... This report, however, was the first in which an American official observer stated that he saw military gliders." Finally, under the direction of General Henry 'Hap' Arnold in 1941, the United States glider program was born.

By late 1944, the American glider fleet totaled more than 10,500 military gliders. To meet the pressing needs of production, gliders and their subassemblies were produced by a wide variety of manufacturers ranging from Ford Motor Company and piano companies to casket factories. The mainstay of the U.S. glider fleet was the Waco Aircraft Company's CG-4A. The CG-4A was constructed of a metal and wood frame covered with fabric, manned by a crew of two and with an allowable cargo load of 3,750 pounds, allowing it to carry 13 combat-equipped troops or a jeep or small artillery piece. The British equivalent, the Airspeed Horsa, was about twice as large in size and payload as its American counterpart. These gliders were used to take the fight to the Axis.

Allied Glider Operations in WWII

The Allies expanded the concept the Germans used at Eben Emael tenfold. Large-scale glider and paratroop drops were used several times during Operation Overlord, the invasion of Normandy; Operation Dragoon, the invasion of southern France; Operation Market Garden, deep penetration into Holland; and Operation Varsity, crossing the Rhine River into Germany. Each of these operations entailed a massive movement of troops and equipment via gliders that made the glider attack on Eben Emael pale in comparison.

The largest of all these operations was Market Garden, launched on September 17, 1944. British Field Marshal Montgomery developed the plan for the operation. The general concept was to lay a corridor of paratroopers and glidermen along a 60-mile stretch of Holland to secure key bridges ending just across the northern end of the Rhine River. The British XXX Corps, armored component, would punch through the German frontlines and link up with the three Allied Airborne Divisions in Holland, crossing the bridges seized by the airborne troopers. From the northern terminus in Arnhem, Allied forces would be poised to strike deep into Germany's industrial heartland, hopefully bringing an early end to the war. Mrazek highlighted the scope of the operation: "Operation 'Market' was an airborne operation of unprecedented magnitude. A total of 34,876 troops had gone into battle by air--13,781 by gliders, 20,190 by parachute, and 905 by aeroplane on a prepared landing strip. Gliders brought in 1,689 vehicles, 290 howitzers and 1,259 tons of ammunition and other supplies." The original plan for the operation required three consecutive days of good weather to deliver all of the gliders and paratroopers to their intended landing and drop zones. Out of the 2,596 British and American gliders dispatched for Operation Market, 2,239 gliders were effective and delivered men and equipment to their designated landing zones. A corps worth of troops starting with the 101st Airborne Division in the southern sector stretched from Eindhoven to Uden to meet



the 82nd Airborne Division in the center between Grave and Nijmegen and the British 1st Airborne Division with the 1st Polish Parachute Brigade at the northern tip in Arnhem. This overly ambitious plan went too far and ended in the near destruction of the British force at Arnhem.

The Allies also used gliders in small-scale operations. The British seized two bridges in Normandy on D-Day, June 6, 1944. Six Horsa gliders, each containing a platoon of glidermen, landed on a small strip of land between the two bridges, destroyed the defending Germans, defeated any counterattacks and held the bridges until relieved by follow-on forces of British paratroopers and Lord Simon Lovat's commandos landing on the beachhead. Major Howard's men defeated German counterattacks of tanks, infantry, gunboats, and frogmen until the linkup occurred. This operation was carried out successfully due to the silent insertion of Howard's men by glider on top of their objective.

Gliders were also used by the Allies to execute critical resupply missions in Europe, Pacific, and in the China-India-Burma theaters of operation. A striking example is the glider resupply mission launched to assist the encircled 101st Airborne Division at Bastogne during the Battle of the Bulge in December 1944. As the Germans tightened their encirclement of Bastogne, the American field hospital was overrun and ammunition was running low. General Anthony McAuliffe, the assistant division commander of the 101st, sent a message to Supreme Headquarters Allied Expeditionary Force, to request delivery of medical teams, supplies, and ammunition. This request was approved on December 26, 1944, and 11 gliders were sent into Bastogne. The following day a serial of 50 gliders were sent in with more ammunition, gasoline, and supplies,

but only 35 gliders successfully landed inside the Bastogne perimeter. Mrazek argued, "That all of the 15 were shot down is entirely possible, particularly if these were near the end of the air serial, for by that time the Germans were fully alerted." The supplies delivered by the gliders helped bolster the beleaguered defenders until General George Patton's Third Army broke through the German lines.

The glider as a means of insertion of troops and equipment had a very short life span, starting with its premier at Fort Eben Emael and ending with the only glider use in the Pacific at Luzon in the Philippine Islands in June 1945. In spite of the advantages gliders provided, military planners focused on their drawbacks, and this led to their demise. Gliders were difficult to maintain and required special maintenance crews detracted from the pool of maintainers for powered aircraft. In addition, gliders were easily damaged in landings. Another disadvantage of gliders was that they tied up powered aircraft to be tow planes that could have been used in other ways to support the mission. This is especially true for the British who lacked a good transport plane and were forced to use bombers as tow planes. The construction of gliders with their fabric skin and wooden supports in an age of metal powered aircraft made the glider easily susceptible to adverse weather, both on the ground and in the air. For these aforementioned reasons the glider's combat existence only spanned the last five years of World War II.

Following World War II, the United States hung onto its glider program until the early 1950s before dropping it completely. Technological advances made in aeronautics drastically improved the capabilities of military transport aircraft to the point where even light tanks could be dropped by parachute. In addition, aircraft were designed that could land on unimproved landing strips. Also, the physical shape of aircraft changed to a wide-body design, which allowed vehicles to roll on and roll off. The most noticeable shift was the development of rotary wing aircraft. The helicopter could place groups of Soldiers almost anywhere with pinpoint accuracy and could extract them--a feat that a glider could not do. By the 1950s, helicopters were inserting and extracting Soldiers in the mountains and rice paddies on the Korean peninsula. The glider's replacement found its beginnings in the Korean War and would come of age in Southeast Asia in the mid 1960s.

However, the mission template established by the German glider seizure of Eben Emael would be echoed throughout the decades. The attempt to free American prisoners of war in November 1970 in North Vietnam is a good example. The plan, under the command of Colonel Arthur 'Bull' Simons, was to take a small group of Special Forces Soldiers via helicopters from Laos into the Son Tay prison site, 23 miles from Hanoi, and rescue the POWs. Colonel Simons used the same detailed level of training and rehearsals for Son Tay that Lieutenant Witzig employed for Eben Emael. In order to train the raiders, an exact replica of the prison was constructed at Eglin Air Force Base in Florida where they rehearsed every aspect of the raid. A part of the plan included crash landing a helicopter inside of the prison walls to stun and shock the North Vietnamese soldiers so the raiders could rescue the prisoners before the guards started killing them. However, when the raid was executed on November 21, 1970, the prisoners had unfortunately been moved to a different prison site, but the well-rehearsed plan was executed flawlessly in only 27 minutes.

Not only was the assault on Eben Emael the debut of the combat glider, but it also set a precedent for all glider operations conducted in World War II and in the decades that followed. German military exploitation of the glider, which was caused by the restrictions imposed upon Germany following World War I, ironically provided military leaders with a unique insertion method that capitalized on the silence of the motorless aircraft. Additionally, glider insertion of troops behind enemy lines fit in well with Guderian's concept of Blitzkrieg. The detailed planning based on sound intelligence, months of full scale mission rehearsals, and extreme security measures combined with the revolutionary use of the silent glider and the powerful hollow charge made possible assault force 'Granite's' success in reducing Eben Emael's defenses. Although the United States and Great Britain initially lacked military glider programs, they learned from the German success at Eben Emael and quickly developed programs that dwarfed Germany's pioneering program. The prominence of gliders may have fallen as quickly it rose, but the sound principals in training and execution on the objective demonstrated by Lieutenant Witzig's platoon on Eben Emael established a timeless template for other military units to emulate throughout the ages.

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