REGRESSING FORWARD: ARMY ADAPTABILITY AND ANIMAL POWER DURING WORLD WAR II

by

JASON C. MARTIN

B.A., Trinity University, 1988
M.A., University of Central Arkansas, 1995

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of History
College of Arts and Sciences

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Abstract

America forged a successful way of war that relied on adaptation, and this trait was not simply an adjunct to industrial might as a reason why the Allies won World War II. An American penchant for organization and corporate management allowed for mass production of war material, which clearly contributed to Axis defeat. However, to claim that the Axis Powers were merely overwhelmed by an avalanche of weapons and supply is reductionist.

This dissertation contends that adaptability was as much an American way of war as mass production and overwhelming firepower. The particular nature of American adaptability and its contribution to Allied victory are exhibited in the Army's use of animal power during a conflict synonymous with mechanized warfare and advanced technology. The application of pre-modern technology in a modern, machine-driven war was not archaic. On the contrary, the nature of American adaptability allowed the Army to move forward by retreating down a culturally constructed hierarchy of modernity and employing the traditional mode of animal transportation. The Army's technological regression from motors to mules in North Africa, the Mediterranean, and China-Burma-India during World War II is the focus of this work.

Americans possessed material abundance in campaigns across Western Europe and the Central Pacific in 1944 and 1945, as German and Japanese prisoners attested. Mountains of artillery shells, fuel, and food, however, did not exist in the backwater "sideshows." American military success on the periphery was not due to material abundance, nor to a greater sense of determination. America won the backwater campaigns because the nature of American adaptability was cultivated over the centuries and converted from a way of life to an American way of war.

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The number of Americans holding a PhD is around one to three percent of the population. The small number is no surprise to anyone enrolling in a PhD program, much less to the fraction who eventually earns the degree. They are painfully aware that it is a grueling, solitary process. One reaches the PhD milestone on their own, yet the load is often shared and those who bore the burden during my academic odyssey deserve recognition and thanks.

I earned my M.A. from the University of Central Arkansas. I taught night classes at this fine institution for nearly a decade, during which time I explored enrollment opportunities in doctoral programs. My professors and colleagues provided plenty of advice. Don Jones, Gene Corcoran, and Ken Barnes were encouraging. Harry Readnour was more reserved and sometimes disheartening as he portrayed realistic expectations, but tireless in his support once I committed to a program. I am also grateful to my employers at Pulaski Technical College for granting me a one year leave of absence while I fulfilled my residency requirement at Kansas State University. It was a load off of my mind to have job security while I was gone.

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dissertation committee late in the process. My dissertation committee included David Stone, Sue Zschoche, Jim Coffman, and Heather McCrea, and I owe them a great debt of gratitude. I met all deadlines, graduated on schedule, and produced a respectable manuscript because of their diligence and hard work.

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eventually became my wife, my biggest fan, and greatest source of inspiration. It took a fierce personal commitment to finish my PhD, but Amanda is the main reason I never gave up.

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A number of CBI veterans were interviewed for this work. Most were confident that they tied down legions of Japanese troops, and thus, eased the burden for Marines and soldiers advancing across the Central and South Pacific. I am less convinced of this argument, even after spending a significant amount of time with and developing a deep sense of awe for those who fought in CBI. I am certain, however, of their remarkable ability to endure unimaginable privation, constantly adapt, and triumph in one of the war's most inhospitable environments. Several of the CBI veterans became my friends, including Lloyd Hackenberg, Buck Cureton, Paul Yardley, and Pete Ewing. Their serene nature and willingness to visit with me about mules in the Army was as moving as it was helpful to my research. I became the closest with Hank Kinder and consider his friendship most dear. Sadly, Hank Kinder died in March 2012. It is to all of the veterans of Operation *Galahad* and the Mars Task Force that I dedicate this work.

Introduction

A Biblical story states that Samson found a jawbone of an ass, took it, and slew his Philistine enemies, or as Samson declared, "*Heaps upon heaps, with the jaw of an ass have I slain a thousand men.*" Samson fashioned himself a handy weapon, and in dramatic fashion killed his opponents. Three thousand years later, men continue improvising weapons, still utilize the venerable ass, and persist in slaying "heaps upon heaps" of men. History is rife with examples of weapons development and military innovation, regardless of the time, place, or people. America certainly contributed to the long history of battlefield evolution, and the particular nature of American adaptability was especially evident during World War II.

America forged a successful way of war that relied on adaptation, and this trait was not simply an adjunct to industrial might as a reason why the Allies won World War II. True, an American penchant for organization and corporate management allowed for mass production of war material, which clearly contributed to Axis defeat. However, to claim that the Axis Powers were merely overwhelmed by an avalanche of weapons and supply is reductionist. The ability to adapt was an equal partner to mass quantities of war material, superior firepower, and, "brute force" utilized by America to help destroy the Axis during World War II.[1]

This dissertation contends that adaptability was as much an American way of war as mass production and overwhelming firepower. The nature of American adaptability and its contribution to Allied victory are exhibited in the Army's use of animal power during a conflict

[1] John Ellis, *Brute Force: Allied Strategy and Tactics in the Second World War*, (New York: Viking), 1990. Ellis argues that the Allies, particularly the Americans, lacked martial finesse and simply bludgeoned the Axis into submission with overwhelming industrial output. A more nuanced counter argument is found in Richard Overy, *Why the Allies Won*, (New York, W.W. Norton), 1996; see also Gerhard Weinberg, *A World at Arms: A Global History of World War II*, (New York: Cambridge University Press), 1994.

synonymous with mechanized warfare and advanced technology. The application of pre-modern technology in a modern, machine-driven war was not archaic. On the contrary, the nature of American adaptability allowed the Army to move forward by retreating down a culturally constructed hierarchy of modernity and employing the traditional mode of animal transportation. The Army's technological regression from motors to mules is the focus of this work.

A recent Army study defined adaptability as "an effective change in response to an altered situation." A veterinary science course defined adaptability as "the problem-solving aspect of survival."[2] Both definitions are applicable in the study of adaptability and an American way of war. During World War II, the U.S. Army effectively changed their mode of supply in theaters where motor transport failed by moving much needed supplies with animal transport. The process of making these changes to survive and successfully prosecute war in theaters with forbidding terrain and primitive infrastructure are presented in subsequent chapters.

Adaptability is hardly unique to America. All nations exhibit adaptive traits as a matter of survival. However, at the risk of stating the obvious, nations adapt differently and American adaptability during World War II was unique. First, U.S. material prosperity influenced adaptability compared to other nations. An overabundance of resources and mass production of material allowed America the luxury of technological advances not shared by most countries. Germany, for example, employed over 750,000 horses and mules to transport supplies during the invasion of Russia because the German military relied on animal power in 1941, and never developed a fully motorized transport system during the war. The U.S. Army, on the other hand,

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[2] Rose A. Mueller-Hanson, Susan S. White, David W. Dorsey, and Elaine D. Pulakos. Research Report 1844, *Training Adaptable Leaders: Lessons from Research and Practice*, (Arlington, VA: U.S. Army Research Institute, 2005), v; See also Dr. James R. Coffman, "The Horse as a Window to the World," Course Number ASI 330, Kansas State University, Spring 2005.

was fully motorized and rapidly becoming completely mechanized when war began, which was a process that required widespread adjustments. The nature of U.S. Army adaptability was greatly affected by America's material prosperity.[3]

American adaptability also differed because of its flexibility in theaters with challenging terrain. One of the major flaws in Germany's invasion of Russia was their lack of resources to modernize fully; Germany depended on animal-powered transport, the result of which was supply deficiencies. By way of comparison, in the rugged theaters of North Africa, the Mediterranean, and CBI, America's motorized military adapted by deploying animal power thus contributing to overall Allied success. Material abundance was seldom a concern in these peripheral areas. Equally important to mountains of material was the ability to adjust, particularly when supplies were scarce and only mountains existed. The Army's use of beasts of burden constituted an innovative and creative method of labor that made the U.S. military more adaptable and thus superior to its enemies in certain theaters during World War II.

Adaptability is a characteristic often overlooked as a major contribution to Allied victory because it is overshadowed by staggering industrial output. Adaptability occurred at all levels of the U.S. military, including the strategic and tactical. American war planners made the strategic decision to defeat Germany first prior to formal U.S. involvement. The dedication to the Germany first strategic goal was steadfast. Yet, the fluid nature of prosecuting a global war involved serious adjustments. For example, the number of troops and material sent to fight Japan in the South Pacific far surpassed those sent to Europe at the end of 1942. Even though

[3] Janusz Piekalkiewicz, *The Cavalry, 1939-1945*, (Harrisburg, PA: Historical Times, Inc., 1997), 43; Klaus Christian Richter, *Cavalry of the Wehrmacht*, (Atlgen, PA: Schiffer Military History, 1995); Mark C. Yerger, *Riding East: The SS Cavalry Brigade in Poland and Russia*, (Atglen, PA: Schiffer Military History,1996).

America was devoted to Germany first, the strategic necessity of stopping Japan temporarily put mobilization efforts intended for Europe on hold.[4]

Another example of upper echelon adaptability was the strategic decision for a cross-channel invasion of Western Europe. American war planners, notably George C. Marshall and Dwight D. Eisenhower, pushed hard for an early, rapid build-up of U.S. forces in Great Britain for the anticipated invasion of mainland Europe, preferably France. In a controversial decision, President Roosevelt demonstrated operational flexibility and opted for an invasion of North Africa instead.[5]

Nowhere is the American knack for innovation and adaptability more evident than in the mundane tasks of logistics. American military doctrine in twentieth century placed a premium on massive firepower, resulting in unbelievable expenditures of ammunition. The result was a great strain on logistics. American factories produced ammunition in large quantities, but getting it to forces in the field was another problem.

The U.S. Army hoped to ameliorate transportation setbacks with technology, particularly motor transport. In the interwar years (1919-1941), the Army evolved from animal power to an almost completely motorized force. Prewar maneuvers and operational plans counted on American troops riding into battle, supplied by a steady stream of motor transport. The harsh reality of combat operations in remote, undeveloped locations proved these peace-time notions were misguided.

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[4] Maurice Matloff, *American Military History,* (Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1969), 435-440.

[5] For a recent work on America's decision to invade North Africa and the Mediterranean, see Joseph E. Perisco, "Did Roosevelt Doom Us to a Longer War?" *Military History Quarterly* Spring 2012, Volume 24, No. 3, pp 74-79.

The Army's first forays into combat were in areas with non-existent roads and impassable terrain, causing a temporary break in the supply chain. A solution was found after the Army improvised, regressing to the more basic form of animal-powered transportation. Army mules, which had been replaced by truck transportation before the war, were hastily reinstated, and the flow of supplies resumed. The Army's decision to regress technologically to animal powered supply can be easily overlooked. Logistics lacks glamour and if logistics is actually pondered, then fleets of tanks, planes, and trucks are simply more impressive than pack mules. The effect of American mass production on the war effort cannot be discounted, and the Army's use of several thousand mules did not determine the war's outcome. Yet, the Army's decision to use mules is noteworthy because it demonstrates an adaptive quality that was as essential to victory as material or technological superiority.[6]

The Army of 1942 was almost fully motorized and rapidly becoming mechanized, so it seems paradoxical that a technologically advancing Army reverted to animal power for some of its supply transportation requirements. However, the technologically regressive application of animal power was hardly illogical, but rather demonstrated flexibility in the face of challenging conditions. Necessity was not exactly the mother of invention, but it certainly required adopting proven if "obsolescent" methods, an extraordinarily surprising response from an institution not often associated with visionaries.[7]

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[6] Everett B. Miller, *United States Army Veterinary Service in World War II,* (Washington, D.C.: Office of the Surgeon General, Department of the Army, 1961), ix. Hereafter cited as Miller, *AVS in WWII*. Approximately 60,000 mules were procured or requisitioned, and around 16,000 shipped overseas. An unknown number of animals were requisitioned in theater, but AVS estimates are in the thousands.

[7] Army struggles with modernization are well documented by Williamson Murray and Allan R. Millett, *Military Innovation in the Interwar Period*, (NY: Cambridge University Press, 1998); David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917-1945*, (Ithaca, NY: Cornell University Press, 2003); and Matthew D. Norton, *Men on Iron Ponies: The Death and Rebirth of the Modern U.S. Cavalry*, (Dekalb, IL: Northern Illinois University Press, 2009).

The theaters in which the Army used animal transportation were devoid of an infrastructure system for supporting large motorized and mechanized forces. Likewise, many American war planners questioned the value of war on the perimeter, preferring instead for a direct assault against Germany and Japan. Consequently, resources for American forces operating in North Africa, the Mediterranean, and China-Burma-India (CBI) were always in short supply. Material scarcity generated creativity and ingenuity that allowed American troops to defeat opponents, and do so occasionally using superior firepower, but the Army never operated with abundance in these theaters.[8]

Victory over the Axis involved the use of "brute force," but this was hardly the sole source of triumph. Whether lavished with supplies, as in West Europe, or receiving lower priority in the backwaters of North Africa, Italy, or CBI, the Army continuously adjusted. Mass mobilization and mass production were crucial because they created the sledgehammer with which the Allies crushed the Axis. The main factor for Allied victory, however, was the legions of competent individuals determined to carry and swing that hammer, often doing so in the most spartan environments.

Cases of adaptability abound in all branches of service, particularly in the unglamorous realm of logistics. A prime example was the floating dry docks, an enormous, and enormously consequential, innovation. Floating dry docks were not warships, but primarily served a logistical purpose and, thus these peculiar vessels are largely overlooked in most accounts of the

[8] A detailed explanation of "motorization" (usually associated with supply transportation) and "mechanization" (usually associated with armor and armored fighting vehicles) is included in Chapter 1. For a theater-specific examination of Army adaptability in the austere environment of CBI see James Ehrmann, "Ways of War and the American Experience in the China-Burma-India Theater, 1942-1945," (Unpublished Dissertation, Kansas State University, 2006).

naval war.[9] The Navy had long realized that some method of ship repair was required for operating at great distances from home port facilities. Ship damage and wear were inevitable, and returning to base for repairs was often impractical if not impossible. But the Navy brought port facilities closer to the combat areas with the floating dry dock. Floating docks were not new, as some were in use as early as 1900, but the early dry docks lacked mobility. Most were built in large pieces, then moved piece-meal and re-assembled at a final destination where the docks remained a permanent fixture. The Bureau of Yards and Docks conducted studies during the 1920s and 1930s to develop a truly mobile floating dry dock, that is, a movable repair facility.

In 1933, the Bureau built ARD-1 (Auxiliary Repair Dock), a dry dock that revolutionized mobile port facilities. The U-shaped ARD-1 was a hull with a closed bow (front) and an open stern (rear). A bottom-hinged flap gate could open and close the stern, allowing ships needing repair to enter into the submerged dock. The dock was raised by pumping water from ballast compartments and the main basin. The ARD-1 was equipped with a diesel-driven electric power plant, a pumping plant, numerous repair shops, and living quarters for the crew. The ARD-1 was the first dry dock that was largely self-sustaining and capable of accompanying a fleet anywhere. The Bureau deployed some thirty ARD-class docks from 1942-1945, with each dock improved by the incorporation of war-time experience. [10]

The Pacific war heightened the Navy's urgent need for dry docks, particularly mobile dry docks capable of serving the largest classes of warship. ARD-class docks possessed mobility but

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[9] U.S. Bureau of Yards and Docks, *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946*, Volume 1, Part II, The Continental Bases, Chapter 9, Floating Drydocks, Washington, D.C.: Government Printing Office (1947), 209-226.

[10] Ibid., 209.

lacked lift capacity, and all efforts to enlarge them were unsuccessful. Construction of such a massive structure required an enormous basin in which to build the behemoth. Towing a vessel of this size presented a multitude of problems, including protection against storms and enemy attacks. The solution was a dry dock of sectional design, or the Advance Base Sectional Dock (ABSD). The ABSD had ten sections. Each section consisted of a bottom pontoon and two wing walls. Navy construction crews placed each section transversely atop 50-foot outrigger platforms and, when assembled, the dock measured 927 feet long and 256 feet wide and had a lift capacity of 90,000 tons.

The construction, transportation, and deployment of an ABSD were monumental tasks involving several complicated steps, some of which themselves required further only ingenuity. For example, the two wing walls of an ABSD section were upright, but the walls were hinged at the bottom so that they could be folded inboard. This reduced wind resistance and lowered the center of gravity, both measures crucial for towing in rough seas. Navy construction crews raised the walls into the normal position upon arrival at the advanced base.[11]

Raising the wing walls was no mean feat. Each wall was 20 feet wide and 55 feet high, and Navy construction crews raised walls upright using two jacks. The jack consisted of a long telescoping box strut and a 500-ton hydraulic jack. According to the Bureau of Yards and Docks,

> Closely spaced matching holes were provided in the outer and inner boxes of the strut through which pins were inserted to permit holding the load while the jacks were run back after reaching the limit of their travel. After the wing walls were in the vertical position, they were bolted to the bottom pontoon around their entire perimeter. The sections of each dock were successively brought together and aligned by means of the matching pintles (pins) and gudgeons (sockets). Heavy splice plates were then welded in

[11] Ibid., 212-214. Construction crews were from the Navy Bureau of Yards and Docks, Navy Civil Engineer Corps, the Seabeas, and Navy enlisted men.

> position from section to section across the joints at the wing walls, at top and bottom, and on both the inside and the outside faces of the wing walls.[12]

Fully assembled ABSDs required a minimum depth of 80 feet, and were moored by thirty-two 15-ton anchors, fourteen on either side, and two at either end. The ABSD was anchored in protected harbors to reduce potential storm damage. Unlike the mobile ARD-class, the larger floating dry docks were more fixed. However, they still guaranteed the Navy greater flexibility, allowing the fleet to cut the umbilical cord of a home port.

One hundred fifty five floating dry docks were constructed by private contractors for the Bureau of Yards and Docks, and 78 saw service in advance areas. One of the greatest challenges was provisioning the docks upon arrival at their destination. A titanic amount of men and material deployed with each floating dry dock, and auxiliary vessels with shops, storage, and personnel accommodations accompanied each floating dry dock, creating what was akin to floating cities. According to the Bureau of Yards and Docks,

> The ARD docks, in particular, were fine freight carriers and seldom left for their overseas bases with an empty center chamber. On the contrary, they usually carried their own work barges, small boats, dredges, cranes, locomotives, piling, and other supplies too numerous to mention.[13]

Exhibiting a characteristic American way of war, the dry dock crews utilized every scrap and square inch of shipping space to bring their home port to the advance area.

America's construction, deployment, and operation of floating cities is irrefutable evidence for the school asserting that America and its Allied benefactors smothered foes with material. Easily missed among the mountains of material, however, were the ingenuity, innovation, and adaptability necessary to orchestrate these resources. The abundance of

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[12] Ibid., 214-215.

[13] Ibid., 224.

newsreels displaying combat and weaponry overlooks an American proclivity for organization, systems application, and the capability to make adjustments, but these skills were part of an American way of war just as valuable as mass-produced, superior firepower.

The Army Air Force also substantiates the argument that America contributed more to Allied success than mere material. The United States produced nearly 300,000 aircraft from July 1940 to August 1945, with some 230,000 planes procured by the Army Air Force. Primary recipients of the remaining aircraft were the U.S. Navy, Great Britain, and Russia. The story of wartime aircraft production is impressive, as these fantastic numbers attest. Yet, the production of hundreds of thousands of aircraft was only part of the story. The delivery of aircraft around the world is another fascinating part of the narrative.[14]

Moving nearly 300,000 aircraft world-wide required an effective transport system. According to Army Air Forces history:

> Pearl Harbor produced feverish improvisations in deployment of combat units in response to a rapidly changing strategic and tactical situation. In the months immediately following 7 December 1941 aircraft allocations were in a constant state of flux…. But the enormous demands of the air war produced a huge outpouring of planes from the factories which made mandatory a distribution machine dwarfing anything previously contemplated by the AAF.[15]

The development of an aircraft transport system was a work in progress.

An American tendency is to approach problems systematically, and the U.S. military is no exception, frequently applying various systems to the myriad problems encountered during peace or war. The U.S. military also lacks talent in predicting or avoiding problems, some of which appear quite obvious such as moving several hundred thousand planes around the world or

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[14] Craven, Wesley F., and James L. Cate, eds. *The Army Air Forces in World War II.* Vol. VI, (Chicago: University of Chicago Press, 1955), 398. For the impact of American industrial output, see also Richard Overy's *Why the Allied Won*, specifically Chapter 6 "Economies at War."

[15] Ibid., 414.

the necessity for pack animals in mountain warfare. Fortunately, an ability to adapt is another American characteristic that counters some of the deficiencies in farsightedness. And while "system" implies a certain level of rigidity, structure, and routine, the U.S. military maintained flexibility during World War II, making adjustments until effective systems were applied, problems solved, and enemies defeated.

No effective method of aircraft transport existed prior to World War II. In 1940, the Army Air Force considered developing special ships to move assembled or partially assembled aircraft. Funding allowances did not permit the advancement of the idea beyond the planning phase. Navy aircraft carriers worked best for aircraft transportation, but the number of carriers for Navy operations was short, much less for helping out their Army comrades in arms. The onset of war touched off a titanic increase in demands for shipping tonnage. The deployment of U.S. forces and supplying these and Allied forces stretched shipping space to the limit. German U-boat activity added to the strain. Shipping space was at a premium, and according to the Army Air Forces, "It was necessary to establish a control of shipping resources which was fully as tight as any other resources control system established during the war."[16]

Various methods of aircraft transport were attempted. Pilots of the Air Transport Command and civilian members of the Women Airforce Service Pilots (WASPs) ferried planes to their destination. Bombers and transport aircraft had longer range and could often make the journey if it was broken into segments. Ferrying fighters and smaller aircraft was not an option because of their limited range. Army Air Force technicians disassembled aircraft, which were placed in crates, loaded, and shipped. The crating method proved time consuming and

[16] Ibid., 417.

expensive, due primarily to the uncrating and re-assemblage of aircraft. Fully assembled, deck-loaded aircraft were optimal. The planes were easier to prepare for shipment, though the basic task of weather-proofing aircraft from exposure was tedious and time-consuming. Fully assembled aircraft were also easier to unload, and the aircraft were nearly combat-ready on arrival. Unfortunately, most cargo ships could carry only five or six assembled aircraft. [17]

Several different vessels were used to transport aircraft. Barges loaded with fully assembled aircraft were towed by another ship, both of which made easy targets for enemy submarines. The Army Air Force requested the use of the Navy's escort carriers to move Army aircraft. The Joint Chiefs refused, deciding that escort carrier service in combat roles and convoy protection was more pressing than transporting aircraft.[18]

One of the most novel vessels to transport aircraft was developed by Seatrain Lines, an innovator in rail and water transport. Seatrain introduced ships during the 1930s capable of carrying one hundred fully loaded railroad cars. Special cranes lifted the loaded railcars from adjacent tracks on to one of four decks aboard the ship. The ship's decks had railroad track upon which the loaded railcars were placed. The unloading and reloading of railcar content was unnecessary while portside, which saved time and minimized damage from multiple loadings. The process was reversed upon arrival at the destination. The enormous size of Seatrains made

[17] Ibid., 629-636. The same tedious process used to weatherize the aircraft prior to the transoceanic voyage was reversed at the destination. Once all of the weather-proofing grease was removed from the essential parts, then the aircraft were airworthy.

[18] Ibid. The Navy transported Army Air Force planes by carrier and the planes were flown ashore to North Africa during *Operation Torch* in November 1942. However, shifting carriers from air cover to transport duty seldom occurred.

them viable aircraft transporters, but their use in this capacity was limited as the Army opted to move armor instead of aircraft by Seatrain.[19]

Large size and adequate deck space made tankers a very practical alternative for aircraft transportation. A main drawback, however, were the difficulties involved with lashing the planes to the tanker's deck. Tankers required special prefabricated stands to hold the aircraft in place, which were costly to construct and installation was time-consuming. Each stand held a particularly type of aircraft, and the stands were seldom adjustable for different models. Tankers proved more valuable at moving petroleum, oil, and lubricants (POL) and were never able to transport aircraft to theaters around the world in the numbers demanded.

In the summer of 1943, the Army Air Force pressed for the development of a devoted aircraft transport. Tests showed that converted Liberty ships worked well. The ships were imperfect, for example, aircraft could not fly off of the ship's deck, but these vessels were fairly easy to convert from existing ships. The modified Liberty ships, designated the ZEC-2, proved so successful at aircraft transportation that the War Shipping Administration allocated funds to build a dozen of them. The Army Air Force received eight ZEC-2s in February 1944, and requisitioned nineteen more in April 1944. The ZEC-2 carried forty-two fully assembled aircraft, less than the fifty-six carried by escort aircraft carriers but considerably more than the fourteen

[19] Ibid., 418. Seatrain Lines originally operated from ports in New York, New Orleans, and Havana, Cuba. Private operations by Seatrain Lines were suspended in May 1942 when its ships were requisitioned by the War Department. See http://www.usmm.org/seatraintexas.html for the war-time transportation exploits of *Seatrain Texas,* which delivered its vital cargo of some 250 M-4 tanks just prior to the decisive battle of El Alamein in October 1942. The small Seatrain fleet (six ships) were refurbished and returned by the War Department once the war ended. Corporate America's mobilization supporting the war effort proved decisive regarding why the Allies won. As Secretary of War Henry L. Stimson noted, "If you are going to try to go to war or prepare for war in a capitalist country, you have got to let business make money out of the process…." (quoted in Overy, *Why the Allies Won*, p. 198). Seatrain Lines was merely one of hundreds of companies participating in the marriage between public and private sectors collectively working to defeat the Axis.

carried by tankers. Production of the ZEC-class aircraft transport was steady until the war ended.[20]

The ZEC-class aircraft transports epitomized the American way of war during World War II. Boeing, Lockheed, and several other corporate giants built mass quantities of aircraft, but the means to move the planes to war zones was missing. Ingenuity and adaptability overcame the problem of aircraft transportation and, once the missing link in the supply chain was found, then a steady application of "brute force" followed.

The late Russell Weigley broke new ground in 1973 when he proposed that the United States fought wars in a marked, American fashion. Weigley divided the U.S. military narrative into two distinct parts. In the first phase, the resource-poor United States depended on wars of attrition that exhausted opponents. The second phase occurred after the United States grew economically, especially after substantial industrial growth. No longer strapped for resources and better able to afford the growing costs of war, an American way of war emerged that emphasized victory through annihilation. Weigley contends that the North applied the second phase during the Civil War campaigns of Generals Grant and Sherman. The annihilation phase reached its zenith in World War II after America harnessed its industrial power and military might for the complete and unconditional destruction of the Axis Powers.[21]

Few theses in U.S. history have been more analyzed and criticized than Weigley's "American way of war." One of its most cogent critiques is Brian Linn's article, "The American Way of War Revisited," in which Linn asserts that (among other things), Weigley does not

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[20] Ibid., 421. According to Maritime codes, Z indicated aircraft transport while EC-2 stood for a Liberty-class cargo ship.

[21] Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington, IN: Indiana University Press, 1973).

provide a clear definition of annihilation or attrition; that reducing national strategy into either attrition or annihilation is constraining and fails to consider alternatives, such as deterrence; and that it forgets that from the Civil War until the middle of World War II the American way of war was dominated by improvisation and practicality due to thin military budgets. Linn continues to provide an implicit counter to the Weigley thesis and elucidate his views on an American way of war in *The Echo of Battle: the Army's Way of War*, in which Linn examines how the military (including planners, warriors, and intellectuals) struggled to define war, and have never reaching a consensus on the way wars should be fought.[22]

One aspect of Weigley's thesis that has received widespread acceptance is the belief that American industrial output and mass productivity determined how the United States conducted war and defeated its enemies. Conventional wisdom holds that America's greatest contribution to Allied victory in World War II was less about battlefield exploits and more about mass production on the assembly line. America simply out-produced its opponents and then annihilated them.

In *Brute Force: Allied Strategy and Tactics in the Second World War*, British historian John Ellis bluntly asserts that Allied victory was due to material preponderance and the enormous advantages the Allies enjoyed in firepower and supplies. Victory was not a foregone conclusion, but Ellis insists that Allied victory was inevitable based on simple arithmetic: the Allies produced more of the things necessary to wage all-out war than their Axis opponents. Ellis also states that, because of their vast superiority in war material, the Allies grew more and more dependent on massive firepower—*brute force* as he calls it—to defeat their foe.

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[22] Brian Linn, "The American Way of War Revisited," *Journal of Military History* Vol. 66, No. 2 (April 2002): 501-533; Brian Linn, *The Echo of Battle: the Army's Way of War*, (Cambridge: Harvard University Press, 2007).

"The American Army does not solve problems—it overwhelms them" is on the header of Ellis's conclusion. An American way of war existed that substituted mass firepower for finesse. In the end, according to Ellis, the Allies "inched forwards with extreme circumspection, only making progress as they did by resort to an overwhelming superiority of fire." There were hardly any strokes of military genius, but rather Allied forces lavishly equipped by American industry and dependent on sheer material superiority bludgeoned the Axis to death.[23]

Contradicting Ellis is Williamson Murray and Allan Millett, co-authors of *A War to be Won: Fighting the Second World War*. Murray and Millett echo Ellis's sentiment that economic strength was important to ultimate victory, but that material superiority never by itself proved decisive. According to Murray and Millett, winning World War II required the combined arms warfare, mass mobilization of industry, and flexibility when making strategic decisions that balanced ends against means. Another vital component to Allied victory, and a uniquely American way of war, was the contribution of "citizen soldiers," who. Murray and Millett say, lacked tactical sophistication yet possessed tremendous adaptability and a talent for on-the-job training, so that "their learning curve was steady and steep."[24]

Keeping with the theme that victory went to those with the biggest or most guns is Richard Overy's *Why the Allies Won.* Though not specifically about adaptability or an American way of war, Overy's work provides a much clearer understanding of adaptability in defeating the Axis. Overy emphasizes economic mobilization and industrial might as a cornerstone to Allied success. Indeed, one of Overy's strong points is his use of statistics to illustrate how the belligerents compared in the war on production. The strategic bomber plant at Willow Run,

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[23] Ellis, *Brute Force,* 440.

[24] Williamson Murray and Allan R. Millett, *A War to Be Won: Fighting the Second World War*, (Cambridge, MA: Harvard University Press, 2000).

Michigan, known as the "Grand Canyon of the Mechanized World" is one example Overy uses to demonstrate America's knack for ingenuity and mass production, and how vital these talents were to the war effort.[25]

However, Overy argues that winning also required something beyond better planes and bigger battalions. Victory also depended on the moral resources of the belligerents. Overy examines early Allied failures and asserts that a crucial element to Allied success was their self-examination and then their necessary corrections. Allied war planners, particularly the Americans, "stretch[ed] their strategic imaginations to embrace ways of warfare that were more ingenious and effective."[26] American leaders made changes against an opponent who grew complacent and operationally arthritic. Beyond mass production Overy shows that the American adaptability developed into a "way of war" that greatly contributed to Allied victory.

Michael Doubler's *Closing With the Enemy* examines U.S. Army adaptability at the tactical level across Western Europe. His narrative on the evolution of American combined arms warfare compelling argues that American success did not derive exclusively from superior firepower. German defenses in the Norman hedgerows initially stymied American troops. A simple solution was discovered after a Second Armored Division non-commissioned officer blended ingenuity and brute force. Sergeant Curtis G. Culin had the idea of taking German landing and beach obstacles, which were in ample supply, and welding them to the front of American armor. Sergeant Culin supervised the construction and the first hedgerow cutting tank was created from scrap iron pulled from a German road block. Tank dozers capable of busting

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[25] Overy, *Why the Allies Won*, 197.

[26] Ibid., 6.

through the natural barriers soon appeared across the Norman countryside. The device was so successful that First Army commander, General Omar Bradley, ordered the Ordnance Section to assemble a fleet of tank dozers capable of busting through the natural barriers. American tanks powered through the breached hedgerow and applied heavy fire to suspected German positions. Doubler acknowledges the importance of firepower and material abundance. He also asserts that resources were no more decisive than an American talent for being quick studies in "the schoolhouse of war."[27]

American reliance on superior firepower, material abundance, and advancing technology is irrefutable in a number of theaters and campaigns, such as the Eastern Front, Western Europe, or Central Pacific. Yet advantages in firepower, supplies, and technology were hardly the rule in war on the periphery. America's earliest combat ventures were in backwaters, lacking infrastructure and low among the Allies' strategic priorities. Consequently, the resource-poor troops deployed to these areas did not rely on the triad of firepower, supply, and advancing technology. Instead, they depended on ingenuity and economy in the peripheral theaters of North Africa, the Mediterranean, and CBI.

Historians of war on the periphery most often view these theaters from the perspective of strategic value. The argument over strategic goals and operations persisted throughout the war, and became no less acrimonious after hostilities ceased in 1945. The debate, then and now, centers on the best strategy to defeat the Axis: a direct assault on enemy capitals or an oblique approach. An indirect line of attack was chosen by Allied political leaders, at least until Allied (notably American) forces were mobilized sufficiently to conduct outright attacks against Axis centers of war. Victory did not stop criticism of Allied war planners, and after nearly seventy

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[27] Michael Doubler, *Closing with the Enemy: How GIs fought the War in Europe, 1944-1945*, (Lawrence, KS: University Press of Kansas, 1994), 50-51.

years of post-mortem, the debate still rages, not over why or how the Allies won but how they could have done so sooner.

The logical approach to studying war on the periphery is to proceed by theaters and from such a study one gleans countless examples of adaptability's prominent role as an American way of war in World War II. In 1970, Trumbull Higgins summarized the first twenty-five years of scholarship on the Mediterranean Theater (MTO), asserting that most historians viewed the theater as Anglophobes or Anglophiles, colored by anti-colonial sentiments and Cold War bias. Generally, British historians regarded the MTO as vital and resented American reluctance to view it otherwise. Americans tended to see the MTO as a waste that diverted much needed resources from a cross-channel assault on Western Europe. An overwhelming sense of irrelevance hung over the MTO after the Normandy invasion. "All roads lead to Rome, but Rome leads to nowhere" was a sentiment shared by many Americans serving in the MTO, and was shared by those writing about it in the decades immediately following the war.[28]

Contemporary scholarship is more approving of the American initiation of war on the periphery, particularly operations in North Africa and the Mediterranean. Rick Atkinson began his "Liberation Trilogy" with *An Army at Dawn: the War in North Africa* 19421-1943 followed by *The Day of Battle: the War in Sicily and Italy, 1943-1944*. Atkinson asserts that American war planners, namely President Roosevelt, made the correct decision in sending troops to North Africa and Italy, which allowed the United States to gain much needed experience and grind

[28] Trumbull Higgins, "The Anglo-American Historians War in the Mediterranean 1942-1945." *Military Affairs*, Vol. 34, No. 3, October 1970; see also *Fifth Army Medical Service History, Troop Conditions—Mental Attitudes,* pp. 26-29, February 21, 1945, File: Fifth Army Medical Service History, Box 6, RG: 112, National Archives and Records Administration (NARA). The secret report provides stark evidence of soldiers' indifference regarding the Italian campaign, and Army frustrations at soldiers' "lack of understanding or even of interest of 'Why We Fight.'" A detailed survey indicates troop apathy resulted from feelings of abandonment and diminished importance in the war effort, and was substantiated in the troops' mind through a lack of supplies, reduced numbers of replacements, dwindling newspaper reports, and a decline in mail.

down Axis troops. Likewise, Douglas Porch's *The Path to Victory: The Mediterranean Theater in World War II* contends that the MTO was "pivotal" to the second front in France and overall German defeat. And while the MTO is no longer viewed exclusively as a strategic cul-de-sac, the debate over the strategic value of war on the periphery versus war on the enemy heartland(s) endures.[29]

Consent supporting American operations in China is more elusive. China was to be America's great Asian ally waging war against Japan. China received significant aid and military training from the United States, but with the exception of some tactically successful campaigns in Burma, American strategic goals did not bear fruit in CBI. The reasons for China's lackluster performance as an Allied Power are numerous, and so are assessments of the value of the CBI Theater to the war effort. [30]

However, waging war in the backwaters was indispensable to Allied victory. The war was truly global in scope, becoming one of history's greatest corporate undertakings, and necessitating mass mobilization by the belligerents. It also required seeking out and destroying opponents regardless of locale. As Murray and Millett affirm, victory demanded the death and destruction of soldiers and civilians alike, in "terrible killing battles," and lengthy campaigns. Winning could not be achieved quickly, because waging such a war was a massive, time consuming process. Neither was the war confined to places of convenience. Contrary to

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[29] Rick Atkinson, *An Army at Dawn: The War in North Africa, 1942-1943*, (NY: Holt, 2002); Rick Atkinson, *The Day of Battle: The War in Sicily and Italy, 1943-1944*, (NY: Holt, 2007); Douglas Porch, *The Path to Victory: The Mediterranean Theater in World War II,* (NY: Farrar, Straus, and Giroux, 2004). A rebuttal to Porch's contention that the MTO was "pivotal" to Allied victory is found in Joseph E. Persico, "Did Roosevelt Doom Us to a Longer War?" *Military History Quarterly*, Vol. 24, #3, (Spring 2012): 74-80.

[30] John D. Plating, *The Hump: America's Strategy for Keeping China in World War II*, (College Station, TX: Texas A&M University Press, 2011); Edward Fischer, *The Chancy War: Winning in China, Burma, and India in World War II,* (NY: Orion, 1991); Edward Dryer, *China at War* (London: Longman, 1995); Frank McLynn, The Burma Campaign: Disaster Into Triumph, (New Haven, CT: Yale University Press, 2011); Akira Iriye and Warren Cohen, Editors, *American, Chinese, and Japanese Perspectives on Wartime Asia, 1931-1949*, (Wilmington, DE: Scholarly Resource Books, 1990).

predictions by armor advocates in the 1930s, the next major war was not constrained to places with roadways and developed infrastructure. Rather, forces were deployed to trackless deserts, snowy mountains, and dense jungles because these were also arenas "where important wars are fought."[31]

The role of adaptability in the American way of war has not been fully explored, regardless of whether examining central or secondary theaters in World War II. James Ehrmann's unpublished dissertation makes a great effort at documenting the role of American adaptability through a study of logistics in the CBI Theater. The present dissertation is hardly definitive, but it will also include the austerely supported Allied efforts in North Africa and the Mediterranean, where ingenuity and improvisation replaced material superiority as an American way of war. The Army's regression to and reliance on animal power in these theater backwaters demonstrates one aspect of the U.S. military's adaptive nature, and the Army's use of animal power in World War II is the framework upon which this dissertation is built. [32]

America's contribution to Allied victory transcends material. America practiced a unique way of war centering on adaptability, and the nature of American adaptability was equally vital to Allied success. One facet of the Army's ability to adapt, in a sense regressing to move forward, can be seen in the multifunctional use of mules in World War II.

Americans possessed material abundance in campaigns across Western Europe and the Central Pacific in 1944 and 1945, as German and Japanese prisoners attested. Mountains of artillery shells, fuel, and food, however, did not exist in the backwater "sideshows." American

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[31] Murray and Millett, *A War to Be Won*, x. In the 1930s, General Adna Chaffee, considered the 'father of American armor,' assessed that mechanization and motorization would replace animal power because he presumed the next major war would occur in countries with developed infrastructures.

[32] James Ehrmann, "Ways of War and the American Experience in the China-Burma-India Theater, 1942-1945," (Unpublished Dissertation, Kansas State University, 2006).

military success on the periphery was not due to material abundance, nor to a greater sense of determination. America won the backwater campaigns because the nature of American adaptability was cultivated over the centuries and converted from a way of life to an American way of war.

Chapter 1: Of Mules and Men

The mission of pack transportation is simply stated: transport loads on the backs of animals over terrain that is difficult or impassable for wheeled or tracked vehicles.[1] Over many millennia militaries around the world have employed beasts of burden, including dogs, horses, donkeys, oxen, camels, elephants, and llamas. The varied types of horses and their highly adaptable nature allowed horses a widespread popularity as pack animals. The history of horse domestication is unclear. The most convincing evidence indicates that charioteers regularly employed horses in Mesopotamia around 2,000 BCE. The most successful sumpter, however, has been the mule.[2]

Mule breeding first occurred in Egypt and Mesopotamia where domesticated donkey and horse populations were increasing around 1,500 BCE. Breeding in the wild between donkeys and horses was possible. However, it is most likely that humans manipulated the breeding of donkeys with horses since the mule offspring displayed top qualities as pack animals. Mule populations rose during the Greco-Roman periods, with widespread deployment of pack mules by Roman legions. Peasant farmers and royalty alike used mules extensively during the Middle Ages to

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[1] U.S. Army Field Manual, FM25-7, *Pack Transportation*, (Washington, D.C.: War Department, GPO, August 25, 1944), 1.

[2] Rossel Stine, Fiona Marshall, Joris Perters, Tom Pilgram, Matthhew D. Adams, and David O'Connor, "Domestication of the donkey: Timing, processes, and indicators." *Proceedings of the National Academy of Science* 105,10, (2008):3715-3720. http:/www.pnas.org/content/105/10/3715 (accessed October 28, 2012); Levine Marsha A. "Botai and the origins of horse domestication." *Journal of Anthropological Archaeology* 18, 1, (1999):29-78; Robin Bendrey, "From wild horses to domestic horses: a European perspective." *World Archaeology* 44,1, (2012):135-157. Archaeological evidence suggests horses may have been caught, placed in pens, and used as a food source (both for meat and milk) in Kazakhstan around 5,000 BCE. Bit marks and metal wear on jawbones and teeth suggest domestic use of horses in areas east of the Ural Mountains around 3,500 BCE. Donkey skeletons discovered in Egypt indicate domestication around 3,000 BCE. The timing of mule domestication is uncertain, but mule populations grew primarily through human intervention after 1,500 BCE.

pack and pull heavy loads, though horses garner more attention than mules in contemporary accounts and art.

Mules in America trace their lineage to Spain. Columbus imported Spanish donkeys to the New World, as did Cortez who introduced horses and donkeys to the Aztecs of Mexico in1519. The horses were of Arabian stock and the donkeys were descendents of the North African wild ass, both of which were tailored for the arid climate of Mexico. The North American equine population rose as European imports grew and as Spanish and Native Americans bred horses. They also bred donkeys (or burros) with horses, and the mule population gradually increased.

Mules proved hardy, being able to withstand a variety of climates, and subsist on low quality food sources. They became a good economical choice for farmers scratching out a living on the frontier of colonial America. Wealthy American colonists bred mules. George Washington received a gift from Spanish royalty in 1788 that included some of the first Mammoth Jack stock. A standard donkey weighs 450 to 500 pounds and stands 36 to 54 inches. Mammoth Jacks weigh over 550 pounds and measure over 54 inches. By the 1820s Mammoth Jack imports from Europe were steady, and by the 1840s breeding of Kentucky and Tennessee thoroughbreds with Mammoth Jacks produced exceptionally large, durable mules known as American Mammoth Jacks. Missouri, Kentucky, and Tennessee became the nation's top mule producing states by mid-nineteenth century.

U.S. imports of European jack stock tapered off by the 1870s. American mule breeders were hardly concerned as the number of American Mammoth Jacks rose steadily in the early Twentieth century. The "Roaring Twenties" found America's automobile craze moving into high gear, but the number of registered American Mammoth Jack stock peaked in 1920 at 5,000,000

animals. The Army would have a vast pool from which to draw whenever the need for pack animals arose.[3]

The reason for mule superiority as a pack animal is genetic. Cross breeding *Equus asinus* (donkeys) with *Equus caballus* (horses) produced the mule hybrid. That is, when a donkey breeds with a female horse, the offspring is a mule. Occasionally male horses breed with female donkeys, producing a hinny, but the conception rate from such couplings is low and mortality rates are high. The offspring in either case are called mules. Regardless of gender, all mules are sterile and cannot reproduce. Mules are a textbook example of heterosis or hybrid vigor, which is the improved or increased function of any biological quality in a hybrid offspring.

Mules excel as pack animals because hybrid vigor allows them to posses the best qualities of each parent. The mule's large, thick head and long ears resemble a donkey, as do its thin legs and small hooves. Mule hooves are smaller, requiring smaller shoes, and their feet are harder than horses, which makes mules resistant to foot injury and disease. The smaller hooves produce less weight displacement, but this can be detrimental when operating in boggy soil because the animal is apt to sink.

The height and body shape of mules resemble a horse, particularly their neck and hind-quarters. The mule's mane, tail, and coat are also horse-like, though their skin differs. The skin of a mule is much tougher than a horse. Consequently, mules are less prone to develop saddle sores or skin injuries and can withstand extended periods of heat or rain. Similar to their parents, mules can be quite noisy, combining a donkey bray and horse whinny to make a raucous sound that the Army was obliged to excise during combat operations in World War II.

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[3] John Ashton, Duane Dailey, and Melvin Bradley, *Jack Stock and Mules in Missouri*, (Columbia: University of Missouri, Extension Division, 1987); Melvin Bradley, *The Missouri Mule: His Origins and Times* Volume 1-2, (Columbia, MO: University of Missouri Press, 1993).

Beyond physical appearance, hybrid vigor is most apparent in mule temperament and labor capacity. Mules possess the endurance and patience of a donkey, along with a donkey's weight-bearing capabilities and sure-footedness. Because of their similarity in size, the mule shares the power and strength of a horse. Mules also possess the courageous nature of horses, though aficionados of either animal disagree to what extent this characteristic is shared. Mules are preoccupied with self preservation, making them seem more stubborn than brave. However, with minimal training mules can contend with the most alarming circumstances.

One donkey-like characteristic of mules is their herd mentality. Mules generally remain bunched up, even when their lives are threatened. Horses, like most herbivorous prey animal, will bolt from the first sign of danger. Mules are exceptional in the combat pack role because they become essentially impervious to fire. The down side of this habit is that when troops need mules to scatter, such as during an artillery or air attack, the mules remain clustered and sustain heavier losses.

Another by-product of hybrid vigor is mule weight and size. Mules are often larger than their parents. An average horse weighs 1,100 pounds and is about 54 to 64 inches high. A standard donkey weighs 450 to 500 pounds and stands 36 to 54 inches. The average Army pack mule weighed 1,000 pounds and was around 60 inches tall. Like most equine, mules are measured by hands, which is the equivalent of four inches. Thus, an average mule would be fifteen hands high.

Daily food and water consumption for a standard sized pack mule is 19 pounds (10 pounds of hay and 9 pounds of grain), and 10 gallons of water (roughly 80 pounds). A horse needs slightly more food, requiring 24 pounds (14 pounds of hay and 10 pounds of grain), and 10 gallons of water. The five pound weight difference in the daily food intake between a mule and

a horse seem minor, but the variation of a few pounds become major considerations when calculating the amount of material to pack and the number of animals to move it.[4]

In cases where terrain is exceptionally rugged and devoid of grazing and water sources, the number of animals required to haul forage and water for the pack train outnumbered those animals moving combat equipment and supplies. One of the main disadvantages to pack transportation is the forage requirement of its animals, particularly when the animals are required to carry their own forage and water. Payloads of other cargo must be reduced, making pack transportation "very uneconomical."[5] When every ounce of cargo must be factored and only essential items can be loaded, the mule's reduced food requirement give them an edge over horses as pack animals.

The U.S. Army employed three distinct classifications of pack animals. First, there were cargo pack trains, which moved heavy, bulky items secured to saddles by ropes. Second, there were artillery pack units, which moved heavy howitzer parts, communication equipment, and ammunition secured to saddles with special arches and hangers. The first two units moved slowly at the walk or amble. Third, there were horse cavalry units, which moved lighter loads on specially equipped saddles with hangers designed to maintain balance at the walk, trot, and gallop. Cargo and artillery units preferred mules, and used them almost exclusively. Cavalry units preferred horses, though mules were also used. Mules are quick and capable of maintaining a gait or gallop, though horses can maintain a gallop for longer distances. The use of Army horse cavalry in World War II was negligible. The employment of cargo and artillery pack units, however, was widespread and is the focus of this dissertation.

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[4] U.S. Army Field Manual, FM25-5, *Basic Field Manual of Animal Transport*, (Washington, D.C.: War Department, GPO, September 30, 1940), 70-72.

[5] U.S. Army Field Manual, FM25-7, *Pack Transportation*, (Washington, D.C.: War Department, GPO, August 25, 1944), 2.

Pack unit success depended on three things. First was the selection of animals. According to FM 25-7:

> In general, a pack mule should be from 14 3/4 to 15 1/2 hands in height and weigh 1,000 to 1,200 pounds. He should be compact, stockily built, and have a short neck; short, straight, strong, and well-muscled back and loins; low withers and croup [rump]; large barrel [belly] with deep girth; straight, strong legs; and good feet. In addition to desirable physical proportions, pack animals should be gentle and have friendly dispositions. They should have no fear of man and should be free of vices and vicious habits.[6]

Procuring properly proportioned mules was not difficult. Even though the United States was shifting toward full motorization, the quantity of healthy mule stock remained high. Finding mules with "friendly dispositions" proved more difficult, and finding large quantities of qualified personnel was equally problematic.

Selection of personnel was also instrumental in pack unit success. According to FM 25-7, "The mobility of pack transportation in the field depends in a great measure upon the gentleness and willingness of the pack animals." Obtaining pack animal "willingness" depended largely on the men training the mules. Pack trainers were "selected because of their knowledge and lack of fear of animals. Their personal qualities should include patience, kindliness, and firmness."[7] Like finding "friendly" mules, finding qualified personnel was a tall order. Many Americans retained their knowledge of animal husbandry, in spite of the steady migration from rural to urban centers. Finding and recruiting those with the kind of knowledge was another challenge for the Army, particularly once the war began and time was of the essence.

The third element to pack unit success was conditioning and training. Training on the types of terrain over which the pack units operated was crucial. Thus, the implementation of

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[6] Ibid., 4.

[7] Ibid., 5.

carefully planned training programs involved “extensive practice in packing all types of loads, and marching of the animals under full loads over all types of terrain.” Daily marches over varied terrain conditioned mules and men for overseas deployment. The training curriculum included gentling, or breaking instinctual fears and developing confidence between mules and men, as well as leading, riding, and standing. Once mastered, packing followed.

Packing took several days to learn. After around ten days of riding, pack troops placed an empty or unloaded pack saddle on the animal. Pack troops increased the weight each day added until reaching the mule’s full load of around 250 pounds. Troops made the mules stand quietly while they adjusted loads, and then the troops ordered their mule to move slowly for short distances.

A unique characteristic of mules is their fondness for mares. Keeping a mare with the mules makes them more docile. Also, attaching a bell to the mare’s neck improves handling because the mules associate the bell with the mare’s presence. The bell mare, often led by a mounted rider, leads the pack mules in a herd at a slow gait around the pen. The herding principal worked well for Army mules in certain circumstances, particularly in wider, open areas. It was not effective, however, in the narrow confines of jungle trails or mountain ledges. These conditions required individual trooperss leading one or two mules.

A crucial component of successful pack unit training was what the Army called “battle inoculation,” or getting the mules mentally conditioned to the many sights, sounds, and odors of the combat zone. Most mules quickly learned to disassociate the sensory overload of battle from pain and harm to themselves. Inoculation included exposure to motor parks, where engines roared, metal banged, and heavy equipment ran; low flying aircraft, artillery and gunfire of all calibers; and various odors including gasoline, smoke, and “disintegrating flesh and rotting

vegetation." Battlefield training also involved crossing narrow bridges, jumping ditches, walking up and down steep inclines, and "taking slides confidently and without hesitation."[8] The unshakable nature of mules to battle stress was another positive trait that furthered their reputation as excellent combat pack animals.

Army pack mules carried three types of saddles. The largest was the Phillips cargo pack saddle. It weighed 95 pounds and all pack trains, pack artillery units, and heavy infantry weapons units (such as machine guns and mortars) used model. The frame was made of steel arches**,** steel hanger bars, aluminum side bars, spring steel ribs, and aluminum bottom bars, all of which provide a single unit upon which troops packed various loads.

The saddle frame included two pads. The pads cushioned the weight of the frame and cargo against the animal's back. Each pad was made of leather reinforced internally by aluminum alloy ribs. Curled horse hair filled the pads, which maintained resiliency and leather thongs kept the pads in place. Five holes in the back of each pad allowed troopers to make quick adjustment of the leather thongs. Attached to the lower corner of each pad was an aluminum bar with footrests, which keeps the pads off the ground when not in use.

A leather-trimmed piece of canvas covered the frame and pads, protecting them from the elements. The cover included various cinches and breeches to prevent the saddle from riding forward or backward along the animal's back. A woven mohair pad served as a cushion between the saddle pads and the animal's back. The mohair quickly conformed to the animal's back, eliminating most of the friction. The saddle and pads were designed to reduce animal discomfort and make for easy adjustments.[9]

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[8] Ibid., 9.

[9] Ibid., 26-27.

The second most commonly used saddle was the Phillips cavalry pack saddle. The cavalry pack saddle weighed 45 pounds and designed around an aluminum alloy frame. It included pads, though not as thick as the cargo pack saddle. Like the cargo pack saddle, it included an assortment of cinches, breeches, and d-rings for hanging items, but the Phillips cavalry pack saddle was for riding by pack masters. It was not intended to haul cargo, thus it did not include the weight or trappings of its larger cargo pack saddle counterpart.

Later in the war (1944), the Army designed a third saddle, called the Phillips cavalry pack saddle, Modified (or China Special). The China Special weighed around 70 pounds and was similar to the earlier cavalry pack saddle in that it was smaller than the larger cargo pack saddle. It was designed for animals approximately 800 pounds and accommodated the shorter native animals from Australia and CBI. However, the China Special was not for riding. The frame included steel arches (instead of aluminum alloy) and much thicker pads. It also had a special breast collar to minimize slippage of high-riding loads, particularly the howitzer loads of pack artillery units.[10]

Troops carefully placed cargo on the saddle and they lashed or tied it to hangers on the saddle. Troops placed a large piece of canvas, called a manta, around the cargo. The manta protected the articles from sun, rain, dust, and the insatiable appetite of most mules. Assorted hitches then fastened and secured the manta-wrapped cargo. Optimally, two men placed the 95 pound saddle on the mule, and assisted one another with the cinching. It was much easier for two men to pass rope back and forth over and around the mule, no matter how still the mule stood. Often mule skinners worked alone, developing considerable upper body strength and a knack for knot-tying.

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[10] Ibid., 20-28

The typical pack unit included approximately 300 mules and 75 men divided into four categories of personnel, though the term "muleskinner" loosely applied to all men working with mules.[11] First were packers, whose responsibilities included training and basic animal care, maintaining equipment, preparing cargo, slinging, lashing, and hitching all loads. At the end of the day, the packers removed all loads, fed, watered, and groomed their mules, and repaired lines. The cargador oversaw packers and assisted the packmaster. He assigned specific mules and equipment to packers and instructed packers as to the type of load each mule should carry, making sure that loads were balanced. Cargadors also served as saddlers and repaired damaged tack.

The pack master was "responsible for the presence, care, and maintenance of all pack equipment and animals of his unit."[12] The pack master rode the column constantly checking and adjusting loads and monitoring the condition of mules and men. The pack train commander was the officer in charge of the pack train and supervised the march. The commander maintained contact with the forward echelon and preceded the train to find suitable bivouac, including cargo areas, supply depots, and picket lines. Preferable bivouac sites had protection from air and artillery strikes, close proximity to water, and an open grazing area. The commander made sure that all animals were fed, watered, and groomed, all equipment repaired, and cargo systematically arranged and readily available.

Textbook training and mule capabilities projected that a pack train could move twenty miles daily, with mules carrying 200 to 250 pounds of cargo over "non-mountainous" terrain. When pack units encountered mountains, which was almost always the case in missions

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[11] Don L. Thrapp, "The Mules from Mars." *The Quartermaster Review*, (May-June 1946): 1-6. http://www.qmmuseum.lee.army.mil/WWII/mules_of_mars.htm (accessed September 11, 2012).

[12] Ibid., 110-112.

requiring pack mules, commanders reduced the march distance to ten to fifteen miles daily, though the load remained the same. In some cases the distance travelled was greater (such as General Truscott's Third Infantry in Italy) or it was greatly decreased (such as Colonel Hunter's force in Burma). However, most pack units maintained these averages. The pack transportation mission was accomplished as firepower and supplies were delivered "on the backs of animals" to places where vehicles could not travel. Such were the capabilities, responsibilities, and challenges of mule units and the soldiers who operated them.

Figure I-1. A fine example of a pack artillery mule. The 240-pound front trail howitzer piece secured to the 95-pound Phillips cargo pack saddle required exceptionally stout animals serving as "gun" mules. (Image available at http://www.freerepublic.com/focus/f-vetscor, accessed August 1, 2012).

Chapter 2: Shifting Gears

A basic understanding of logistics is necessary to appreciate Army adaptability and animal power in World War II. Inhu the 1830s, Antoine Henri Jomini theorized that the art of war rested on three pillars: strategy, grand tactics, and logistics. The term "logistics" derives from the Greek word "logistikos," meaning "skilled in calculating," and computation is a vital component of logistics. However, the main task of logistics is supply and transportation. An adage goes "amateurs study tactics, professionals study logistics." Indeed, tactics have a heroic appeal and, perhaps, military history is still governed by the Clausewitzean ideal that the primary function of soldiers is to use the tools of war, not fashion or provide them. Nevertheless, the greatest tactics cannot be successfully employed without supplying first those who are executing the plans. Contrary to most film and general battle histories, well-equipped troops do not simply appear, fight, and then exit the battlefield. Instead, battles are a complicated, multi-stepped process that involves attention to details, i.e. logistics. The larger the army, the greater the logistician's task of orchestrating and supplying men with material needed for battle. [1]

Huge armies using mass firepower characterized wars during the early to mid twentieth century. Thus, the task of supplying beans and bullets increased to unimagined levels. Success went to the side that not only out produced opponents, but also adapted and kept a continuous flow of supplies to their troops. From December 1941 to September 1945, the U.S. produced some 84,000 tanks, 2.2 million trucks, and 350,000 artillery pieces; and shipped over seven

[1] Richard M. Leighton and Robert W. Coakley, "Logistics—The Word and the Thing," *Global Logistics and Strategy 1940-43*, U.S. Army in WWII, (Washington, D.C.: Center of Military History, 1995), 1. The writings of French military theorist, Antoine Henry Jomini, attempted to create prescriptions for war, which Jomini suggested were static and predictable. Carl von Clausewitz focused on descriptions of war, framing war and history in relative, ever-changing terms with few absolutes. His most celebrated work, *On War*, was first published in the 1830s, and his theory of war remains influential among many military historians.

million troops overseas. The days of an army subsisting off of the land, akin to Napoleon or Sherman, were over. In World War II, the U.S. Army did not minimize supply lines, but rather produced a "series of endless conveyor belts," and while the supply chain grew longer, the Army frequently adjusted so that supplies continually moved down the chain.[2]

Like most armies during the first half of the twentieth century, the U.S. Army adopted strategy and tactics that relied on mass numbers and mass firepower. The dependence on more men and more guns required a system that provided continuous supply, and here is where the U.S. Army differed. Unlike their rivals, the U.S. Army improved their supply system, and often lavished their troops with supplies. According to Richard Leighton, "By employing myriads of ships, trucks, and other transport, stocking supplies in depth on a huge scale, and copying the managerial techniques of American big business, the U.S. Army was able to achieve a continuity and volume of supply…" that could not be equaled.[3] Leighton's statement is uncontestable, but it should not be misinterpreted or used to reduce America's main contribution to one of simple mass production during World War II. The "myriads of ships" and mountains of material must not overshadow the equally important element of adaptability. The U.S. military employed unparalleled quantities of material, but the mountains of material were inconsequential without the ability to adapt their supply system to the war's changing landscape.

Sustained advancement of armies requires continuous resupply, and they follow standard elements of a supply system. The basic supply system includes procurement and collection, followed by the transportation of supplies. Transportation of supplies for the U.S. military occurred in the following manner. Material moved by rail to an American port, then shipped to a

[2] Ibid., 3-4.

[3] Ibid., 14.

foreign port, and moved to a railhead. Material then moved from the railhead to a truck depot, and finally trucked to supply depots where it was collected at convenient distribution points near the front. Adhering to this supply system was easier during World War I because of the static positions, which allowed supplies to be amassed at distribution points very near the front. The mobility of World War II, however, strained the supply chain because stockpiles were forced to keep pace with fluid battle lines. Breakthroughs by one's own forces were nearly as complicating as those by the enemy, because keeping pace and continuously supplying the voracious appetite of the combat arms was nearly impossible.

Continuous supply was further challenged by the destruction of infrastructure. Retreating enemy forces often destroyed rails, roads, and bridges. Likewise, the careful interdiction of supply lines by Allied forces was just as problematic. For example, months of preliminary air strikes against French transportation networks preceded the Normandy invasion in an effort to reduce German counterattacks. However, the methodical destruction of roads and rails by Allied air power rendered these supply lines unusable by Allied ground forces attempting to break out. Feverish efforts to rebuild damaged infrastructure, combined with the creative and "lavish use of all forms of transportation available," eventually allowed the Allies to break out of Normandy.[4]

The supply chain grew longer as Allied forces advanced further toward Germany, and the vital railroad link in the chain had been destroyed. A partial solution to this problem was found by using trucks. Trucks were normally the last link in the supply chain, and usually operated short distances. However, the Army altered their supply system and replaced the missing railroad link with trucks in the supply chain. Trucks hauled supplies greater distances and moved quantities far exceeding the amount normally planned in Army supply tables.

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[4] Ibid., 5-6.

Plans for the Normandy invasion calculated a slow initial drive, allowing supplies to keep pace with the advance. The Army was to gradually move east toward the Seine River, where they would regroup and supplies would catch up. Supplies were to be stockpiled before proceeding on toward the Rhine. Initially, things went pretty well according to plan. Trucks and reserve stockpiles grew quickly on the Normandy beach head, and no immediate breakout occurred. Three weeks after the initial landing (D+21), some 177,000 trucks and one-half million tons of supplies sat on the beach at Normandy. Unfortunately, the port at Cherbourg was not operating, and no pipelines were available to move mass quantities of fuel to Allied forces slowly moving away from the beach. Then, during the last week of July 1944, the First and Third Armies broke out, rapidly moving east and further away from supply stocks at Normandy. Fuel reserves were quickly consumed and trucks made daily runs hauling fuel from the beach to the front.

The plan to regroup near the Seine River did not happen. The First and Third Armies pursued the fleeing Germans, with some ninety percent of all supplies still at depots back at Normandy. In about one month's time, the First and Third Armies jumped three hundred miles beyond their supply stocks, and in thirty days they moved a distance that was expected to take seventy. By D+90, when the Army planned to be nearing the Seine River for a scheduled build-up, advance elements of the Third Army were two hundred miles beyond the Seine River. The supply system was in chaos and Army forces ground to a halt.[5]

The ports and railroads were inoperable, so without any advanced planning an impromptu solution was found. Trucks replaced the missing links in the supply chain, and continuously hauled supplies over three hundred miles down a one-way loop highway system. The Red Ball Express, as it was known, originated at St. Lo and ended at Versailles near Paris. The non-stop

[5] James A. Huston, *The Sinews of War: Army Logistics 1775-1953*, (Washington, D.C.: Office of the Chief of Military History,1966) , 526.

convoy travelled down two restricted-access routes, with deliveries coming from the northern route and returns made along the southern route. Operating from late August to early November 1944, the Red Ball Express moved 500,000 tons of supplies, kept the Army advancing, and allowed support troops to rebuild the ports and railroads that sustained the final Allied drive into Germany. The feat of the Red Ball Express illustrates how a system-driven Army successfully adjusted on the fly and replaced a missing link in the supply chain.[6]

Rapid, "blitzkrieg" advances did occur, but this type of war was not a hard, fast rule. In many areas, such as the Mediterranean Theater and China-Burma-India, terrain often hindered continuous supply. The pace of war slowed down, but supply needs remained high. When the Army's supply system of ships, rails, and trucks encountered terrain difficulties, another link was added to the supply chain by using pack animals. Truck and motor transportation could not move supplies to troops fighting in mountains or jungles, and the Army soon realized that animal power was the most efficient supply method in these areas. Returning to animal power for supply purposes seems logical and very apparent in retrospect, but this switch was not so obvious to those who fought for decades to replace pack animals with motors and machines.

The focal point of this work is animal power in the U.S. military, specifically the use of mules by the Army in World War II. The work does not begin with much mention of mules or the Army. Instead, its beginning is at the end of the nineteenth century with the birth of what

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[6] Steven E. Anders, "POL on the Red Ball Express: Getting fuel from the beach to the front lines as U.S. Divisions raced across France in 1944," *Quartermaster Professional Bulletin*, (Spring 1988): 1-5. POL stands for Petroleum, Oil, and Lubricant. See also Daniel G. Grassi, "Refuel on the Move: Resupplying Patton's Third Army," *Quartermaster Professional Bulletin*, (Summer 1993): 1-4. Both articles found at U.S. Army Quartermaster History website: www.qmmuseum.lee.army.mil/ under Research; Forest C. Palmer, A Wartime Journey to Berlin: The 296th Engineer Combat Battalion (1943-1945), Vertical File Manuscript, Carlisle, PA: U.S. Military History Institute (USMHI) also available as a PDF file at the Institute's website: www.carlisle.army.mil/ahec/ under *Digitized Material.* Particularly useful was the *"Recollections"* section in which several enlisted men, including truck drivers and mechanics, share their experience moving supplies via motorized transport; David P. Colley, *Road to Victory: The Untold Story of World War II's Red Ball Express, (*NY: Warner Books, 2000).

James J. Flink called "automobility."[7] The early American history of automobiles is a logical point of origin for the present work. First, the period perfectly demonstrates American adaptability, which is the main theme of this work. Second, examining the period will clearly show the depth and breadth of America's "car consciousness" which developed over a fairly short period. Third, American automobile history illustrates that during the late 1930s America was well on the road to complete automobile dependency, so that by World War II it was an even greater feat of adaptability to shift gears again and use animal power in certain theaters of war.

In June 1895, twenty two automobiles competed in a race was conducted from Paris to Bordeaux and back to Paris, France. Nine of the vehicles finished the 727-mile endurance test. The results of this race were not lost on the American public and its impact was two-fold. First, many Americans viewed this event as proof that the day would soon come when animal power was replaced by a more advanced form of transportation: the internal combustion-gas-powered motorcar. Second, the race inspired Americans to adopt a largely European innovation and adapt it to their needs, leaving a uniquely American mark on the automobile and indelibly changing American culture. Countless American automotive periodicals were published, and only five months after the Paris-Bordeaux-Paris race *Horseless Age* proclaimed: "All signs point to the motor vehicle as the necessary sequence of methods of locomotion already established and approved. The growing needs of our civilization demand it; the public believes in it; and await

[7] *Automobility* is defined as the combined impact of the motor vehicle, the automobile industry and the highway, plus the emotional connotations of this impact on Americans. James J. Flink, "Three Stages of American Automobile Consciousness," *American Quarterly* Vol. 24, No. 4 (Oct., 1972): 451; see also James J. Flink, *The Car Culture*, (Cambridge, MA: M.I.T. Press, 1975); and John B. Rae, *The American Automobile. A Brief History*, (Chicago: Univ. of Chicago Press, 1965).

with lively interest its practical application to the daily business of the world." [8] The statement was overly enthusiastic, but it did herald a growing, widespread shift in American attitudes regarding transportation. In 1899 approximately 2,500 motor vehicles were produced in the United States. By 1910 approximately 458,000 were registered in America.[9] Clearly the country was in an epic, transitional period that would necessitate adaptability on an equally grand scale.

The nation was shifting gears, and even those in conservative, rural America were gradually warming to the idea of motor transportation and mechanization. Motor transportation became a weapon used by farmers to battle railroad monopolies and rising transportation costs. Mechanization, primarily in the form of tractors, improved farm production and greatly increased crop yields. The number of tractors produced did not start rising until 1920, and the number of draft animals actually increased from 1910 until shortly after World War I. Around 1920, however, animal power began a continual decline, with motor transport and mechanization making a steady, rapid rise in American agriculture.[10]

The United States Army, as with most institutions steeped in tradition, has generally been considered a bastion of conservatism. It is not surprising that the Army was slow to embrace motorization and mechanization.[11] Yet, similar to the impact of automobiles on the American

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[8] "Salutatory," *Horseless Age*, 1:1 (November 1895): 1 quoted in Flinck, *The Car Culture*, p. 13.

[9] Flink, "The Three Stages of Automobile Consciousness," 454.

[10] Alan L. Olmstead and Paul W. Rhode, "Reshaping The Landscape: The Impact and Diffusion of the Tractor in American Agriculture, 1910-1960," *Journal of Economic History* Vol. 61, No. 3, (Sep. 2001): 663-698; see also A. P. Brodell and R. D. Jennings, *Work Performed and Feed Utilized By Horses and Mules*. U.S. Bureau of Agricultural Economics, and Farm Management No. 44., (Washington, DC: GPO, 1944); U.S. Bureau of the Census: *Historical Statistics of the United States: Colonial Times to 1970*, Part 1, (Washington, DC: GPO, 1975).
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[11] The U.S. War Department defined *mechanization* as "the application of mechanics directly to the combat soldier on the battlefield." *Motorization* was defined as "the substitution of the motor-propelled vehicle for the animal-drawn in the supply echelons of all branches of the Army...." From "Proceedings of a War Department Board of Officers on 'A Mechanized Force,' October 1, 1928," G-3 Course Number 24, U.S. Army War College, 1928-29, File 352-A-24, pp. 1, 3, 5-6. U.S. Army Military History Institute, (USMHI) Carlisle, PA. These different

public, the Army experienced radical change compliments of automobility. The change experienced by the Army during the first four decades of the Twentieth century was more evolutionary than revolutionary. Nonetheless, the technological advances in the first half of twentieth century dramatically affected the development and characteristics of the U.S. military; and few advances in technology had as significant an impact on the Army as the adoption of automotive technology.[12]

Most European powers found within the first decade of the twentieth century that motor transport was superior to animal-driven transportation of military men and material. By 1914 animal power had been largely replaced by motor vehicles, though the scope and scale of The Great War proved that these countries were still woefully unprepared to meet the supply demands of total war. The U.S. Army was not as far-sighted as their European counterparts.

The Quartermaster Department Equipment Board formed in 1900, but showed little interest in motorization other than as a novel curiosity. A few members of the Board became advocates of motor vehicles, such as Captain J.M. Carson of the Quartermaster Department. Carson pointed out the weaknesses of horse and mule power, particularly the difficulties in maintaining and training draft animals, and the slow speed of animal power as compared to motor vehicles. Carson recognized that motor vehicles could not completely replace horses and mules for carrying men and supplies in the field or off-road, but motor transportation could move larger quantities of men and supplies from railheads to forward depots, thus "eliminating huge

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designations came about in the late 1920s as the Army was mired in controversy over gasoline-power versus animal power in the combat arms and supply services.

[12] David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917—1945*, (Ithaca, NY: Cornell University Press, 1998); see also Norman M. Cary, Jr., "The Use of the Motor Vehicle in the United States Army, 1899-1939," (unpublished Ph.D. diss., University of Georgia, 1980); and for debate regarding "evolution" or "revolution" see Williamson Murray and Allan R. Millett, eds., *Military Innovation in the Interwar Period*, (Cambridge University Press, NY: NY, 1996).

trains of wagons and herds of animals." He also proposed that motor vehicles could move sick and wounded much quicker than animal power. Captain Carson's recommendations were flatly rejected as the Board concluded that "aside from the limited use which may be made as an adjunct to our present methods of transportation, the machines are of no value to the Army."[13]

Two issues hindered motorization of the Quartermaster Department and supply service in the early twentieth century. First, auto manufacturers were hesitant to produce military vehicles. Automotive firms saw little profit in making a limited number of motor vehicles for the Army when these companies could mass produce and sell growing quantities to an enthusiastic buying-public. Similarly, auto manufacturers had a genuine concern that military contracts would be cancelled due to budgetary constraints. Defense spending was meager, and for a time annual cuts were such that companies were reluctant to commit to Army contracts, fearing the very real possibility of the Army defaulting on its promises. Second, a general sense of apathy toward motorization and mechanization dominated the supply services and combat arms. Both were governed by an older generation of officers who clung to tradition and saw little, if any, benefit in converting to motorized or mechanized forces. This attitude, combined with severe fiscal limitations, fueled widespread indifference to technological advancements by the Army in the early 1900s. [14]

In 1910, attitudes toward motorization began slowly changing in the Army. The rapid rise in automobile production and ownership by the public was one reason. Likewise, the reliability and durability of automotive vehicles steadily improved, making automobiles more attractive for

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[13] Letter from Captain J. M. Carson to Brigadier General A.E. Bates, Head of Quartermaster Dept. Equipment Board, November 1, 1901, File # 350017, Record Group (RG) 94, NARA; Letter from Brigadier General A.E. Bates, Head of Quartermaster Dept. Equipment Board, to Adjutant General, November 9, 1901, File # 350017, RG 94, NARA.

[14] Cary, "The Use of the Motor Vehicle in the United States Army, 1899-1939," 20-21.

military purposes. Improvements in vehicle quality provided the few auto advocates something with which to counter opponents of motorization and mechanization in the military.

Army maneuvers provided excellent case studies for the potential use of motor vehicles. The Massachusetts maneuvers in 1909 included the use of between fifteen and twenty motor vehicles. Most were used as ambulances and the transportation of supplies. Detailed records were kept and Army officers observing the maneuvers concluded that trucks were "considerably more economical than horse-drawn transport." [15] Also, all vehicles in the Massachusetts maneuvers were standard, commercial-grade trucks, which were "able to handle all the difficult road conditions they encountered" and "were able to move rapidly, without significant mechanical problems, in spite of the difficult road conditions."[16] One final note regarding the Massachusetts maneuvers was that the Army owned none of the vehicles used in the operation. Most were rented daily or were the personal vehicles of officers and men participating in the maneuvers. These actions illustrate that a shift (albeit a slight one) toward motor transportation was taking place. The use of privately owned or rented vehicles also typifies the adaptive nature of American military personnel.

Further evidence of the Army's changing attitude toward motorization was seen in reports. According to the U.S. Army Infantry Equipment Board's twelve month study: "The extensive use to which automobile transportation has been developed in commercial life…leads to the belief that it can be advantageously adapted to our military necessities and urges the careful consideration of the subject." The Board also included a caveat: "It is not the belief of

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[15] Letter from Brigadier General A. L. Mills to the White Trucking Company, August 1, 1910, File #267270, RG 92, NARA quoted in Carey, 41.

[16] Captain E. J. Williams, "The Use of Automobiles and Motor cycles in the Field of Operations," *Infantry Journal*, Vol. 7, No. 6, (May-June 1911): 886.

the Board that automobile transportation should ever entirely replace the present animal transportation for the reason that many occasions and conditions will always arise when such transportation will be necessary...."[17] Whether or not the Board was being cautious or far-sighted to suggest the use of both forms of transportation is difficult to determine. However, the Army's intention to begin implementing motorized transportation was clear.

Field and durability tests were conducted by the Quartermaster Department in 1912. Beginning on February 6, 1912 five commercial motor trucks departed Washington, D.C. and travelled to Richmond, Charlotte, North Carolina, Atlanta, Georgia, Nashville, Tennessee and then Louisville, Kentucky on to Fort Benjamin Harrison near Indianapolis. Three trucks continued the journey on to Dubuque, Iowa, where they supplied an infantry regiment in the area until the maneuvers and tests were completed in July 1912. The mission was tiny and not without problems, but was considered a success by the Quartermaster Department, as the motor vehicles were able to withstand rugged conditions.[18]

Support for motor vehicles grew, but some in the Army complained about using commercial vehicles and wanted, instead, a vehicle that was made to military standards. As one officer mused, if a company produced a vehicle specifically for military use, then mules would become "a thing of the past soon to be relegated to the zoo."[19] Animal power, particularly mules, was still a long way from becoming a relic of the past, but motorization for supply purposes progressed and in 1916 the principal of motor transport appeared to be coming of age.

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[17] "Report of the Infantry Equipment Board," Rock Island Arsenal, Rock Island, IL, April 28, 1909; April 15, 1910, RG 92, NARA.

[18] Brigadier General A.E. Williams, U.S Automotive Transport History, 6-8; document has no publisher or date of publication, but is located in Folder marked "1911," Box 192, RG 319, NARA, quoted in Cary, p. 58.

[19] Captain Alexander E. Williams. "Field and Combat Trains," *Infantry Journal*, Vol. 10, No. 4, (January-February 1914): 521.

On March 9, 1916, Mexican rebels led by Francisco "Pancho" Villa attacked Columbus, New Mexico, killing fifteen American civilians. The United States' response was swift as General John J. Pershing and some 10,000 troops entered Mexico the next day. The Punitive Expedition was conducted from March 1916 until February 1917. Nearly all Regular Army troops were involved and over 112,000 National Guard troops were mobilized, creating massive logistical and supply headaches. The success of the Punitive Expedition has been the subject of much debate, but America's foray into Mexico unquestionably provided excellent schooling for Army logisticians and supply services.[20]

The Punitive Expedition exemplified the military's adaptive nature. The Expedition into Mexico was the first time the Army utilized motor transportation on any sizable level, as well as aircraft, though on a diminutive scale. However, animals remained the prime mover of men and material because mechanical problems continued to occur. These break-downs were aggravated by Mexico's harsh conditions and the heavy toll on motor trucks steadily rose.

Commercial trucks by 1916 had improved in durability, but off-road operations in northern Mexico proved quite different compared to cross-country endurance tests on American roads. The Army had yet to receive a standard military-grade vehicle and was forced to utilize machines that were straight "off the rack" or the same vehicles mass-produced and sold for civilian use. Most of the vehicles were of sound quality, but simply not built to handle the rigors

[20] Jeff Jore. "Pershing's Mission in Mexico: Logistics and Preparations for the War in Europe," *Military Affairs,* Vol. 52, No. 3, (July 1988): 117-121. For additional information on transport and logistical problems during the Punitive Expedition see also Marc K. Blackburn, *The U.S. Army and the Motor Truck: A Case Study in Standardization*, ed. Kenneth J Hagan and William R. Roberts, Contributions in Military History # 163, (Westport, CT: Greenwood Press, 1996), 17-20; Frank Tompkins, *Chasing Villa*, (Harrisburg, PA: Military Services Publishing Company, 1934).

and abuse of military operations under abysmal conditions.[21] Similarly, the commercial vehicles that had previously been in Army service or had proven most durable were in short supply when operations in Mexico commenced.

The Quartermaster Department came up with a simple and quick solution to the motor vehicle shortage. As there was no time for the usual road- tests, the Quartermaster ordered all interested truck manufacturers to apply with an ad hoc committee composed of Quartermaster Department members. The manufacturers were "given authority to place their trucks on the line of communication at Columbus, N. Mexico for demonstration and test." The results were "carefully observed, and upon their performance…subsequent purchases were made." These in-the-field trials rapidly reduced the shortage of vehicles as over twenty different truck companies supplied vehicles to the Army during the Punitive Expedition.[22]

The gap quickly closed between the quantity of trucks needed and the number in service in Mexico, but the rapid increase in vehicles generated new problems. The first was a lack of qualified drivers. The first companies to answer the Quartermaster's call for motor trucks provided civilian drivers and even some mechanics. This practice eventually proved problematic. Civilian personnel were familiar with motor vehicles, but Army regulations were a more foreign concept, and the Quartermaster Department was forced to adopt a more selective process when procuring truck drivers.

Any troops with prior knowledge of auto mechanics, motor transportation, or basic driving skills were deemed qualified to serve in the growing motor pool. A competitive

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[21] Daniel R. Beaver, "Politics and Policy: The War Department Motorization and Standardization Program for Wheeled Transport Vehicles, 1920-1940." *Military Affairs*, Vol. 47, No. 3 (October 1983): 101-108.

[22] U.S. War Department, *Annual Report, 1916, Vol. 1*, 383-384. Regarding exploits by specific auto manufacturers to meet Army needs see also Cary, p. 99-100; and James A. Huston, *The Sinews of War*, 298-299.

examination was generated to develop a more competent corps of drivers, but with dubious results. One non-commissioned officer admitted after receiving his sergeant-chauffeur's license that he knew nothing of driving a truck. He had taken a correspondence course in auto mechanics and passed the exam even though he had never driven a vehicle. Over time, however, the Army was able to refine their methods of selection and the quantity of qualified driver-mechanics rose.[23]

Another serious problem concerned spare parts and repairs. During the year-long Punitive Expedition, the Army used a variety of truck types made by several manufacturers. Interchangeable parts existed, but were uncommon and no system of organization had been given serious thought prior to the Expedition. Quartermaster requests for standardization had fallen on deaf ears prior to 1916. Now, with the crisis at hand, the Army was forced to depend on the ingenuity of the officers and troops involved. For example, a gasoline truck broke a spring, requiring the mechanic some five hours to build a new spring because no spares were on hand and the truck was a different make than the other trucks in the company.[24] The Army experienced a variety of growing pains during this time of transition, but remained adaptable during operations in Mexico.

The dawn of motorized warfare in Mexico was not completely without promise. The lackluster performance of motor transportation during the Punitive Expedition hardly indicated that motorized forces would immediately replace animal power or that mules would soon become zoo specimens. However, through trial and error and a steep learning curve Army forces gathered a wealth of experience during the year-long operation. Mexico became a laboratory

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[23] Tompkins, 250-25.

[24] Erna Risch, *Quartermaster Support for the Army: A History of the Corps: 1775-1939*, (Washington, D.C.: Quartermaster Historians Office, Office of the Quartermaster General, 1962), 595-597.

where motor transport theories were tested. Some of them failed, some proved successful, and some became an amalgamation of animal and motor power that led to the successful completion of supply missions.

The lessons learned during the Expedition proved invaluable to an Army about to embark on a trans-oceanic war, including the improved coordination of National Guard troops, the application of more mobile warfare, and the use of advancing technology. This last attribute would be magnified over the next thirty years, and as the scope of conflicts grew, so too did America's ability to adapt. Eventually there would be more machines than animals, but each conflict required the judicious application of both.

General Pershing and U.S. forces were recalled from Mexico in February 1917, thus ending the Punitive Expedition. Two months later, the United States declared war on the Central Powers, and the country mobilized for World War I. A great irony was that one of the world's most industrialized—and rapidly becoming the most auto-driven—society went to war with a pathetic number of trucks, almost no mechanization, and a little armor borrowed from the French. The Army, particularly the Quartermaster Department, tried to improve the quantity of its motor pool, which, one should recall, had not even existed just a few years earlier. In June 1916—during the Punitive Expedition—some 600 vehicles were in Army use. By June 1918, over 82,500 trucks were in the Army's motor pool.[25]

The most pressing problem associated with this quantum increase in vehicles was a lack of standardization. The Army and auto manufacturers tried to cooperate and develop standard vehicles. The Quartermaster Department and the American Society of Automobile Engineers

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[25] U.S. War Department, *Annual Reports, 1917, Vol. 1*, 316-317; U.S. War Department, *Annual Reports, 1918, Vol. 1*, 41.

attempted to establish criteria for standard truck designs. Headway was made in the development of standard military trucks, but the process was time-consuming. It was not until the end of 1917 that a standardization policy was adopted, and it was well into 1918 before the policy was implemented and a standard type of vehicle arrived for Army use in France.[26] The U.S. military, as well as their French and British Allies, demanded quantity during the initial phases of American mobilization, and simply could not wait to produce a standardized truck fleet. Organization was sacrificed for numbers, and the war was over by the time the Army began addressing the problem of disorganization.[27]

The reality was that no transportation panacea existed for the Army in 1917 and 1918. Motor transportation clearly had advantages over animal transport: motor trucks moved supplies faster than animal power. Motor trucks consumed large quantities of fuel, but the fuel was in many ways easier to ship and store than grain and feed for animals, and shipping space for a trans-Atlantic voyage was at a premium. Likewise, motor fuel could be stored for indefinite periods of time, sometimes months, compared to grain, which had a much shorter shelf-life.

The quality of automotive and motor transportation had improved, and Army advocates of motor transportation produced glowing reports of vehicle durability. Reports notwithstanding, Army vehicles remained frail, primarily because the Army was forced to rely on commercial-grade vehicles, which were simply not designed to meet the rigors of military operations. Also, the greater problem for motor transportation remained the lack of standardization. The Army used some 274,000 vehicles in 1918, with over 200 different makes and models. Keeping these vehicles maintained proved an almost insurmountable task; half were non-functional at any given

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[26] U.S. War Department, *Annual Reports, 1917, Vol. 1*, 313-318.

[27] Blackburn, *The U.S. Army and the Motor Truck*, 27.

time. Spare parts for this massive, varied quantity nearly paralyzed Army transport. As a supply officer observed: "fields as large as five or six acres were stacked as high as buildings with spare parts…. We were trying to segregate them, in other words put Packard parts in one place, Ford parts in another, Dodge in another, and Cadillac parts and so on…. There were so many parts that no one really knew what was there…."[28] The American Expeditionary Force (AEF) was in dire straits regarding the delivery of supplies. In the end, however, and largely through trial and error, the AEF's supply services created a system that managed, maintained, and operated the AEF's diverse motor fleet.

Three things saved the AEF regarding logistics and supply in 1918. First, the Army began to adapt at the administrative level, creating a bureaucratic framework to ameliorate some of the logistical headaches, such as vehicle maintenance and spare parts supply. The War Department issued a General Order in April 1918 establishing the Motor Transport Service, followed in August by the creation of the Motor Transport Corps (MTC). The MTC had authority to procure, maintain, and repair all motor vehicles. MTC personnel were trained, maintenance schedules kept, and the motor pool system developed. A standardization board formed in October 1918 and, while the war was a mere months from ending, the issue of standardization that had bedeviled the Quartermaster Department since the genesis of motor transport was finally

[28] U.S. War Department, *Annual Reports*, 1918, Vol. 1, 786; see also Beaver, "Politics and Policy," 103; Maj. William C. Dunckel, "The Procurement and Maintenance of Automotive Vehicles in the Next War," Army War College, USMHI, Carlisle, PA: 1938. Appendix 1; and Jack Speedy, "From Mules to Motors: The Development of Doctrine for Motor Vehicle Maintenance by the Army, 1899-1918 (unpublished Ph.D. Dissertation, Duke University, 1977).

addressed. Parts of this framework remained intact after World War I and expedited the shift from animal power to motor transportation.[29]

Second, the continued use of animal power in many ways saved the floundering motor transport pool. In October 1918, the AEF had over 51,000 trucks, automobiles and motorcycles in France. Over 163,000 horses and mules augmented these motor vehicles. Advocates of motor transportation argued that animal power was expensive and slow, two undeniable charges. Yet the development of motor vehicles at this point was such that few were truly capable of off-road movement. The fact remained that there were places where motor vehicles could not travel. The only mode of transportation that had a reasonable chance of delivering supplies remained the time-tested horse and mule; and occasionally even this durable source of transportation failed.[30]

The horrendous conditions of the roadways and surrounding countryside made it virtually impossible to move across "the morass of the battle zone." Vehicles and animals together, along with several hundred thousand men created unimaginable scenes of congestion. In the Saint-Mihiel sector fifteen divisions were concentrated, with a single division occupying approximately nineteen miles of road space. In the Meuse-Argonne area alone some 3,500 motor trucks and 93,000 horses and mules were crammed to supply AEF operations in September 1918. Supplying front-line troops of the AEF was most arduous, the difficulty of which was only exceeded by combat operations. However, severe shortages of motor vehicles, horses and mules, transport personnel, and viable roadways were not insurmountable. At critical moments the delivery of supplies always managed to come through and keep the AEF moving. [31]

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[29] U.S. War Department, *Annual Reports, 1919*, "Report of the Chief of Staff, Vol. 1, Part 1, 288-291; Report of the Quartermaster General, Vol. 1, Part 1, 729-739; "Report of the Chief of Motor Transport Corps," Vol. 1, Part 4, RG #165, NARA, quoted in Cary, pp. 113-115.

[30] Huston, *Sinews of War*, 385.

[31] Ibid., 378-383.

Finally, the war ended. It is reasonable to assume that had the war continued for several more months, the supply system in all likelihood would have been strained to the breaking point. It is doubtful that the ad hoc transportation network of motors and mules could have sustained the Meuse-Argonne offensive, much less supported additional offensive actions. The consumption rate of supplies available was so high that stocks were nearly depleted at the time of the Armistice. Trans-oceanic shipping struggled to keep up with supply and overland transportation of supplies was hindered by a paucity of vehicles, animals, and service personnel. All of these problems were compounded by failures of the AEF to coordinate and organize what supplies they actually had on hand. Experience and advanced planning would have ameliorated some of these logistical problems. However, as Huston asserts, "experience of the kind required was experience that neither the AEF nor any other army had, for the support of such a force at such a distance from its homeland…was a pioneer effort in 1917 and 1918."[32] Unfortunately, much that was learned regarding transportation during these pioneering days on the Western Front was forgotten as soon as the AEF demobilized.

America attempted to focus on domestic affairs immediately following World War I. Yet despite widespread public indifference and drastically reduced defense spending, innovation and adaptability occurred within the Army. Development in aircraft, ships (particularly aircraft carriers), submarines, and armor saw quantum improvements. Among the most evolutionary areas of improvement for the Army during the interwar period (1919-1940) were the movement of men and material and the increase of firepower. Change was a constant battle against a stingy

[32] Ibid., 383.

Congress, an unsupportive public, and intra-service rivalry, but the Army was not completely stricken with atrophy and managed to evolve.[33]

The Army was able to motorize and mechanize during the interwar period because of the American public's full embrasure of auto-transportation during these two decades. As President Warren G. Harding proclaimed to Congress in April 1921, "The motorcar has become an indispensable instrument in our political, social, and industrial life." Horse culture and animal power was being replaced as automobiles became an integral part of American life. By the mid 1920s, over 55 percent of the 27.5 million American families owned at least one car; and by 1929 all states were collecting gasoline taxes.[34]

The Great Depression did little to deter the American preoccupation with automobiles and driving. After 1929, new automobile sales leveled out temporarily and people drove older cars as the Depression wore on, but American still drove. As Robert S. and Helen M. Lynd noted, it was "not unusual to see a family drive up to a relief commissary in 1935 to stand in line for its four or five dollar weekly food dole." Car ownership and operation proved to be among the most Depression-proof markets and routines in urban America.[35]

Rural America, likewise, began adopting auto-transportation during the 1920s and 1930s. Farmers only grudgingly embraced motorization and mechanization. In this regard American agriculture's conservatism was similar to that of the military, and those in the Army echoed

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[33] *Military Innovation in the Interwar Period*, Murray, Williamson and Allan R. Millett, Eds. (Cambridge University Press, NY: NY, 1996), 2, 344.

[34] Warren G. Harding's Message to Congress, April 12, 1921 quoted in Flink, *The Car Culture*, 140. See also Flink, 142-149. Note that there was no general protest against nationwide gasoline tax as Americans willingly sacrificed income to continue driving.

[35] Robert S. Lynd and Helen M. Lynd, *Middletown in Transition: A Study in Cultural Conflict* (NY: Harcourt, Brace, 1937), 266-267. See also Robert S. Lynd and Helen M. Lynd, *Middletown: A Study in Modern American Culture* (NY: Harcourt, Brace, 1929).

many of the challenges raised by opponents to mechanization on the farm. Tractors prior to the 1920s were less reliable, and animals had greater efficiency, pulling power, and mobility in poor field conditions. The quality and reliability of tractors improved and the animal power advocates gradually lost credibility. But it was in efficiency that tractors made the greatest improvements: farmers could simply plow more acres per day with tractors. Draft animals still possessed some usefulness, particularly in wet fields, but "good farming" was measured quantitatively. Horses and mules simply could not keep pace with tractors regarding the amount of acres covered per unit of time, and the shifting of gears from animal power to motorization/mechanization lurched forward across America's farmland in the interwar period.[36]

Progressive farmers looked at tractors from an efficiency and economic viewpoint. Reactionary opponents to mechanization critically viewed tractors from a reliability viewpoint. And when this tack lost credibility the reactionary argument switched to on economics arguments (such as the lost jobs and occupations of blacksmiths and veterinarians) and emotion (an American way of life will be lost as these skills and traditions are replaced). Little common ground was found in this dispute over farm power choices. Tractor advocates tended to overstate the abilities of mechanization and downplay the benefits of animal power. Opponents of mechanization boasted that "a mule is the only fool proof tractor ever built." Still a handful of others rode the fence and proposed using both tractor and animal power. Eventually, though, agriculture made the shift from horses and mules to motors.[37]

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[36] George B. Ellenberg, "Debating Farm Power: Draft Animals, Tractors, and the United States Department of Agriculture," *Agricultural History*, Vol. 74, No. 2 (Spring 2000): 545-568.. See also Alan L. Olmstead and Paul W. Rhode, "The Agricultural Mechanization Controversy in the Interwar Years," *Agricultural History*, Vol. 68, No. 3 (Summer 1994): 35-53.

[37] "Three to One in Favor of the Mule: Story of the Tractor Demise from the Miller Bros. 101 Ranch Trust, Oklahoma, The Largest Diversified Farm and Ranch in the United States," Horse Association of America, Leaflet no. 69, ca. 1920, quoted in Ellenberg, "Debating Farm Power," 552.

The similarities were striking between the agricultural community and the Army concerning arguments for and against motorization and mechanization. Progressive-minded military leaders continued to highlight the mobility and cost-efficiency of motorization. The more reactionary camp downplayed any positive aspects of motorization and proclaimed the only reliable, proven source of transportation was animal power. Reactionaries also played the emotional card, arguing that an American military tradition would be lost if horse-mounted cavalry were replaced by a mechanized, armored force. The interwar years witnessed great resistance to motorization, but in the end the Army adapted to and fully embraced motor-transportation and mechanization.

One area in which auto-transportation had improved by the 1920s was in reliability, and the War Department became convinced after World War I that complete motorization was not only the best solution to the Army's transportation needs, but in light of continued advances in automotive technology it was inevitable. Secretary of War John W. Weeks noted in 1921, "…the War Department has been devoting every effort possible to replacing the horse and mule by motorized elements. This is virtually accomplished except for those elements which must cross over open ground away from the roads."[38]

The Army may have had the desire to motorize, but it was severely hampered by a miserly Congress that was supported by a peace-minded and isolationist public. These restraints were felt immediately after World War 1, when the American populace was determined to "bring the boys home" and de-mobilize. By June 1919 over 2 million men had been discharged from the U.S. armed forces; and by January 1920 only 130,000 remained in the Army. The Army

[38] *War Department Annual Reports, 1921*, Vol. 1, 28-29.

possessed over 100,000 motor vehicles, but no mechanics, operators, or technicians.[39] The Army hardly fared better throughout the 1920s under the Harding, Coolidge, and Hoover Administrations, and the restraints to defense spending became all the more acute during the depression-plagued1930s. Nonetheless, against all odds and obstacles, the Army motorized and mechanized.

Congress passed the National Defense Act of 1920 (NDA-1920) to establish a military policy that would address some of the problems experienced during America's mobilization for World War I. One of the major challenges for the U.S. Army was how to accommodate new technologies, such as armor and motor transportation, which had proven to be effective, or at least had great potential, during the Great War. The final version of the National Defense Act fell short of radically revamping the U.S. military, due largely to a President, Congress, and public that desired a return to "normalcy" and grew more convinced that any serious threat to national security was quite remote. In spite of these obstacles and under the restrictions of NDA—1920, the Army attempted to forge ahead with motorization and mechanization.[40]

Aside from budgetary concerns and public antipathy, another seemingly insurmountable obstacle to Army motorization and mechanization came from within the Army itself. The arms most reliant on animal power, including the cavalry, artillery, and Quartermaster, were loath at first to support motorization and mechanization over animal power. As one officer noted in 1920, soldiers

> [M]ay have very conservative views regarding replacing animals for combat transport, and he is certainly correct unless the substitute can do everything the horse has

[39] Johnson, 1, and Cary, 137, 149. See also Huston, *Sinews of War*, 388-399 for a detailed account of post-World War I demobilization, including surplus property disposal, and the liquidation of property overseas and in the United States.

[40] Johnson, 29.

> been able to do in the past. Assuming this one vital condition to be met, every other consideration is most decidedly in favor of the motor. It is cheaper to operate, the volume and tonnage of fuel and oil is less than that of forage, it does not eat when not working, requires less men and less training of these men, it is easier to transport by rail or water, requires less space on the road, is not subject to fatigue, is less vulnerable to gas, bombs, and enemy fire, does not create the unsanitary conditions that the horse does alive or dead, and is easier to camouflage; but it must be repeated that all these advantages are negligible in war unless the motor combat transport can do as well as the horse in getting material to the place needed at the time needed.[41]

The officer summarized most of the advantages possessed by motorization and mechanization over animal power, but stopped short of proclaiming machine supremacy. On the contrary he suggested that animal power still had a place on the battlefield, at least until a machine was produced that could go anywhere an animal travelled. He represented the cautious few that recognized the utility of gas-powered motorization in battle, but were circumspect enough to realize the necessity of animal power on the field of battle. Most of his military colleagues were not as far-sighted.

The Cavalry arm stubbornly resisted motorization and mechanization, particularly in the early 1920s as the cavalry returned from a lackluster showing in World War I and resumed their principal duty of patrolling the Mexican border. The Cavalry was in its element when operating in a region that was dominated by formidable terrain, and proponents of animal power and horse cavalry were quick to point out the necessity of such forces for national security. Similarly, the Cavalry arm could justify their place because mechanization (tanks) and motorization (trucks) still suffered from some reliability problems and mechanical break-downs in the years immediately following World War I. As technology improved, however, and the dependability of motor vehicles increased, the Cavalry arm began to resist motorization primarily on emotional grounds. Many in the Cavalry arm were struck with romanticism and the nostalgic notion that the

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[41] Colonel Lucian B. Moody, "Motorized Artillery," *Army Ordnance*, Vol. 1, No. 1, (July-August 1920): 9.

power of man and beasts won wars, not machines; and some argued this belief until well after it was disproved.[42]

Others realized that the cavalry, and the Army in general, must shift from a largely animal-powered constabulary force to a national army capable of conducting motorized, mechanized total war. In the summer of 1927, U.S. Secretary of War Dwight Davis observed maneuvers of a British experimental tank and armored car force. Shortly thereafter the Army Chief of Staff gave the Army G-3 a simple order to "Organize a Mechanized Force."[43] Again, the desire to change existed, but it met with obstacles and opposition. The "Experimental Mechanized Force" as it was called, gathered at Fort Meade, Maryland in July 1928. Its performance and reception were hardly encouraging. The World War I-vintage trucks and antiquated, foreign-built tanks repeatedly broke down; and public opposition to the maneuvers was rife as state government officials refused to allow armor on highways for fear of destroying tax-payer roads.[44] The Experimental Mechanized Force quickly disbanded, but the drive toward mechanization was unstoppable. Or as the First Cavalry Division commander in Fort Bliss, Texas noted, "When the cowboy down here is herding cattle in a Ford we must realize that the world has undergone a change."[45]

The country was shifting gears, literally and figuratively. And while the Army might not have experienced a revolution during the interwar years, it was undeniably in a dramatic,

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[42] Johnson, 124

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[43] Mildred H. Gillie, *Forging the Thunderbolt: A History of the Development of the Armored Force*, (Harrisburg, PA: The Military Service Publishing Company, 1947), 20.

[44] Ibid., 22

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[45] Brigadier General George Van Horn Moseley to Major General H. B. Crosby, December 2, 1927, File 322, Office of Chief of Cavalry, Box 7a, RG 177, NARA.

evolutionary phase.[46] The shift toward motorization became more apparent in 1931, as Army Chief of Staff General Douglas MacArthur announced, "Every part of the Army will adopt mechanization and motorization as far as practicable and possible." MacArthur was clear in his assessment of the continued use of animal power, stating "as a means of transportation, he [the horse] has generally become, next to the dismounted man, the slowest means of transportation;" and horses and mules "may remain only where they cannot be replaced by the motor."[47] A field artillery officer at the Army War College observed "the care of animals is a passing art, but most of the men know something about motors and are keenly interested to learn more."[48] Major General George Van Horn Moseley, the Deputy Chief of Staff, was more succinct: "My idea is to replace the horse by motor."[49] Needless to say some of those in the Cavalry took this as a direct threat to their livelihood, military tradition, and national security

George Patton was one of the more reserved proponents of mechanization, who, ironically, would later be hailed as one of the greatest armored commanders in World War II. In the early 1930s, Major Patton was more of an animal power advocate, observing that horses truly possessed all terrain capabilities and warned that it was foolish to rely too heavily on machines

[46] See Murray and Millet, Chapter and explanation on "evolution" versus "revolution" and how historians often mistakenly refer to changes as "revolutionary" when in fact they are simply the evolution of doing something, in this case the movement of soldiers and material from animals to motors.

[47] General Douglas MacArthur, May 1, 1931, Adjutant General to Commanding Generals of All Corps Areas and Departments, AG 537.3, File 322.012, Office of the Chief of Cavalry, Box 7a, RG 177, NARA.

[48] Major J.W. Anderson, "Motorization of Armies" Address to Lecture at the Army War College, January 12, 1931, File 377-10, Army War College Curricular Files, USAMHI, 7-9 quoted in Vincent J. Tedesco "Greasy Automatons and the Horsey Set: The U.S. Cavalry and Mechanization 1928-1940," (unpublished Master's Thesis, Pennsylvania State University, 1995).

[49] Major General George Van Horn Moseley, Deputy Chief of Staff, to Major General Guy V. Henry, Chief of Cavalry, July 3, 1931, File AG 537.3, Mechanized Forces, Box 2701, RG 407, NARA quoted in Tedesco, 56.

or to "pin our whole faith on their efficacy."[50] In a colorfully-worded critique of mechanization, Patton referred to the "blithesome theories of the self-styled mechanists or scientific warriors who are so exhilarated by the gaseous exhalations of their pet machines as to be oblivious to the necessity for more prosaic arms."[51] Three years later, Patton continued to express his doubts about the Army's total mechanization and complete replacement of animal power when he wrote, "History is replete with countless other instances of military implements each in its day heralded as the last word—the key to victory—yet each in its turn subsiding to its useful but inconspicuous niche."[52] At this point in the evolution of motorized and mechanized warfare, Patton rode the fence and advocated both forms of power. He believed that the most effective policy was cautiously to implement motorization and mechanization, but he realized that animal power (a more "prosaic" arm) would always have its place.

One of the most devout proponents of animal power, and critic of motorization and mechanization, was Brigadier General Hamilton Hawkins. Like other reactionaries within the cavalry, Hawkins over-emphasized the utility of animal power and never missed an opportunity to point out the shortcomings or potential failures of motorization and mechanization. As General Hawkins wrote, "Mechanized forces may assist but cannot replace cavalry on these cross country missions, because, in spite of unproven assertions that large numbers of

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[50] Johnson, 127.

[51] Major George S. Patton, Jr., "Motorization and Mechanization in the Cavalry," *Cavalry Journal*, 39 (July 1930): 333-334.

[52]Major George S. Patton, Jr., "Mechanized Forces," *Cavalry Journal, 42* (September-October 1933): *8.*

mechanized forces can travel speedily across country, no reliance can be based upon these assertions."[53]

Animal power advocates remained in the Army, and animals remained a part of the Army's Table of Organization and Equipment (TO/E). For example, a 1936 general requirement per the War Department Mobilization Plan called for a total of 90,000 animals to service tactical field artillery units. The total motorization and mechanization of the Army was still far from complete. However, it should also be noted that the total strength of horses and mules on hand was approximately 5,500, a significant shortfall from the 90,000 required in the TO/E.[54]

In the mid-1930s, the Army produced detailed recommendations for the most efficient use of horse and mule power. In a memo to the Adjutant General, the Chief of Cavalry, General Leon B. Kromer, remarked that "conditioning of remounts (replacement animals) prior to issue is inadequate" and that unconditioned mounts were "fatal to mobility." He further noted that "a link in the chain of supply is missing" because of inferior animal conditioning, and that "a system comparable to the replacement system by which recruits are processed, fitted out, trained, and conditioned" should apply to remounts.[55] General Kromer was not the most ardent opponent of mechanization and motorization. He was best known as supporting the implementation of both animal and motor power, particularly within the Cavalry arm, but in 1936 he still remained loyal

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[53] Brigadier General Hamilton Hawkins, "Reorganization of Divisions and Higher Units," Memo, November 25, 1935, p. 4, Correspondence, 1921-1942, Office of the Chief of Cavalry, RG 177, NARA. See also Brigadier General Hamilton S. Hawkins, "Cavalry and Mechanized Force," *Cavalry Journal* 40 (Sep.-Oct. 1931): 19-23; Alexander M. Bielakowski, "General Hawkins War: The Future of the Horse in the U.S. Cavalry," *Journal of Military History*, Vol. 71, No. 1 (January 2007): 127-138.

[54] Colonel L.J. McNair, Office of Chief of Field Artillery, Memo to Assistant Chief of Staff, G-3, War Department General Staff, December 7, 1936, File AG 454, RG 92, NARA.

[55] Major General Leon B. Kromer, Chief of Cavalry, "Mobilization Provisions for Conditioning Remounts," Memo to Adjutant General, November 11, 1936, File AG 454, RG 92, NARA.

to those supporters of animal power, and sincerely believed it to be the most proven method of supply.

Mixed signals about the motorization and mechanization emanated from high levels. In 1937, Secretary of War Harry W. Woodring wrote to U.S. Senator Carl Hayden of Arizona:

> Referring to your letter of October 13, 1937, regarding certain pending legislation designed to motorize the entire Army and Marine Corps, permit me to submit the following. The War Department has not submitted any legislation designed to motorize the entire Army, nor is any such legislation under consideration. Further, it is not contemplated that there will be any curtailment to remount activities.

The Secretary went on to explain that a decrease in the number of horses had occurred, but it was related purely "to reductions in appropriations" and not because of a widespread push to motorize the Army.[56]

Perhaps the most ardent supporter of horse cavalry and most vitriolic opponent of mechanization was General John K. Herr. Appointed Chief of Cavalry in 1938, Herr resisted the Army's transition to mechanization, arguing "we must not be misled to our own detriment to assume that the untried machine can displace the proved and tried horse."[57] Resistance appeared futile as the numbers of horses and mules steadily dwindled during the mid 1930s. Cut backs in horse flesh began around 1935 when appropriations for Fiscal Year 1936 only underwrote about ten percent of the remounts needed in the Cavalry and Field Artillery. As a memo went on to explain: "Under present plans, the purchase of mules for replacements will be extremely limited. Replacements will not exceed 10% of present allowances. Serviceable animals will be retained for use as replacements…and animals not suited for extended field use will be disposed of..." or,

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[56] Secretary of War Harry H. Woodring letter to Senator Carl Hayden, October 13, 1937, File AG 454.1, RG 92, NARA.

[57] Major General John K. Herr, Memo to Chief of Staff, October 17, 1938, File 334. 3, Office of Chief of Cavalry, Box 13, RG 177, NARA.

as a subsequent bulletin explained, "destroyed or put out to pasture."[58] In 1936, the War Department did not allocate any remounts (replacement horses and mules) to cavalry and field artillery units that were in the process of mechanization and motorization. In other words, the number of horses and mules on hand would not decrease, but there would be no replacement for these mounts either. In 1937, the Army was short of its authorized number of horses and mules by 1,903 animals; it was estimated that the Army would be short by 1,300 animals in 1938.[59]

As animal power declined, the war of words between partisans of mechanization and animal power continued. The most outspoken advocate of mechanization and motorization was Adna Chaffee, considered to be the "father of the armored force." In 1927, Chaffee turned down the opportunity to serve as the Chief of Cavalry, instead taking an assignment to the training section of the General Staff. It was in this position that Chaffee developed his ideas about motorized and mechanized warfare. Chaffee envisioned a "union of all arms," including horse cavalry, armored cars, tanks, tracked artillery, and motorized infantry and support troops. In 1931, Chaffee explained: "The main point is this that we, as soldiers, must recognize the tremendous strides which our automotive industry has made since the last war. If we neglect to study every possible usage of this asset in our next war, we should not only be stupid, we should be incompetent."[60]

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[58]War Department, OQMG Memo to Adjutant General, April 8, 1935, File AG 454.1, RG 92, NARA; H.E. Collins, Assistant Director of Procurement, U.S. Treasury Department, Bulletin to Heads of All Departments, "Horse and Mule Surplus to the Federal Government," October 19, 1938, File 454, Miscellaneous Correspondence, RG 92, NARA.

[59]Brigadier General A.B. Warfield, Quartermaster Corps, Letter to U.S. Senator Joseph C. O'Mahoney, May 12, 1937, File 454, Miscellaneous Correspondence, RG 92, NARA.

[60] Colonel Adna R. Chaffee, "Mechanization in the Army," lecture to the Army War College, October 28, 1931 quoted in Gillie, *Forging the Thunderbolt*, 43.

Chaffee's proposals met fierce opposition. Motorization and mechanization were expensive, even if defense spending had not been as paltry as it was during the interwar years. Public indifference and Congressional disapproval for new military innovations left progressives such as Chaffee fighting an up-hill battle. In 1934, Army maneuvers at Fort Riley using both horse and mechanized and motorized cavalry proved the worth of the gasoline engine. Reactionaries, such as Hawkins and Herr, still resisted every move toward mechanization, causing Chaffee angrily to note: "Those fellows at [Fort] Riley ought to understand that the definition of cavalry now includes troops of any kind equipped for highly mobile combat and not just mounted on horses. The motto of the School says, 'Through Mobility We Conquer.' It does not say 'Through Mobility On Horses Alone We Conquer.' "[61] These maneuvers proved that both animal and motorized and mechanized power still had places on the battlefield, but neither camp was amenable to the idea of a mixed force.

Chaffee and the progressives may have been frustrated at the slow pace of mechanization, but the Army was clearly moving toward a motorized and mechanized force. The number of horses in Army use declined rapidly during the late 1930s, and mules hardly fared better. The following memo typified the Army's shift from mules to motors: "In view of recent orders which will eventually motorize the 2nd Division, it is directed that the purchase of mules for the current fiscal year be suspended until further order."[62]

In early 1939, the Adjutant General's Office announced: "As the approved motorization program for the Army progresses and draft mules thereby become excess, it is desired to eliminate all unnecessary maintenance of the Army of such animals, by effecting prompt

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[61] Ibid., 68.

[62] War Department, Adjutant General, "Purchase of Animals, F.Y. 1939," Memo to OQMG, October 5, 1938, File # 454.2 General Correspondence "Subject File" 1936-1945, Box 608, RG #92, NARA.

disposition."[63] According to the War Department: "Economical accomplishment of the Army's approved motorization program visualizes the substitution of motors in place of animals… To this end, it is desired that the present allowances of draft mules…be reexamined to determine whether complete elimination of or any reduction in the number of draft animals…may be practicable."[64] Motorization of the Army was shifting into high gear. Ironically, the demand for these "excess mules" dramatically increased within a few years, forcing the Army to adapt once more.

One of the last defenders of animal power was General John K. Herr, who, in spite of overwhelming evidence to the contrary, continued to champion horse cavalry and animal superiority in modern, mechanized war. Herr used the *Cavalry Journal* as his forum to promote the benefits of animal power and highlight the disadvantages of mechanization. Articles published during the summer of 1939 lauded Poland for wisely developing a premier horse cavalry for its national defense. The articles, most likely written by General Herr, proclaimed that Polish cavalry were ready for modern war and prepared to battle mechanized enemies. The German Army invalidated such claims in September 1939.[65]

Motorization and mechanization proponents seized upon the German "blitz" of Poland as irrefutable evidence against animal power. The German armor, air, and ground forces were

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[63] War Department, Adjutant General, "Mules Rendered Excess by Motorization Program," Memo to the OQMG, October 17, 1939, File 454.2, Miscellaneous Correspondence, Box 608, RG 92, NARA.

[64] War Department, Adjutant General, "Allowances of Draft Mules for Administrative Purposes," Memo to Commanding Generals of All Corps Areas and Commanding Officers of Exempted Areas Concerned, February 25, 1939, File 454.2, Miscellaneous Correspondence, Box 608 RG 92, NARA.

[65] "Training of Modern Cavalry for War: Polish Cavalry Doctrine," *Cavalry Journal* 48, (July-August 1939): 298=305; "Cavalry in Poland," *Cavalry Journal* 39 (July-August 1939): 315 quoted in Johnson, *Fast Tanks and Heavy Bombers*, 138. It is hard to imagine a less credible example of military efficacy than the Polish cavalry against the mechanized German Army in 1939. It must also be noted that the vaunted motorized-mechanized German Army received nearly all of its supplies from animal power, an often overlooked fact that contributed greatly to their defeat later in the war.

driven by the gasoline engine and were able to annihilate Polish horse cavalry and foot soldiers. As a *Cavalry Journal* article noted in the winter of 1939, "The army whose destructive, striking effort was based on mechanization, aviation, and motorized infantry swept the enemy from the battlefield.[66] June 1940 witnessed the fall of France to the German war machine, and the voice of animal power advocates became lost in the roar of mechanized warfare. Images of German mechanized forces blitzing across Europe convinced the Army that the future must rely on motors and machines, not horses and mules. General Chaffee predicted, "In any important war involving armies and fought in terrain where important wars are fought, mechanized cavalry is a vastly more powerful, mobile, and decisive force than an equal or greater force of horse cavalry."[67]

Army maneuvers in 1940 and 1941 saw a steady increase in motorized and mechanized forces. The main focus of these maneuvers was Regular Army and National Guard units training in field operations, but another key purpose was to give motorized and mechanized forces experience in these controlled field exercises. One of the largest maneuvers was held across Tennessee, Arkansas, and Louisiana from June through September 1941.

The exercise in Arkansas was typical of the maneuvers. One corps of Regular Army troops was pitted against a corps of National Guardsmen. The Regular troops included "highly mobile forces, richly endowed with mechanization" versus the National Guard force that was

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[66] "Time to Wake Up," *Cavalry Journal* 48 (November-December 1939): 501.

[67] Brig. General Adna Chaffee, "Some Observations and Recommendations Pertinant to Any Future Expansion and Development of Mechanized Cavalry which May Be Contemplated by the War Department," Memo to Adjutant General, September 15, 1939, File 322.02, Mechanized Cavalry, Box 7, RG 177, NARA.

comprised of "slower infantry divisions…with almost no mechanization."[68] Headaches were plentiful, not the least of which was terrain and lack of infrastructure. The staff decided that the original site was too rugged—heavily wooded and crisscrossed by streams and rivers. They eventually settled on another densely wooded region with only one concrete road and the secondary roads required much maintenance and repair before the exercise commenced.

The two forces finally engaged, but the highly mechanized Army force was unable to encircle and annihilate the less mobile National Guard troops. The National Guardsmen were able to retreat and delay the mechanized forces by using the rugged terrain and destroying what few roads and bridges existed. The final phase of the exercise ended in a draw as the mechanized Regular Army force cut off the National Guard force's line of retreat, but was never able completely to over-run the Guardsmen. A post-maneuver report noted the number one consideration is "that terrain is the key to successful military operations and it should be studied profoundly."[69] Unfortunately, this point was forgotten as the Army rushed to mechanize.

The animal power reactionaries were wrong, but so, too, were the myopic motor-men who failed to develop contingencies for animal power's use when conditions dictated. The most motorized and mechanized nation on earth shifted gears, and the Army, with the exception of the horse cavalry, adapted to technological advances. As ineffective and interrupted as it was, the Army's transition to motorization and mechanization happened. The help of innovators, such as Moseley, Chaffee, McArthur, and Patton, pushed the Army—a rigid, conservative institution—to adopt motorization and mechanization. The Army was hardly advanced or cutting-edge

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[68] Second Army and General Headquarter Phase, Maneuver Report VII Army Corps, Arkansas-Louisiana August 10-September 30, 1941, Vol. II, RG 400, NARA; and Franklin B. Cooling, "The Arkansas Maneuvers, 1941," *Arkansas Historical Quarterly*, Vol. 26, No. 2, (Summer, 1967): 103-122.

[69] Critique of Army Phase, September 10, 1941, Maneuver Report VII Army Corps, Vol. II, RG 400, NARA.

regarding motorization and mechanization and was certainly not a true reflection of American society, which that was becoming completely dominated by "automobility." Nonetheless, by 1941-42 the Army had every intention of driving across the battlefield in the next war. What was unknown at the time was that the Army would be forced to adapt again when deployed to theaters that left motors and mechanization at a standstill. The Army did not get to start in places "where important wars are fought," but rather in undeveloped, backwaters where animal power reigned supreme. The Army was forced to regress in order to move forward.

Figure 2-0. Motorized machine gun company pass cavalry troops during the Punitive Expedition to Mexico, 1916-1917. Troops carried Lewis machine guns mounted on Ford Model T trucks (Kentucky National Guard).

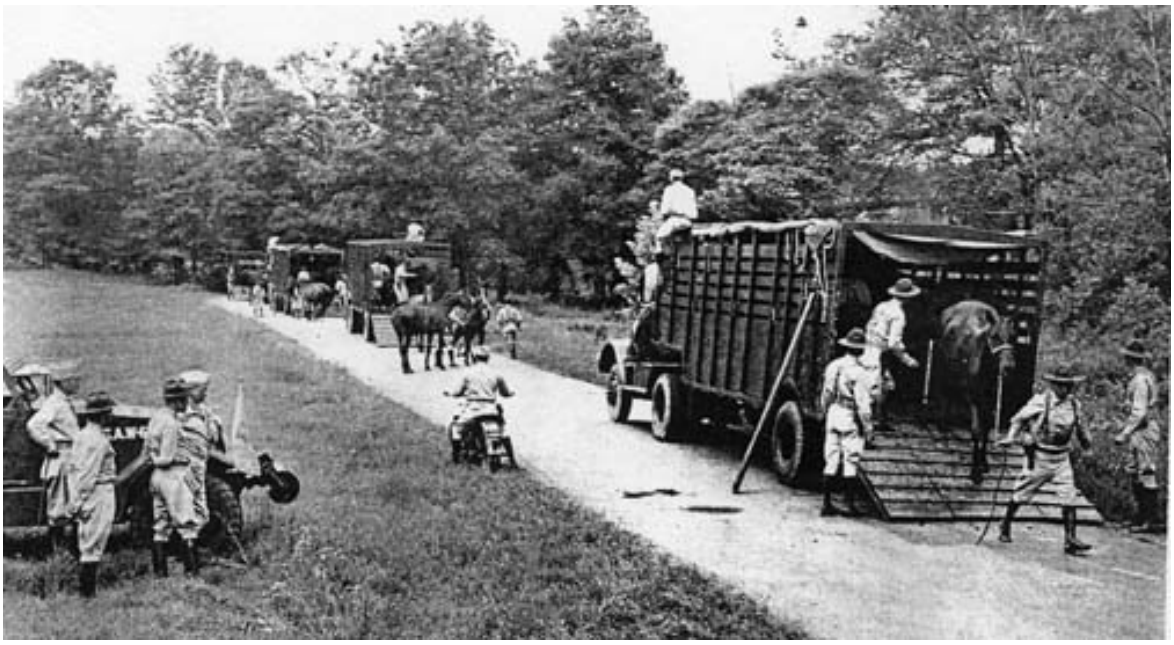

Figure 2-2. Tractor-trailers portee Army cavalry during Louisiana maneuvers in 1940. One tractor-trailer could move eight horses or mules (Cavalry Journal September-October 1940).

Chapter 3: Everything Old was New Again: North Africa and Sicily

The transition from mules to motors steadily advanced in the years preceding World War II. The shift was in high gear from the War Department to junior-grade Army officers. Robert E. Coffin was a prime example. Coffin graduated from Stanford in 1939 and was commissioned as a second lieutenant field artillery reservist. He entered active duty in April 1940 as a field artillery officer in the Third Infantry Division. Coffin's pre-war experience was typical of those serving during a time of great transition.

According to Coffin, the shift began gradually and "the Army didn't officially go into trucks as motive power for artillery until 1936, which was awfully late. Horses had pretty much disappeared from most big farms and had been replaced by tractors and trucks and automotive kinds of equipment. Following studies at Fort Leavenworth and the Army War College in the mid-1930s, the Army decided "that the time was past to go to trucks, but the military budget in the 1930s was miniscule and the cost of going from horses to trucks was prohibitive…."[1]

Yet, if truck power was cost-prohibitive in the mid-1930s, horsepower also had its drawbacks. As Coffin noted:

> Horses were a twenty-four hour a day concern. It was like having a big family of small children. They did dumb things like eating the wrong things and then getting violently ill. They had to be groomed, and watered and fed seven days a week. The life of a soldier was a career of taking care of those damn horses. They were good horses…but it was just a constant concern. Trucks, you could park

[1] Robert E. Coffin Papers, Oral History Transcript, U.S. Military History Institute Senior Officer Oral History Program, Project 81-A, Box 1, File 1, Volume 1, p.17, USMHI. Coffin underwent intensive training at Ft. Ord in May 1942, and landed at Casablanca, Morocco with Battery A, 41st Field Artillery Battalion, 3rd Infantry, in November 1942. He participated in the invasion of Sicily and was heavily involved in the planning and execution of Operation Anvil/Dragoon, the invasion of South France in August 1944.

> them for a couple of days and come back and they'd be ready to go, but you couldn't park horses.[2]

Coffin also expressed a nagging fear that the Army was falling behind technologically through the continued reliance on horsepower over motorization:

> We always had the feeling that if we got into combat with modern weapons, particularly aircraft and tanks, the horses would be vulnerable. We just couldn't quite see, we youngsters, why we were training with these animals when it was perfectly obvious that we weren't going to use them, particularly when we looked at newsreels and Fox Movietone news and we could see Hitler's parades with all this truck-drawn and self-propelled stuff.[3]

By the latter 1930s the Army was in complete transition and retraining, and Lt. Coffin was actively involved:

> It was a whole new fresh game because we had to learn about trucks. The University of Santa Clara's ROTC unit was a truck drawn unit and we did have some cross training with them, particularly when we went to summer camp at the Presidio at Monterey in the summer of '38. We had to learn truck maintenance, truck operations, and truck driving. We learned many things…we were working from six in the morning until eight or nine at night. It was about two or three months of pretty intensive work, the transition from being a horse soldier to a truck soldier—pretty awesome.[4]

While troops like Lieutenant Coffin became truck operators and motorized artillerymen, the rest of the Army slowly re-armed from 1939 to 1940. The U.S. military's rearmament and mobilization program took on a new sense of urgency in December 1941. It would be November 1942 before a major offensive operation was launched. The first half of 1942 was spent trying to stem the tide of Japanese forces across the Pacific. One of the most pressing areas was in the southwest Pacific as the United States and allies fought to contain the Japanese in the Solomon Islands and New Guinea. The epic naval battles at Coral Sea and Midway in May and June 1942, followed two months later by the U.S. landing at Guadalcanal, stymied Japanese plans to invade

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[2] Ibid.,16.

[3] Ibid., 18-19.

[4] Ibid., 20-21.

Australia. In spite of the U.S. commitment to defeat "Germany First," most American resources were sent to the Pacific during the first half of the war.[5]

American war planners, particularly Army Chief of Staff General George C. Marshall and Brigadier General Dwight D. Eisenhower, were determined to refocus America's resources on the war in Europe. The British and Russian allies heartily agreed with the "Germany First" goal, but great discord developed over the grand strategy for defeating Germany. Numerous plans were proposed. Most notable were Operation Roundup, a cross-channel invasion from Britain to continental Europe in the early spring of 1943, and Operation Sledgehammer, a similar cross-channel invasion to be carried out with great haste in the late summer of 1942. Both operations were deemed logistical impossibilities and scrapped due to a lack of ships to move the vast quantity of men and material required.

An alternative to a cross-channel invasion was proposed in Operation Torch, a plan for landing American and British forces in Algeria and French North Africa. Operation Torch found support through the political leadership of Winston Churchill and Franklin D. Roosevelt. A furious debate between the political leadership and those, such as Marshall and Eisenhower, who wanted to avoid operations in subsidiary theaters and concentrate on decisive action against the Axis. The reality was that neither the United States nor Britain could launch a cross-channel invasion in 1942. Both sides lacked resources and training, and, as Dominick Graham noted, neither side was "tough enough to meet head on the best soldiers in the world in the most difficult of all operations in war, an opposed landing." Thus, while Operation Torch may not

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[5] Matloff, Maurice, Ed., *American Military History*, Army Historical Series. Washington, D.C.: Office of the Chief of Military History, United States Army, 1973.Pp. 435-440. For more details on the division of military forces and resources between the Pacific and Europe during the initial phases of the war, see also Allan R. Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America, (*NY: The Free Press, 1984), 439-445.

have been the most appealing venture, it was one of the few alternatives that held a modicum of hope for success.[6]

In July 1942, American war planners agreed to proceed with the Allied invasion of North Africa. Joint operations with the British were set to commence in November 1942. Yet, the problem that cancelled the much-desired cross-channel invasion still plagued the Army as they scrambled to prepare for a landing in North Africa. The Army had little training in amphibious warfare, lacking trained men and landing craft. U.S. troops assembled and trained in Britain, but with the deadline fast approaching, many troops left the United States and sailed directly to North Africa.

On November 8, 1942, some 107,000 American troops landed at Casablanca, Morocco and Oran, Algeria. The plan was for U.S. troops to roll up the Axis western flank and the British in Egypt to roll up the eastern flank, converging in Tunisia. U.S and British troops made initial progress until they reached Tunisia, where German resistance stiffened. Equally problematic for the Allies was a dramatic change in the terrain. There were now mountains and thick brush, and the few existing roads were heavily mined or blocked by the Germans. Allied operations quickly ground to a halt.[7]

The Army was quickly reminded of supply necessities and obliged to re-learn the art of transportation and logistics. Supply is crucial to any military operation, but combat operations in mountainous terrain warrant special attention. As Letcher Wigington noted:

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[6] Dominick Graham and Shelford Bidwell, *Tug of War: The Battle for Italy, 1943-45*, (NY: St. Martin's Press, 1986), 20. Operation Torch was roundly criticized by John Keegan and J.F.C. Fuller for leading the Allies down a long, wasteful road into the Mediterranean Theater of Operations, but as Martin Blumenson rhetorically asked: "If not there, where?" See also George Howe, *Northwest Africa: Seizing the Initiative in the West*, US Army in World War II, Mediterranean Theater of Operations,(Washington, D.C.: GPO, 1957); Charles Robert Anderson, *Tunisia: 17 November—13 May 1943*, U.S. Army Campaigns of World War II, (Washington, D.C. Center of Military History, 1993).

[7] Matloff, 474-475.

> Sustained combat operations cannot be carried on without supplies. The normal channels of supply require road nets, and the expectancy that our motor transport will make hauls directly up to our front lines. We quickly learned that this would not work in the mountains. We learned that we had more vehicles than we had roads. We found that the roads ended and the supplies still had a distance to travel before reaching troops. For these reasons, an infantry division must incorporate into its mountain operations plans certain essential changes in organization, equipment, and operational system.[8]

Operation Torch planners overlooked the elementary concept of adjusting supply demands for rugged terrain. The Table of Organization and Equipment (TO/E) for Operation Torch indicate that the planners thought of nearly everything. First, the obvious was included: thousands of rounds of ammunition in assorted calibers, various types of food in thousands of cases or specialized pallets, and fuel oil by the thousands of gallons. Second, the minor details were included: extra firing pins, camouflage paint or "garnishing colors," batteries, knuckle-duster trench knives with sheath, rat poison, mosquito repellant, sand flea nets, and even fly swatters. Yet, there appears to be little consideration given to the possibility that roads might end and terrain would dictate the flow of supplies to front line troops. Military planners thought of protecting the troops from pestilence, but failed to include pack animals in the TO/E for operations in North Africa.[9]

This oversight was soon felt in the mountains near Bizerte, Tunisia; and it was in this inhospitable land that Army adaptability grew. The need for pack animals was obvious. However, using American mules was not an option. Time was critical and the Army could not wait for animals to make the trans-Atlantic voyage. Likewise, shipping space was at a premium

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[8] Letcher Wigington, Jr. "Supply Problems of an Infantry Division in Mountain Operations." *Military Review* (May 1946): 49-51.

[9]Memo to General Lucian K. Truscott from Quartermaster Corps, August 23, 1942. Memos and Plans Regarding TORCH, August 1942, Box 9, File 3, Lexington, VA, George C. Marshall Library, General Lucian K. Truscott, Jr. Papers. (hence cited as Truscott Papers, Marshall Library); War Equipment Table, 1941-42, Box 10, File 2, Truscott Papers, Marshall Library.

and the military could ill afford to expend cargo space on mules, since men and material were the priority. The Army solution was immediately to impress local animals into service.

Procuring and employing beasts of burden were beset with difficulty in North Africa. First, troops with backgrounds in pack animals were scarce. The Army may have switched to "trucks as motive power…awfully late," but the shift was rapid and widespread. The Army was composed largely of "citizen soldiers" from the motorized generation who knew little about animal power. Many were given a crash course in basic animal husbandry, and these men, along with a cadre of troops raised on the farm, lived the adage that "necessity is the mother of invention." The supply lines began to flow slowly after intense on the job training.

Second, procuring animals of any kind to serve as pack animals was difficult. The hardy American-bred mules were not available, so native donkeys were the only option but were lacking in quality. According to General Lucian K. Truscott, Third Infantry Division Commander, the experiments with local stock were "unsatisfactory from the standpoint of [the] condition of the animals, which had been poorly kept by their former Arab owners."[10] The Army allotted $150, 000 as an emergency remount fund for the Second Corps. Quartermaster agents scoured the countryside and purchased 218 mules, 95 donkeys, and 28 horses. The native population was not particularly willing to give up their animals, many of which fetched a handsome price as their owners took advantage of the supply and demand situation. Mules and horses rented for about one dollar per day, and donkeys were generally bought for $295 to $385.[11] Finding saddles and forage was another unanticipated obstacle, though not

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[10] Truscott, Report, *Section 1—Operations*. Third Division: Related Materials-Campaign Reports, Tunisian-Italian, 1943, Box 12, File 2, Truscott Papers, Marshall Library.

[11] William F. Ross and Charles F. Romanus. *United States Army in World War II , The Quartermaster Corps: Operations in the War Against Germany*, (Washington, D.C.: Office of the Chief of Military History, 1965), 238.

insurmountable. Most natives willing to part with their animals were also willing to sell their packsaddles and accouterments. Many of the local nomadic, Bedouins had little forage available to sell. Fortunately, the British Army provided small but adequate amounts of forage to U.S. Quartermasters as "reciprocal aid."[12]

The basic supply of food, water, and ammunition slowly resumed as Army planners scrambled to assemble men and pack animals. The need for specialized equipment and supply soon followed, particularly for the heavy weapons and pack artillery. Early combat operations occurred in what was described as "tank country," flat, open expanses with few roads. As a German officer observed, the country was "a tactician's paradise, and a quartermaster's hell."[13] As troops moved through the Sedjenane Valley and converged on Bizerte, the terrain changed dramatically, and operations became hellish for tacticians and quartermasters alike.

U.S. troops took to the hills to avoid enemy armor and tank attacks. German forces moved into the mountains to occupy better defensive positions, and both sides struggled for the commanding heights of the Atlas Mountains. Mountain operations required weapons better suited for warfare in rugged terrain, chiefly mortars and pack howitzers or mountain guns. These weapons featured a high trajectory fire, which was ideal for fire support in broken terrain, and pack mules most often moved these guns. As General Clarence Huebner noted:

> To enable the 81 mm mortar and its ammunition to follow the infantry into rough country, mules, equipped with… pack saddles must be available. Engineers normally follow closely behind the advancing infantry preparing trails which will permit supplies to be carried by ¼-ton C&R trucks. Until these trails are built, the only means of providing ammunitions and rations is by mule or light animal transportation.[14]

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[12] Ibid.

[13] Albert E. Phillips, "From Jeeps to Packs," *The Cavalry Journal*, 43 (September-October 1944): 26-28.

[14] Letter from Major General Clarence R. Huebner to Major General George S. Patton, *Report on Pack Equipment and Animals*, 7th Army, September 19, 1943, quoted in Ross and Romanus, 237.

Another group with special needs was the Medical Service. Like the infantry and artillery, the Medical Service had rapidly grown dependent on motor transportation, particularly for the evacuation of the wounded. Alternative methods of transportation were required as U.S. troops entered the Sedjenane Valley and mountains outside of Bizerte in early April 1943. A Ninth Infantry Division Medical report explained the problem of casualty evacuation as related to terrain:

> The terrain in this was featured by steep mountain ranges, heavy and thick under brush, very little over-head cover, and almost complete absence of roads. The non-availability of roads or paths created a definite problem to our normal supply and evacuation lines. Vehicles were of no value in the forward areas, therefore most of the medical property and supplies were hand carried in the forward areas. Throughout this operation, the Engineers were busily engaged in developing trails to be utilized in bringing up supplies, and aiding in the evacuation of wounded.
> The extremely heavy under brush and the blackness of the nights impeded night evacuation by litter bearers. Mules were utilized to carry casualties in both the 39th and 60th Infantry areas. It was found necessary to improvise litter carrying devices on the regular mule saddle, as no cacolets were available. Many difficulties were met in attempting to solve this problem. The method found most expedient was utilizing two mules in tandem with Signal Corps lance poles fastened to the front and rear mule on the sides of the saddle. This method enabled us to fasten the litter, and at times a blanket between the two mules. It was found that if a casualty was transported on a single mule, that the ride was more rough, and the chances of injuring a patient was greater than with the method of using two mules in tandem. Single mules with a casualty on their back invariably attempted to lie down and roll over in order to relieve the extra weight on their backs. It was found necessary to have at least one medical department man with every two mules in the "casualty convoy" to prevent accidents to the casualty. In addition to the mule litter carry, there were some areas in which the casualties had to be hand litter carried.[15]

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[15] Report*: Medical History, Ninth Infantry Division, Battle of Sedjenane and Bizerte.* Office of the Surgeon, 9th Infantry Division, 12 April—14 May 1943. File 309-26, Box 6422, RG 407, NARA. Cacolets were an apparatus attached to pack animals (including mules, donkeys, horses, and camels) for the transport of wounded in rugged terrain. One of the Army's first experiences with cacolets occurred when a group from the Surgeon General's Office traveled to Europe in 1856 and observed Crimean War operations. An officer on the mission, Captain George B. McClellan, wrote a report on the cacolet system of casualty transportation, and the U.S. Army used this method during the Civil War. See Dr. George A. Otis and D.L. Huntington. *The Medical and Surgical History of the War of Rebellion*, Vol. 12. U.S. Department of the Army, Washington, D.C.: 1883. Reprint, Wilmington, NC: Broadfoot Publishing Co., 1991. General McClellan also wrote a manual on saddle designs, including the one that was used by the Army into the 20th Century: the McClellan saddle.

Occasionally during the Sedjenane and Bizerte operation, motor vehicles were successfully used in the transportation of wounded. The following passage illustrates creative genius, and the prevailing American tendency to find and apply a motorized solution:

> In the 47th Infantry area, a railroad track was located approximately in the center of the area. By removing the tires from two one-half ton trucks and placing the trucks on the rails, it was found that the collecting company could efficiently evacuate two battalions by this method. The vehicles were placed on the railroad track attached back to back by a small iron bar. In traveling west on the track, the lead vehicle furnished the power for the "casualty train." On the return trip, the other vehicle furnished the power. The gauge of the track accommodated the truck rims nicely. The rails were broken in several places by shell fire, but were readily repaired with wood and sand bags by collecting company personnel. Twelve (12) litter casualties could be carried comfortably on the two trucks. This "casualty train" rode more easily than an ambulance on the road.[16]

Motor transportation of any item was, by and large, an exception to the rule in this particular area of fighting. Even during the latter stages of combat and the final assault on Bizerte, terrain continued to determine supply movements and the evacuation of wounded. A 9th Infantry Division Medical history gives testimony to American adaptability and determination to overcome daunting obstacles:

> On 25 April 1943, the Division (9th) made a coordinated attack, pushing west toward Bizerte. During the attack it was found necessary to supplement the collecting companies which were evacuating the 59th and 60th Infantry Regiments with approximately one hundred (100) extra litter bearers each. The roughness of the terrain again prevented the use of the wheel litter carriers. At one time there was a three and one-half (3½) mile hand-litter carry distance in two of the Infantry Regiments.[17]

Allied operations bogged down during the winter months from December 1942 to March 1943. American forces were stymied by a tenacious German defense, and the Army suffered a humiliating defeat at Kasserine Pass in February 1943. However, U.S. forces gradually increased in number, supplies moved largely because of improvised pack trains, and the Allies launched an

[16] Ibid.

[17] Ibid.

offensive in March. By May 10, 1943, Bizerte was captured and Axis resistance ceased in North Africa.[18]

The value of Operation Torch was questioned before and after it occurred, but the value of the hard lessons learned and experience it provided American troops is indisputable. The lessons learned would not guarantee success, nor would all of these lessons be fully appreciated and implemented in the coming months. However, the experience gained from November 1942 to May 1943 at least gave the Army a better foundation from which to build, adapt, and prepare for the next round. Items and practices overlooked prior to Operation Torch, such as pack animal transportation, would be incorporated into future campaigns where terrain was even more difficult.

An important lesson learned from fighting in North Africa was that U.S. troops needed to concentrate on aspects of fighting in different environments. Mountain operations were one of the most obvious areas in which the U.S. troops lacked training. General Truscott realized that more training for mountain warfare was required, since U.S. troops would be fighting in mountains for the foreseeable future. Third Infantry troops began basic, mountain training that included hill climbing, range estimation, combat firing of all weapons, and night maneuvers. Supply missions were also practiced, and successful experiments using burros as pack animals were conducted. The object of this training was chiefly to familiarize the troops with operations in hilly country.[19]

U.S. troops also appeared to lack physical conditioning. General Truscott was particularly annoyed by what he saw as a lack of physical fitness in American soldiers. Before combat

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[18] Matloff, 476-477.

[19] Truscott, Report, *Section 1—Operations*. Third Division: Related Materials-Campaign Reports, Tunisian-Italian, 1943, Box 12, File 2, p. 2. Truscott Papers, Marshall Library.

operations ceased in North Africa, Truscott implemented a rigorous training program that included log tossing, obstacle course running, bayonet training, and hand to hand combat. The most radical (and probably most unpopular) training regimen implemented by General Truscott occurred when the Division Commander prescribed a new standard rate of march—five miles in one hour, or four miles per hour for a greater distance than five miles. Infantry regiments eliminated men who were physically incapable of meeting this standard, even though the Field Manual required infantry to march at two and a half miles an hour.[20]

Third Infantry troops adapted in the field and rigorously trained over the next few months. Soldiers in all units, from regimental combat teams to supply companies, rushed to apply the lessons learned during the Torch campaign in preparation for the next operation. Their investment in training and field modifications soon paid sizable dividends, as they embarked on a mission that proved more arduous and rugged than previously experienced.

The next logical step for Allied operations in the Mediterranean Theater was the invasion of Sicily. Dissension remained rife among Allied leaders, with one camp still insisting on a cross-channel attack, and the other side promoting a more peripheral, southerly route. As before, the cross-channel attack was postponed, and the Allied invasion of Sicily occurred when some 160,000 men (and a handful of donkeys and mules) landed on July 10, 1943.

The number of pack animals that accompanied the Army landings at Sicily is unclear. A few far-sighted commanders and troops brought North African animals with them in anticipation of fighting in more trackless, mountainous country. Other records indicate that the Army anticipated the need for pack animals, but planned to use native animals, which they did in great

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[20] Ibid., 1; see also Lt. General Lucian K. Truscott, Jr. *Command Missions: A Personal Story*, (New York: E.P. Dutton and Company, 1954), 179-180. Truscott believed that infantry standards for marching were too low. He was determined to raise the standard and created his own 'Foot Cavalry.' General George S. Patton referred to the newly imposed marching standard as 'The Truscott Trot,' which proved to be a most decisive, valuable tactic throughout the campaigns in Sicily and Italy.

numbers. Approximately 4,000 pack animals of varying types and quality were used during the relatively short 30-day operation in Sicily. Almost all were Italian Army animals or of local, Sicilian stock.[21]

The Army's use of local, native animals had certain benefits. First, it was cost effective. The trans-Atlantic shipment of American mules was expensive, and that assumed ships were available to haul the animals. Paying the local population for their animals circumvented the shipping costs and avoided some of the logistical problems. Second, mules and donkeys native to the Mediterranean region were generally smaller and could not carry as much, but these animals proved incredibly tough. They demonstrated an impressive tolerance to the sounds and chaos of war, particularly Italian Army mules that showed great indifference under fire. As one American soldier observed, "The Sicilian and African mules paid no attention to gunfire. And I have seen times…there was one particular…they's walkin' a bunch of 'em down the road, and a mule got a little off to the shoulder, hit a land mine, and it just blew his whole quarter and everything off.…The other mules never missed a step, just walked on around him."[22] Inexperienced American mules were fractious and hazardous to the troops around them; and experienced local animals became valued for their stoic disposition in combat.

The use of pack animals in Sicily forced the Army to adapt at all levels and varying degrees. A platoon leader or private moving a group of Sicilian mules had to take a crash course in Italian, because "giddy up" did not translate into the native language. Relying on local animals, the Army also relied on saddles and tack from the local population. The few American troops fortunate enough to have experience with mules or the fine art of packing were required to re-learn packing with Italian Army animals and accouterments. A double-diamond hitch worked

[21] Ross and Romanus, 238.

[22] Bradley, *The Missouri Mule,* 391.

on a Phillips Army pack saddle during maneuvers at Fort Riley, Kansas, but the method and gear required serious modification in the combat area near Brolo, Sicily.[23]

Division-level commanders adapted and changed tactics. Pack animals and animal supply remained absent from the TO/E, but commanders began to improvise. Pack trains were cobbled together from local sources and successfully integrated into supply plans. Army and division veterinarians had served primarily as food inspectors in North Africa. However, veterinarians began serving more in their traditional roles as the use of pack animals increased.[24]

Plans to form a contingent of mounted troops were drawn up, though these plans were not fully implemented until the Italian campaign. General Truscott reported:

> In the Sicilian Campaign I found it necessary to improvise mounted organizations and pack trains in order to outflank through the hills strongly held enemy positions located behind blown-out bridges and other defiles. The cavalry troop was equipped with captured German horses and Sicilian mounts, and Italian equipment. The personnel were provided from infantry units, taking anyone who had any experience whatever with horses. There was of course no time for proper training, nor was the equipment, for the most part improvised, adequate. Owing to the lack of proper training, losses in animals and equipment in both the pack units and the cavalry troop were excessive. Although inadequately trained and equipped, these mounted units rendered important service, especially during the latter days of the campaign.[25]

General Patton complained that had a mounted troop existed, the outcome of the Sicilian campaign would have been different. According to General Patton, "It is the considered opinion, not only of myself but of many other general officers…, that had we possessed an American cavalry division with pack artillery in Tunisia and Sicily, not a German would have escaped…."

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[23]Robert Geake, "Beyond the Jeep-Line in Italy," *The Cavalry Journal* 53 (January-February, 1944): 3. The double-diamond hitch was a standard method of lashing gear and supplies to the Phillips pack saddle.

[24]*History for 1943 of the Veterinary Service in the North African and Mediterranean Theaters of Operation*. Veterinary Service, 5th Army. File #HD 319, Box 13, RG 112, NARA.

[25] Truscott, Report: *Army Ground Force Equipment Review Board Preliminary Study*, Fifth Army and MTOUSA Reports Thereon, 14 July 1945. File HD: 314.7, Box 8, RG 112, NARA.

Never one to avoid hyperbole, Patton overstates his case, but he correctly assessed the Army's need for animal power.[26]

Even though Army veterinarians became more involved with animal health, the Army did not try to maintain these animals during the abbreviated campaign in Sicily. Instead, the Army used them to the point of exhaustion and replaced them from the ample supply of local animals. The casualty rate for pack animals in Sicily was alarming. At least one third (of the 4,000 used) were killed in action, and scores were "rendered unserviceable because of bad feet, saddlesores, and general debility." There were not enough veterinarians or Veterinarian Service troops available to care for the beasts nor enough time to train regular troops or establish an effective remount system. The inefficient policy of animal care on Sicily changed significantly during the protracted campaign in Italy.[27]

The procurement of local animals in Sicily was reminiscent of operations in North Africa. Some animals were commandeered along the route of advance in the early stages of fighting. Most animals were either rented for around 50 lire per day or purchased after an Army veterinarian made an appraisal and reached an agreement with the owner. Average prices were $150 per mule, $120 per horse, $40 per donkey, and $40 for a saddle. The owner received the money up front, regardless of whether the animal was killed or returned in poor condition. Again, the treatment of the animals was inefficient at times, with little regard to preserving long-

[26] Waller, Anna M., *Horses and Mules in National Defense*, (Washington, D.C.: Department of the Army, Office of the Quartermaster General, 1958), 22.

[27] Ross and Romanus, 238; see also Emmett M. Essin, *Shavetails and Bell Sharps: The History of the U.S. Army Mule*. (Lincoln: University of Nebraska Press, 1997), 162-163.

term animal health or condition, but the procurement process improved compared to the haphazard approach in North Africa.[28]

Procurement of pack animals depended on the local civilian population, and this could be problematic. A Quartermaster company report illustrates the supply problem with acquiring local mules:

> On Sunday, 8 August left the Office of the Division Quartermaster (O.D.Q.M) at 0800 with sixteen (16) trucks, 2 ½ ton. Stopped at Alimena but no mules were there. Was promised thirty (30) mules the next day. Proceeded to San Catarina and loaded fifty (50) mules on ten (10) trucks.
> On 9 August 1943 loaded thirty-five (35) mules on seven (7) trucks and three (3) trucks with saddles and packs at Caltanissetta.
> On 10 August 1943 received twenty-four trucks…. After filling what gas was available, loaded four (4) trucks with twenty (20) mules and sent back to the O.D.Q.M. By the time this was done no more mules were available at Caltanissetta and it was to (sic) late to get any more.
> On 11 August 1943 went to the Chief of Police in San Catelda who informed me that he had released mules early the day before since he had them for two days and no food or water was available. Chief of Police told me that he would have seventy (70) mules by that afternoon. San Catelda police rounded up fourteen (14) mules which were dispatched at once to O.D. Q. M. Police told me that they would have fifty (50) mules at least the next morning.
> On 12 August 1943 at 0900 only four (4) mules had been obtained….[29]

A surplus of mules and pack animals was never a problem on Sicily. The shortages experienced by the Quartermaster officer mentioned above had a ripple effect on those in combat. The 15th Regimental Combat Team Journal reports the following:

> 13 August 1943—At 0500, 19 trucks arrived at the 15th Infantry trucking point. This was not enough to move even the battalion…. Trucks to move the remainder of the battalion and the mules did not arrive until 0700. They were immediately sent to SAN ANGELO and unloaded. The tactical loads were placed on the mules and the head of the 1st Battalion passed thru SAN ANGELO at 0845.
> Considerable delay was encountered obtaining enough mules for both the tactical equipment and supplies, so the 3rd Battalion and Regimental HQ were given

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[28] Ibid.

[29] Letter, *Report of Mule Trip*, 2nd Lt. Clyde F. Howe to Commanding General, 3rd Infantry Division, 17 August 1943. Reports of Operations--Sicilian Campaign--Headquarters 3rd Infantry Division 10 July—17 August 1943, File 303-0.5, RG 407, NARA.

> priority on the mules and they moved out. The 2nd Battalion did not receive sufficient mules to leave San ANGELO until 1345. The supply trains left as rapidly as mules became available.[30]

The frustration of mule shortages was matched by awful terrain, which wore the troops down physically and inhibited communication. According to one report, "Even mule packs had difficulty negotiating the hills and maintenance of communication proved almost impossible, although mounted messengers furnished by the Provisional Horse Cavalry Troop were indispensable aids. Contact with our own units…not over 1,000 yards away was frequently broken."[31] General Truscott approached an observation post in the area described above and wondered why the 30th and 15th Regiments were not advancing. He saw a forward observation post located about one mile away and virtually straight down. A mule train was returning when General Truscott asked the officer in charge "Crandall, how long will it take me to get down there…?" Major Crandall replied, "Well, sir, I made it in a little over an hour." General Truscott blithely indicated that he would make his way down to the observation post and see what was holding up the regiments. To which Major Crandall admitted, "Well, General, it has taken me just three and a half hours to come back from there—hanging onto the tail of a mule."[32] General Truscott did not bother hiking to the observation post, and he had a much greater appreciation for why his troops were advancing slowly.

Terrain obviously slowed supplies, which influenced the ebb and flow of battle. In one instance, mules were unable to re-supply mortar rounds to men engaged in a fierce fight with

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[30] Report, *Operations of the 15th Regiment from 31 July—18 August*, 15th Regimental Combat Team (RCT) Journal, File 303-INF-(15)-0.3, Box 5620, RG 407, NARA.

[31] Reports of Operations, Headquarters 3rd Infantry Divison 1942—Sept. 1944. File 303-0.3, RG 407, NARA.

[32] Truscott, *Command Missions*, 233-234. Major Robert W. Crandall was commander of the 3rd Division's Provisional Pack Train and Provisional Mounted Troop. Crandall had served with Truscott when both were part of the 5th Cavalry at Ft. Bliss, Texas before the war.

enemy armor near Brolo. The effect of the mortars on the German tanks and their accompanying troops diminished as the ammunition supply dwindled. Fifteen mules had been brought along by the U.S. troops trying to dislodge the Germans. The mule train attempted to bring ammunition up the hill, but was caught by machine gun fire when it came under observation from the hills south of Brolo. All but two mules were killed. The two hapless beasts eventually reached the top of Monte Oreole late in the afternoon. A second effort at re-supply of desperately needed ammunition was attempted that evening, but was only partially successful. The trip was too long, and the toll on mules had been prohibitively high that day.[33]

The Third Division was instrumental in the drive toward the last German stronghold at Messina. The drive from Palermo to Messina was a continuation of the "Battle of Transportation" that occurred up to Palermo, and in one respect it was worse: only one main road existed along the north coast. The Germans jealously guarded the coastal highway, and it was often damaged with mines, craters, and blown bridges. The situation was also aggravated by greater demands on lengthening American supply lines.[34]

The 3rd Division Commander ordered his men to maneuver around the heavily guarded highway and outflank the enemy. The plan required operating over terrain so steep and rocky that it was impossible to use the normal means of supply beyond very limited distance. Anticipating this, the Division Quartermaster and specially selected officers were dispatched by General Truscott to purchase as many mules and horses as possible. The infantry were furnished with sufficient mules to serve as weapons carriers (pack artillery and mortars) and a special pack train to assist these heavier weapons. A second supply train would transport ammunition and

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[33] Reports of Operations, Headquarters 3rd Infantry Divison 1942—Sept. 1944. File 303-0.3, RG 407, NARA.

[34] Reports of Operations--Sicilian Campaign--Headquarters 3rd Infantry Division 10 July—17 August 1943, File 303-0.4, RG 407, NARA.

rations, with water being procured locally and chlorinated. General Truscott determined that pack animals were vital to the success of this mission and was committed to acquiring and moving the mules, though it turned out to be done in an unconventional manner. According to an after-action report, the bulk of the animals were transported by 2 ½ ton trucks "due to the distance involved in the procurement of animals and their physical delivery to the troops.... This was thought to be impossible at first but turned out to be entirely feasible. A minimum number of animals was (sic) lost by this method of transport."[35] The unexpected but successful marriage of motor and animal transportation reveals the integrated nature of Army supply. The movement of *Equus asinus* in two and one-half-ton trucks also illustrates how Army innovation rose as mission difficulty increased.

By the time the campaign ended, the Army had adopted two unusual methods of supply to "see that the combat troops got what they needed" on the mountainous island of Sicily. One, of course, was pack animals. Only a handful of officers and men had given this form of transportation any thought prior to the war, but the need for animal power was undeniable by the conclusion of operations in Sicily. A second novel means of Army supply was the use of U.S. Navy landing craft, as "supplies were shuttled along the coast by the Navy in LSTs and other craft." When General Patton ordered the Third Division to perform an "end-run" on the Germans, the U.S. forces—consisting of 650 men, two batteries of field artillery, one tank platoon, a platoon of engineers, and a handful of pack mules—loaded into Navy LSTs and

[35]*Campaign to Messina*, Reports of Operations--Sicilian Campaign--Headquarters 3rd Infantry Division 10 July—17 August 1943, File 303-0.4, RG 407, NARA.

landing at Sant' Agata. Twice more Navy LSTs landed and supplied Army forces along the coast of Sicily as they advanced toward Messina.[36]

Sicily was exceptionally difficult for specific branches of Army service. Bad roads and rugged terrain created headaches for artillery. According to one report:

> On the north coast of Sicily the situation was particularly bad since there was only one fairly good highway. This resulted in much difficulty…finding suitable positions for the artillery. Under Brigadier General William A. Campbell… however, in every case these problems were solved, whether by the adoption of new types of prime movers for the artillery or the adapting of new devices, such as a special ammunition rack on M-7s for the amphibious assault.[37]

Undoubtedly, one of the new types of artillery "prime movers" was the venerable pack mule, since truck-towed artillery pieces could not travel down destroyed roads or over rough terrain. Likewise, the M-7 was a self-propelled artillery piece that became an artillery prime mover. It was a reliable armored fighting vehicle, but one of the M-7's main weaknesses was that it could only carry a load of twenty-four rounds. Field modifications, and eventual factory production alterations, increased the load to sixty-nine rounds. This marked increase in the supply of on-board rounds was a real boon to the artillerymen. The re-supply of ammunition was often impossible by truck, so the M-7 was customized to carry extra ammunition and could keep up a greater sustained rate of fire.

Terrain affected the Medical Service as well. Fortunately, they were able to apply many of the lessons from North Africa to overcome similar barriers in Sicily. Rough terrain was not a

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[36] Reports of Operations--Sicilian Campaign--Headquarters 3rd Infantry Division 10 July—17 August 1943, File 303-0.4, RG 407, NARA; see also Truscott, *Command Missions*, 231-232 and Carlo D' Este, *Bitter Victory: The Battle for Sicily, 1943*. (NY: E.P.Dutton, 1988), p. 476-483.The Landing Ship Tank, or LST, was one of several specialized landing craft used by the Navy to transport men and material on amphibious operations. General Patton obsessed with beating the British Army to Messina, and used all resources available, including the Navy in a textbook example of combined arms warfare. The amphibious landing at Santa Agata was successful, but the subsequent landing at Brolo was more controversial due to its rushed nature and heavy U.S. losses.

[37] Ibid. Reports of Operations—Sicilian Campaign.

serious factor in the opening phases of the American campaign. Medical detachments were able to establish colleting stations near the combat area. Casualties were carried in hand litters a short distance to points accessible by litter jeeps, from which they were then taken to the ambulance loading point. Litter jeeps proved most valuable, cutting down on travel time and navigating where regular ambulances could not go. The terrain grew impassable within a few days of fighting, and jeeps could no longer operate. Casualty evacuation could only be done by hand or mule litters.[38]

The Sixtieth Combat Team had one of the most difficult medical problems of any unit in the Ninth Division. One report noted: "On 5 August the unit marched east into the mountain area toward MOUNT PELATO. All of this movement was cross-country, the terrain being so rough that it was impossible to move vehicles until the Engineers constructed a trail around the many mountain ranges." Heavy fighting was anticipated around Capizzi, and with the area's known terrain difficulties, the unit took extra measures. One hundred ten extra litter bearers were attached to the unit (some coming from the 9th Division band), and litter bearer squads were placed at 300-to 400-yard intervals to relay casualties back to aid stations. The unit report continued:

> In addition, plans were drawn for a litter carrier to be attached to mules. The Ordnance Company cooperated nicely and in a relatively short time we had twenty workable attachments for mules. This litter carrier was constructed along the lines of the French cachelet (*cacolet*). This device allowed us to carry two patients on one mule. Prior to completion of these devices, Signal Company lance poles were obtained for keeping mules in tandem. By means of the lance poles it

[38] *Medical History, Ninth Infantry Division, Sicilian Campaign.* Detailed Operations Report—Sicilian Campaign—Office of Division Surgeon, 9th Infantry Division, 30 July—14 August. File 309-26, Box 6422, RG 407, NARA.

> was possible to carry one casualty between the two mules. The use of both of these devices was made difficult by the heavy vegetation.[39]

The casualty collecting company was hindered and movement was extremely difficult because of the total lack of roads. The company noted "the collecting station was originally established on the only trail leading in the area leading north out of CAPIZZI. During the first two days, collecting company men were kept in the vicinity of mule head to lead hand litter bearers back to the collecting station." Engineers, who used bulldozers to blaze a jeep trail, slowly made progress. The trails soon accommodated vehicles, and the movement of casualties was greatly simplified. The collecting company report concludes by noting that "the movement of this regiment has again proven the value of and necessity for strong, sturdy litter bearers. It cannot be emphasized too strongly that litter carrying devices for mules be made readily available to any unit engaged in cross-country, mountain warfare.[40]

Operations on Sicily were short, only about one month, so the amount of time the Army cared for this cadre of pack animals was not lengthy. The Army used around 4,000 animals, with around 400 being used by the Ninth Infantry Division. Yet, over this abbreviated period and caring for a relatively small number of animals, the Ninth Division Quartermaster noted that 3,300 pounds of hay and 9,913 pounds of grain were fed from August 4 through August 14, 1943. The amount of supplies required to care for the supply animals became staggering as campaigns grew in scope and duration, forcing the Army to adapt exponentially.[41]

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[39] *Activities of the 60th Combat Team, Detailed Report of Division Surgeon*, Detailed Operations Report—Sicilian Campaign—Office of Division Surgeon, 9th Infantry Division, 30 July—14 August. File 309-26, Box 6422, RG 407, NARA.

[40] Ibid.

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[41] Detailed Report—Sicilian Campaign—Office of the Division Quartermaster, 30 July—14 August, 1943, File 309-30, Box 6422, RG 407, NARA.

Sicily provided the Army with another wealth of education. Many of these lessons were implemented and expanded as fighting moved to Italy. General Truscott continued to be a trendsetter regarding the use of animal power in a motor-bound Army. He implemented a familiar program during the interlude between Sicily and Italy.

> After the experience gained in Sicily, it was recognized that pack animals are essential to fast-moving operations in mountainous terrain lacking in passable roads as is this part of Italy. Although a Pack Troop of 4 Platoons of 50 mules each is now in operation, it is felt that at least two more such platoons are needed…. Rations, ammunition, water, casualties, radios and wire were transported by mule pack. It is believed that a pack platoon should be attached to each regiment operating in mountains and that sufficient reserve platoons should be maintained to allow complete platoon replacement after each two days of active packing. Native animals were found lacking in endurance and size but the native pack saddle has proven quite satisfactory. On the other hand, the issue Philips pack saddle proved to be too heavy.
> After the Sicilian campaign I intensified the training of the cavalry troop and pack train and organized a battery of pack artillery, in anticipation of operations in the mountainous country in Italy. Improved equipment was obtained and full advantage taken of the four weeks available. These provisional units accompanied the Third Division to Italy.[42]

General Truscott campaigned to highlight the continued need for animal power in places lacking roads and dominated by rough terrain, particularly in Italy. He appealed to the upper ranks of the Army to implement more animal power in both the supply and combat arms.

> Recent operations of the Third Division in Sicily have shown the distinct need for pack animals to facilitate infantry operations in terrain not accessible by motor transport. I believe that nearly all Divisions engaged in the operation had the same experience. The Third Division landed at Licata with about 90 burros from Africa. They were used to transport ammunition and weapons loads during the assault phase. There were found to have limited use due to limitations in loads and speed. The burros were eventually discarded and replaced by captured or confiscated animals, both mules and horses. At the end of the Palermo phase, we had accumulated a number of horses and mules equipped with a number of captured and improvised pack saddles. During the final advance to Messina, it

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[42] Truscott, *Report of Operations: Employment of Pack Animals. Supply, Evacuation, and Special Staff Activities, Section III*, 9 November 1943. Third Division: Related Materials-Campaign Reports, Tunisian-Italian, 1943, Box 12, File 2, Truscott Papers, Marshall Library; Truscott, Report: *Army Ground Force Equipment Review Board Preliminary Study*, Fifth Army and MTOUSA Reports Thereon, 14 July 1945. File HD: 314.7, Box 8, RG 112, NARA.

> was necessary to increase greatly the number of pack animals. More than 500 were in constant use to supply elements engaged in flanking movements through the mountains. Losses and wastage among these pack animals was extremely high because of crude improvisation and lack of trained personnel to handle them. The impossibility of improvising efficient mounted reconnaissance, combat, and pack transportation during active operations from untrained personnel is obvious. I am firmly of the opinion that if operations contemplate the employment of this Division in terrain approaching that in the Sicilian operation that these organizations will be worth their weight in gold. In the event that this Division is not employed and any other Division may be, I will be glad to release both the pack platoon and reconnaissance troop when and where needed because I am convinced they will be invaluable to any unit engaged in mountain warfare.[43]

The regression to the more primitive method of animal transportation was embraced, at least at the division and lower levels of the Army. Unfortunately, the upper echelon was slower to recognize the need for animal power. General Truscott continually requested support of Army commanders for the use of animal power. He also requested that Army leadership recognize the specialized personnel required to handle and care for this old but no less vital method of transportation. General Truscott's petitions went unanswered:

> Reference letter, same subject, dated 2 September 1943, copy attached hereto, to which no reply has been received to date. Provisional organization of this mounted reconnaissance troop, pack train, and pack battery was begun in Sicily. These units have been actively engaged in operations since the day they landed in Italy, September 18, and have proved of tremendous value to date. As we continue the campaign I expect its value to greatly increase. However, it is highly desirable that the provisional organization be authorized and the necessary grades and ratings be provided. At present these grades and ratings must be taken entirely from the Division line units. It is requested that authority be granted for the provisional organization of these units as per attached Tables of Organization with the necessary grades and ratings.[44]

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[43] Truscott, *Pack Troop and Mounted Organization*, Letter to Commanding General, NATOUSA (North African Theater of Operations, U.S. Army), 2 September 1943. Third Division: Correspondence, March-December 1943, Box 11, File 11, p. 40. Truscott Papers, Marshall Library.

[44] Truscott, *Mounted Organization, Third Infantry Division*, Memo to Commanding General NATOUSA, 6 November 1943. Third Division: Correspondence, March-December 1943, Box 11, File 11, p. 43. Truscott Papers, Marshall Library.

General Truscott sent General Eisenhower a lengthy letter in which he compared operations in Sicily with the first few months of the Italian campaign. Differences included the fact that the men were more fit and getting acclimated to the rigors of combat. Another difference was the weather. Sicily had been hot; Italy was becoming cold and very wet, adding to the overall discomfort of troops and complicating supply lines. Obvious similarities were the mountainous terrain, the ongoing demand for animal transportation, and the Army's failure to recognize formally the crucial role played by the men in these animal powered units. General Truscott noted:

> In operations such as this in rugged country, infantry battalions will largely operate off roads and will spend considerable periods of time in the mountains and away from their transportation. Supply, ammunition, and communication present real problems in these instances. Our organization is not particularly well suited for such operations but can be adjusted with some improvising.
> My pack train, pack battery, and mounted troop have been worth their weight in gold. You may recall I organized these in Sicily and started them in this campaign before their organization was complete and before they were trained. They have had their training the hard way but all have certainly done a grand job. Incidentally, when I organized them I asked NATOUSA's blessing upon them, that is, I asked authority for the provisional organization for an allotment of grades and ratings on a temporary basis while the need existed. I have never received a response. Every Division in this theater has need for a similar organization.[45]

General Truscott sent a similar letter and petition to General W. B. "Beetle" Smith in the Army Chief of Staff's Office. Amid the standard military report and information, General Truscott was sure to point out the need for animal power, the upper echelon's oversight at recognizing their value, and the adaptability of those men closer to the front.

> I think I wrote you from Sicily that I was organizing a pack train, mounted reconnaissance unit, as well as a combination pack and jeep battery of 75 (mm) howitzers. We sailed for Italy before the organization was complete but I brought them

[45] Truscott, Letter to General Eisenhower 23 November 1943. Third Division: Correspondence, March-December 1943, Box 11, File 11, p. 56. Truscott Papers, Marshall Library.

> along. As a matter of fact, they began unloading on Sept. 19th and started into the mountains that night and have been going continuously since. Fifth Army has endeavored to organize such units, particularly the pack elements, for other divisions here. They are certainly needed. This Division could never have accomplished all that it has without them. I requested authority… to organize them on a provisional basis and receive an allotment of grades and ratings for them. I never received any reply to my request.[46]

General Truscott never received approval from NATOUSA leadership. Nevertheless, innovative division and army commanders recognized the need for battlefield adaptability, and they diligently worked to implement these changes so that GIs could better carry on the grim, sometimes mundane, business of war.

Allied forces led by General Patton's Seventh Army liberated Messina from Axis control on August 17, 1943. The city was in ruins, and the bulk of the German forces had escaped across the Straits of Messina to the Italian mainland. There seemed to be little cause for celebration. American forces had little time to catch their breath before the pursuit continued.

Sicily is often seen from the viewpoint of what was not accomplished, most notably the destruction of German forces before their evacuation to Italy, or the epic personality clashes between Allied leaders as they struggled with coalition warfare. Indeed, undeniable blunders occurred, but what these glaring flaws easily overshadow was how the Army adapted. In this regard, Sicily was a success. Sicily demonstrated that the Army, while not revolutionary, could be quite evolutionary, successfully adapting to each challenge. Superior firepower and brute force clearly helped bring about Allied victory on Sicily. U.S. forces were frequently saved by heavy artillery that repulsed German attacks. Numerous German accounts suggest that Navy gunfire gradually destroyed their ability to fight. However, the expulsion of German forces from

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[46] Truscott, Letter to General Smith, 1 December 1943. Third Division: Correspondence, March-December 1943, Box 11, File 11, p. 59. Truscott Papers, Marshall Library.

Sicily was also accomplished by the sweat and toil of an innovative Army and the animals that supplied them.

Figure 3-1. African burro impressed into service by 60th Infantry in Tunisia, April 1943. (NARA).

Figure 3-2. Third Infantry Division lead native donkeys ashore at Licata, Sicily, July 1943. (NARA).

Chapter 4 - Mule Mobilization: From the Farm to the Front

In October 1937, Arizona Senator Carl Hayden wrote Secretary of War Harry H. Woodring inquiring about the continued use of animal power by the military. Some of Senator Hayden's constituency had lucrative contracts to provide the Army with replacement horses and mules, or remounts, and provide stud services for the Army's horse breeding program, which had originated shortly after World War I. Horse breeders and mule suppliers with Army contracts saw a threat to their earnings as the Army motorized in the late 1930s. Thus, Senator Hayden wrote the Secretary of War and asked about any "pending legislation designed to motorize the entire Army or Marine Corps." Secretary of War Woodring replied: "The War Department has not submitted any legislation designed to motorize the entire Army, nor is any such legislation under consideration. Further, it is not contemplated that there will be any material curtailment to remount activities."[1]

It appeared that the upper echelons of the U.S. military were unaware of the rapid transition taking place within Army transportation, but within a year of the correspondence between the Senator and Secretary of War, the Army had an unmistakable change of direction. A memo marked as "Immediate Action" from the Adjutant General to the Quartermaster General noted that "in view of recent orders which will eventually motorize the 2nd Division, it is directed that the purchase of mules for the current fiscal year be suspended until further orders." And in February 1939 a flurry of communiqués between the Adjutant General and Quartermaster

[1] Letter from Secretary of War Harry H. Woodring to Senator Carl T. Hayden, October 25, 1937, File 454 "General Correspondence 1936-1945," Box 608, RG 92, NARA. Carl T. Hayden served from 1927 to 1969 and was one of the longest serving representatives in U.S. history. Hayden represented Arizona and often backed legislation that impacted the Western United States, including public land use, land reclamation, and livestock.

General discussed the "prompt disposition" of Army animals—particularly mules—that were "rendered excess" because of Army motorization.[2]

The Army was in a period of great transition and suffered from misdirection in the months preceding World War II. The combat and supply arms of the Army motorized, but the Army Remount Branch continued to procure animals. Prewar mobilization plans called for as many as 200,000 animals, and the Remount Branch expanded their purchasing efforts in 1940, procuring some 24,000 horses. This was well short of the prewar projections, but still a considerable number of animals for an Army that was motorizing. Yet, the horse-mounted cavalry era was rapidly fading. The procurement of Army horses in fiscal year 1942 reached approximately 2,900, and was suspended in late 1941 as mounted units became motorized. Only four horses were purchased for fiscal year 1943, and no horses were purchased in the last three years of the war.[3]

The number of Army mules also declined during the early war years. The Army procured 4, 279 mules in fiscal year 1941 and only 1,699 mules in fiscal year 1942. However, in fiscal year 1943, mule procurement skyrocketed to 10,217. The newly motorized, road-bound Army realized that terrain still dictated transportation, and Army transportation reverted to animal power in its first campaigns of World War II. The durable, sure-footed mules were superior to horses in the pack transportation role, and the demand for mules remained high for the duration

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[2] Memo from Adjutant General, War Department to Army Quartermaster General, "Purchase of Animals for F.Y. 1939", October 5, 1938, File 454.2 "Miscellaneous Correspondence," Box 608, RG 92, NARA; War Department, Adjutant General, "Mules Rendered Excess by Motorization Program," Memo to the OQMG, October 17, 1939, File 454.2, " Miscellaneous Correspondence," Box 608, RG 92, NARA.

[3] Waller, Anna L Waller, *Horses and Mules and National Defense*, (Washington: D.C. Department of the Army, Office of the Quartermaster General, 1958), 24; for an electronic copy of Waller's work see also http://www.qmfound.com/horse.htm located at http://www.qmmuseum.lee.army.mil/history/index.html under Remount.

of the war since operations continued in mountain areas. Over 14,000 Army mules were purchased in the United States from 1944 until the war ended in 1945.[4]

Animal-powered transportation rapidly declined in the late 1930s, and the Army was almost fully motorized by 1941. The number of personnel with knowledge of pack animal use and care dwindled as well. However, animal care was second nature to a small cadre of experienced Cavalry and Army Veterinary officers and enlisted men. These men were visionaries who saw a renewed demand for animal power looming on the horizon. They worked feverishly to resuscitate the dying art of pack animal transportation and took the existing Army Remount Program, a program that was in its nadir, and improved upon it. The level of adaptability exercised by this group of Army officers and men was extraordinary considering that a transportation revolution had occurred in the United States from World War I to World War II. Yet, at the outbreak of war, and under growing pressure to motorize and mechanize the Army, the animal power advocates successfully implemented an old, outmoded system of transportation in a newly motorized Army.

It did not take long for some war planners to see the vital role animals might play in the coming hostilities. In a letter written shortly after Pearl Harbor, the War Department informed the Western Remount Area of the Quartermaster Corps:

> Registration of all horses and mules between the ages of three and ten inclusive in the States of California, Oregon, Washington and Nevada is desired by the Headquarters, Western Remount Area, San Mateo, California. Why? America is preparing with all possible speed for an all out, long War. Manpower is being mustered, industry and production thrown into high gear and economic and natural resources marshaled.
>
> Experience of the present War shows the horse and mule still essential for a variety of uses in modern armies. Germany has thus far employed something

[4] Ibid. These numbers only represent mules purchased in the U.S., and does not account for those purchased or impressed in theater. The approximate number of native horses and mules used by the Army was in the thousands, but little accurate data exists to provide firm numbers.

> like a million, Japan has used large numbers in China and Russia currently is winning large scale successes with mounted units or units otherwise employing horses.
>
> America has more well-bred useful horses and mules than any country in the world. We can use them and may need them anywhere and anytime.

The letter went on to request that horse and mule owners provide their county agents with basic information, including age, sex, color, and type of animal. It also made a point to emphasize that "this is not a draft of animal resources and it seems most unlikely this will ever be necessary." If and when animals were needed, the Army would purchase them. Nonetheless, "prompt registration of animals of a useful military age is simply a most desirable step in our defense preparation," and, though voluntary, it was "obviously a patriotic obligation."[5]

Quartermaster officers in charge of the Western Remount Area immediately went to work. Letters, brochures, and pamphlets announcing the animal census were circulated to all County Agents, local newspapers, and radio stations. The census deadline was set for 10 January, 1942, but Remount officers agreed to an extension because heavy snows across the region made it impossible for animal owners to deliver their reports. In spite of dismal winter weather, participation in the animal census was quite heavy. The Officer in Charge reported: "The census met with popular approval and enjoyed the heartiest cooperation of the County Agents and various horse breeding associations, and particularly the newspapers, radio stations and similar mediums." The report also noted that the census "did not at any time, so far as can be determined, arouse any antagonism or objections."[6]

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[5] Letter from the War Department to Headquarters, Western Remount Area, Quartermaster Corps, "Registration of Horses and Mules of Military Age," December 18, 1941, File 454 "General Correspondence 1936-1945—San Mateo," Box 608, RG # 92, NARA.

[6] Report from Officer in Charge, Headquarters Western Remount Area to the Quartermaster General, "Horse and Mule Census Western Remount Area," January 28, 1942, File 454 "General Correspondence 1936-1945—San Mateo," Box 608, RG # 92, NARA.

A follow-up report indicated that by mid-February participation was thorough enough to be "considered satisfactory and most useful…." The report also noted that while the census was incomplete, it still provided sufficient information "to justify certain conclusions…." One conclusion was that large numbers of animals were potentially available for Army use. Another conclusion from the census was a dearth of mules compared to horses. The Army hoped that this was simply a lack of reporting by mule owners and not an actual shortage, because many realized that the demand for mules would be rising as the war progressed into areas where motor transportation must be replaced with animal power, preferably pack mules.[7]

A snapshot of Army animals available at Remount depots in May 1942 revealed a surplus of horses. Some 11,942 horses were at the Remount depots, and the number increased monthly as units underwent motorization or mechanization. Large quantities of horses were available if needed. Horses, however, would not be needed. Instead, mules were in growing demand and in short supply.[8]

The Quartermaster General "strongly recommended" to the Service of Supply "that the purchase of 10,000 pack mules be authorized and that purchasing commence at once." The estimated cost for the mules was $2,000,000, a hefty price. Nevertheless, the need for mules outweighed the cost and funds were made available for the purchase of mules. As the report explained:

> In anticipation of future animal demands not yet made known to this office and for which plans are probably in a state of flux in various planning agencies, it is believed that a conservative purchasing program should be initiated at once….

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[7] Ibid., Nevada, for example, reported some 40% of their horse and mule population compared to U.S.D.A. and Census Bureau data from 1940; see also Report from Officer in Charge, Headquarters Western Remount Area to the Quartermaster General, "Horse and Mule Census Western Remount Area," February 13, 1942, File 454 "General Correspondence 1936-1945—San Mateo," Box 608, RG # 92, NARA.

[8] Report from Quartermaster General Major General E.B. Gregory to the Commanding General, Service of Supply, "Reserve Stocks of Animals, May 18, 1942, File 454 "1942," Box 608, RG 92, NARA.

> It is probably not fully realized that at least from five to seven months are required to purchase, process, and issue animals, especially pack mules, ready for duty with troops, from date notice to purchase is received.
>
> Due to a competing civilian market, accelerated by a sharp curtailment in tire and gasoline supply, great and increasing difficulty may be expected in the future purchase of pack mules and the more desirable light draft animals suitable for packs.
>
> Should it develop within a reasonable length of time that animals will not be required for military purposes or should a termination of the war render…a reserve of animals unnecessary, a ready civilian market is available for prompt disposition of the surplus animals by sale.

The report concluded that it was "impossible at this time to definitely predict what numbers and types of animals will be required, the foregoing recommendation is…that the demand will be for pack animals."[9] Upper echelons of the Army agreed, and the request for appropriations to purchase more mules was approved with few conditions. One of the few recommendations by Army leadership was to expedite the formation of a mountain division, which would definitely require pack mules, and to discontinue the purchase of horses.[10]

Procurement of Army mules began in earnest during the spring and summer of 1942. A maximum purchase price was set at $250 for draft mules and $225 for pack mules. Procurement was to begin immediately. Careful coordination between purchasing officers and Remount Depot commanders was urged by the Quartermaster General to ensure that the quantity of mules rose without delay, but not at the sacrifice of quality. If it was questionable whether the animal could be used satisfactorily by the troops, then the animal should not be purchased. In no way was type or condition to be sacrificed in order to complete the procurement of pack mules allotted for purchase. The urgency evinced by Army officers in charge of animal procurement was

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[9] Ibid.

[10] Memo from Assistant Adjutant General Lt. Col. J.W. Ramsey to Commanding General, Service of Supply, "Reserve Stocks of Animals," 4 June 1942, File 454 "1942," Box 608, RG 92, NARA; Memo from Headquarters, Service of Supply to the Quartermaster General, "Animals," 6 June 1942, File 454 "1942," Box 608, RG 92, NARA.

understandable. Yet, there was hardly panic or notions of giving up quality to meet a quota, instead the officers adapted.[11]

The Army Veterinary Corps, the primary care-giver for Army animals, traced its heritage back to 1770s and the establishment of the Continental Army. The attention given to Army animal care was modest to say the least. In 1792, Congressional legislation provided the four light cavalry troops with one farrier to care for their mounts. Throughout the nineteenth century, demands for animal care and veterinary service multiplied as the Army's use of animals rose. However, the Army failed to manage the increasing number of animals in Army service. For example, the cavalry and artillery arms, and the Quartermaster Department, employed a small number of veterinarians and farriers, but these individual arms and department acted without oversight or coordination. The National Defense Act of 1916 established the Veterinary Corps and began organizing veterinary service within the Army.

The Veterinary Corps improved Army animal care by creating a corps of commissioned veterinary officers within the Medical Department. Also, animal care was consolidated under one department, and the organization and expansion of a war-time veterinary service was carried out by the Surgeon General during World War I. These organizational changes were beneficial, but more corrections were needed as animal power reached its zenith during World War I. Ironically, World War I, often associated with motors and machinery saw the employment of horses and mules in epic proportions. It was estimated by the Veterinary Corps that a ratio of one animal to every three men was employed/utilized. Horses and mules used by World War I belligerents numbered in the millions. Thus, veterinary service was undertaken at an unprecedented level

[11] Report from the Officer of the Quartermaster General to the Under Secretary of War, "Procurment Price of Horses and Mules F.Y. 1943," May 16, 1942, File 454 "1942," Box 608, RG 92, NARA; Report "Procurement Program F. Y. 1943," July 27, 1942, File 454.2 "Procurement Directives 1943," Box 608, RG 92, NARA.

during World War I.[12] In April 1917, the Veterinary Corps included 203 officers and 597 enlisted men. By January 1919, the Veterinary Corps grew to 835 officers and 9,282 enlisted men.[13] The Veterinary Corps was taken aback by the rapidity, size, and distance of animal deployments in World War I. The Veterinary Corps performed admirably on the whole, but at times its service was haphazard and grossly inefficient. The Veterinary Corps was determined to make corrections in preparations for another war.

One of the changes within the Veterinary Corps was the establishment of the Army Veterinary Service (AVS) in 1922. Its stated mission was to provide for the health and preserve the efficiency of Army animals. The AVS was subordinate to the Veterinary Corps and their missions were one in the same. The main difference was that the Veterinary Corps primarily functioned as an upper-level administrative organization for the Zone of Interior. The AVS, on the other hand, conducted daily animal care operations at home and abroad.[14]

In the coming years, the AVS implemented standard veterinary practices to improve Army animal health and performance, such as instituting measures to control communicable diseases, quarantining sick animals from healthy animals, conducting thorough physical exams before purchasing new animals, and integrating trained AVS personnel into units utilizing animals. These measures were not necessarily innovative, but still represent an Army evolving and applying lessons learned from the most recent conflict. These actions are also surprising,

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[12] Miller, *AVS in WWII*, ix.

[13] U.S. Army Medical Department, The History of the U.S. Veterinary Service, A.E.F., during World War I, (Washington, D.C.: GPO, 1927), 13; see also Greg Krenzelok, The History of the U.S. Veterinary Service, A.E.F., during World War I, http://freepages.genealogy.rootsweb.ancestry.com/~gregkrenzelok/veterinary%20corp%20in%20ww1/veterinary%20corp%20in%20ww1.html, (accessed September 1, 2012).

[14] Ibid., 5-6. The Zone of Interior is defined as the part of the theater of war not included in the theater of operations. During World War II, the Zone of Interior was comprised of the lower forty-eight or continental states.

since the AVS was implementing such programs in the same period that motorization and mechanization were occurring.[15]

The AVS was part of the Army Medical Service and so was also responsible for safeguarding the health of all living things Army, including men as well as beasts. The AVS totaled some 10,116 officers and men during World War II. One of the primary functions of the AVS during the war came to be inspecting food rations for quality and quantity. Approximately 90% of the AVS personnel served as food inspectors during the war. The other 10% were responsible for "the professional care of over 56,000 horses and mules," as well as thousands of war dogs and even Signal Corps pigeons.[16] The AVS expanded from approximately 126 officers in 1939 to 2,116 in August 1945. Many were professional veterinary care providers, most were not professional soldiers, but all served as a core of the troops providing veterinary service to Army animals. This cadre joined up with thousands of combat infantrymen, Quartermaster, and Service of Supply troops, all with varying levels of skill in animal care, to ensure that Army animal transportation functioned. Occasionally animal transportation worked well and at other times it performed poorly, but that it functioned at all is a testimony to Army adaptability, especially considering that animal power was supposed to be a thing of the past.[17]

Citizen suppliers met the Army's urgent need for mules, and a chief responsibility of the AVS was to provide professional supervision for the procurement of remount animals. All told, the AVS inspected some 140,000 horses and mules from 1941 to 1945, purchasing approximately 60,000. The Zone of Interior, or continental United States, was divided into

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[15] Miller, *AVS in WWI,* 17-18.

[16] Ibid., 615-637; 643-654. Some 40,000 dogs were donated for national defense, of which 18,000 were recruited by the Army, and 1,380 procured for service. Approximately 54,000 pigeons were donated to or raised by the Army Signal Corps.

[17] Ibid., x.

Remount Areas. Remount Area headquarters were located at Front Royal, Virginia; Lexington, Kentucky; Sheridan, Wyoming; San Angelo, Texas; Colorado Springs, Colorado; and Pomona, California. Each Remount Area was supported by a number of Remount Depots. The number of Remount Depots changed during World War II, but four permanent Remount Depots were located at Front Royal, Virginia; Ft. Robinson, Nebraska; Ft. Reno, Oklahoma; and Pomona, California. Each Remount Area and Remount Depot was under the command of a Veterinary Corps officer. The Veterinary Corps officers were responsible for animal procurement, and AVS officers and personnel supported them.[18]

Aside from animal procurement, the Veterinary Corps officers also served on the Purchasing Board for their Area. Veterinary Corps officers examined all animals offered for Army procurement and oversaw the conditions under which these animals were delivered. They performed preliminary tests for disease, particularly glanders, and made sure that no animals were purchased or transferred until the test results were available. Once results were known, the animals were given a special brand. If time was of the essence, the animals might be temporarily branded with paint at the purchase point and then given a permanent brand once test results showed no signs of contagion.[19]

The Veterinary Corps officers noted the animal's age, physical condition, weight, sex, and general disposition, such as whether the animal was a biter or kicker, defiant or docile. They

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[18] Waller, *Horses and Mules and National Defense*, pp. 3-4. "Remount" meant replacement animals. Remount depots (whether domestic or abroad) were responsible for procurement, training, and issuing replacement animals for those killed or no longer effective in service to the Army.

[19]Miller, *AVS in WWII*, 491. Glanders is a highly contagious bacteria-borne disease primarily effecting horses, mules, and donkeys. It often originates in contaminated food and water, and is transmitted through direct contact or inhalation (air borne). Glanders was particularly deadly during World War I. The AVS made a concerted effort to limit this vicious disease during World War II through constant testing and immediate disposal of infected animals. Glanders has not occurred in the United States since 1945. The Preston brand was issued to all horses and mules upon purchase by the Army. It included a series of numbers and letters and most often was placed on the animal's neck.

recommended a type of service for each remount, such as pack (supply) mule or artillery mule. Army procurement regulations were adjusted as the war continued, allowing the pool of acceptable animals to widen while maintaining standards. In June 1943, the Quartermaster Corps lowered the minimum height requirement from 14 ¾ hands to 14 ½ hands; and extended the maximum age requirement from eight to twelve. These changes were predicated on four considerations:

> An anticipated large demand for pack mules by the military service; a diminishing supply of mules of suitable type meeting existing specifications; a good, sound mule up to and including 12 years of age…is capable of doing the same job as a mule purchased under existing specifications; and, as a temporary expedient, since mules purchased now will probably be required for the duration of the war only, and in many cases, those sent to overseas theaters will not be returned to the U.S. after the war is over.

The Quartermaster concluded "these minor changes in the specifications will not result in any sacrifice in quality, but will assure a more adequate supply of pack mules for the military service." These small changes were also representative of widespread Army adaptability.[20]

Veterinary Corps officers physically examined 129,942 horses and mules from 1940 to 1945, of which 60, 230 animals, mainly mules, were purchased. Yet, this large number of animals never suffered any serious outbreaks of disease. Strict protocol was followed and significant adjustments occurred during the inter-war years. For example, equine influenza was observed at civilian assembly points, but the AVS took steps to avoid, or at least lessen, the seriousness of this debilitating illness. Veterinary officers insisted that contractors assemble animals just prior to visits by the Purchasing Board and then immediately move newly purchased animals to Remount Depots, because it had been discovered that minimizing the amount of time the animals were gathered in large herds reduced disease outbreaks. Mass herds had been kept

[20] Memo from the Quartermaster Corps to the Adjutant General, "Changes in Specifications for Pack Mules," 8 June 1943, File 454.2 "Procurement Directives 1943," Box 608, RG 92, NARA.

for lengthy periods during World War I, and epidemics were much more common. Similarly, the dispersal of animals was crucial to the reduction of contagions. Instead of concentrating all animals in one or two shipping points, as was the practice during World War I, the AVS organized some twenty to thirty shipping points in each Remount Area. These adjustments seem minor, but the impact was significant. Disease was reduced, and Army animal efficiency increased.[21]

Upon purchase, animals were transferred to Remount Depots across the Zone of Interior. The primary functions of Remount Depots were to receive, condition, and train animals prior to their assignment to pack and mounted troops. In many regards, Remount Depots were similar to other Army bases, forts or camps where new recruits underwent basic training. The AVS maintained continuous care for animals at Remount Depots to avoid illness.

Army mules were typically processed as follows. First, they were immediately inspected upon unloading from trucks or trains. Second, all animals were quarantined in special corrals for at least twenty-one days, tested for various diseases, and re-tested at the end of the quarantine period. They would be tested again just prior to transfer from the Depot to the port of embarkation, tested at the port just prior to departure, and tested once more immediately upon arrival at their overseas destination. Such redundancy minimized the number of disease outbreaks during World War II. Any sign of illness or injury received immediate attention from AVS officers, and "it was an inviolate rule that no animal would be shipped…unless it was sound, healthy, and free of disease…."[22]

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[21] Miller, *AVS in WWII*, 490.

[22] Ibid., 496.

One of the major improvements instituted by veterinary officers from World War I to World War II was prophylactic inoculation. The vaccinations themselves were refined, such as the inoculation for equine encephalomyelitis. Perhaps an even more effective advance was changing the timing of the vaccination process. but it was not simply the quality or quantity of vaccines that improved, but also the timing in which the vaccine was given. For example, animals during World War I seldom received tetanus vaccine until after a traumatic injury, and the number of cases was widespread. The AVS implemented a protective vaccination program in 1941 that included a battery of tetanus toxin shots before deployment, which imparted permanent immunity against tetanus. Only one animal contracted tetanus at Remount Depots during World War II, a remarkable record.[23]

Training and conditioning followed the quarantine inoculation period, and training not only applied to the mules, but to men as well. Unfortunately, there was very little in the way of formal training for personnel working with mules. Many brought their knowledge and farm experiences when they joined pack and animal supply units, but many did not. The Army lacked large numbers of specialized personnel needed to care for animals. Thus, the Army was not too selective when filling the ranks and, as one dismayed recruit discovered, "MP" stood for "Mule Pack," not Military Police.

According to Jim Sims, a veteran Army mule skinner, "The c.o. said look over in those corrals. There was around 1,200 to 1,300 head, mostly horses. He told us they was to be trained and ready for cavalry use and that our Army training could wait until after we had them trained." Sims continued, "Then we was shipped to Fort Bliss, Texas. Went on maneuvers in Louisiana, used horses there, came back to Texas and dismounted all the horses….Then we trained mules."

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[23] Ibid.

Army planners were in an obvious "state of flux" that would require sorting out and serious adjustment.[24]

Mule packers, particularly those working with artillery mules, needed to posses special physical requirements, such as height and strength. The Philips pack saddle alone weighed one hundred pounds and had to be placed on the mule's back, about five feet in height, before packing could begin. Longer strides were required for mule packers in order to keep pace with their animal charges, and the rate of marching for pack troops was around four miles per hour compared to 2 ½ miles per hour of the regular infantry. An adage among mule backers was that the Army put a bar up six feet high, and if your head hit the bar or you had to duck, the you were qualified. Men with weak arches or bad knees were generally disqualified from serving as packers, and often wound up in the motor pool. [25]

One of the well-qualified troops to serve in a pack animal unit was Hank Kinder. He was raised in the country and spent summers on his grandfather's farm, where he tended to eight mules and a horse. He joined the Army in the summer of 1942 after the military board for his county lowered the enlistment age from 21 to 20. He was assigned to the 32nd Field Artillery and spent three months at Ft. Sill, Oklahoma. According to Kinder:

> The Army then picked out all men who knew anything about farming or ranching and moved me to a pack troop (the 33rd Quartermaster Pack Troop) because of my experience with horses and mules. Late in 1942 we went off to Ft. Bliss, and it was a big change from artillery to pack mules. I recall thinking we were going to be part of the tank corps because there was lots of tracks across the desert when we arrived, but that wasn't the case. There was around 5,000 mules and 320 men. They divided us into two troops and each troop into 4 platoons—I was in 3rd Platoon. Each platoon had 4 shoers, 4 saddlers, 4 platoon sergeants, and

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[24] Bradley, p. 368.

[25] Bradley, 369-370; W.B. Woodruff, *Pack Artillery and the Light Infantry Connection,* (Carlisle, PA: U.S. Military History Institute, 1988). 7; Narrative of Activities of the 601st Field Artillery Battalion (Pack) to Accompany the Unit Journal, History 601 Field Artillery Battalion April 1942-October 1944, File FABN 601-01 (9150), Box 1750, RG 338, NARA.

> one pack master. Each platoon had about 70 mules. The 320 of us broke those 5,000 mules in short order.
>
> I got to break some of the worst in the outfit. I asked my sergeant one time, "Do I have to break every God-damned mule in the Army?" The sergeant told me, "If I say so, you do." I got to break the meanest mule in the crowd—his name was Santa Clause. He was always the last mule packed and always the lightest mule packed on account of being so mean. We were usually paired up to help with loading, so my partner, Swede, and I decided to teach Santa Clause a lesson. We took two 90 pound anvils, wrapped them in the mannie, and took a twitch—you could subdue the meanest mule with a twitch— loaded him down with those anvils, and wore Santa Clause completely out. It was a hot day, covered about 20 miles, and Santa Clause was last in to camp that evening. It wasn't by any book, but seemed to cure him. He was a pretty good mule after that little exercise.[26]

Men and mules alike were trained. Feed, water, daily inspection, and basic skills, such as halter, lead, and handling, were performed in an effort to prepare for the arduous tasks ahead. Both men and beasts were conditioned to march and travel great distances at various times and under all conditions. "For a while we hiked every night," noted Kinder, "to break us and the mules in to moving in the dark. It was good we did because we packed more at night in Burma than in the daytime."[27]

The Army continued to widen the pool of mules suitable for military service. Height requirements were modified again to include a range of 14.2 to 15.2 hands high. The addition in height allowed purchasing officers "a certain amount of leeway" when they found "a big mule that still is a pack mule." Aside from adjustments to height, requirements for weight and age were amended. The weight of the mule needed to be in keeping with their height and

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[26] Private Hank Kinder, 33rd Quartermaster Pack Troop, 5307th Composite (Provisional) Regiment "Merrill's Marauders," Personal Interview May 20-21, 2011. Hereafter noted as Kinder Interview. A mannie (manta) was a canvas tarp that covered the entire pack saddle and packed contents. The mannie kept food and equipment dry, and deterred mules from chewing on supplies and eating rations. A twitch is a piece of braided twine with a small loop on one end with the other end wrapped around a stick. The loop is placed over the mule's upper lip, the stick is twisted or rotated so that the twine tightens around the mule's lip, and the mule is pacified. Santa Clause died when a Japanese submarine in the Indian Ocean torpedoed the animal transport *Jose Navarro*. The members of the 33rd QM Pack Troop were aboard the ship and a British corvette rescued all troops after spending some 24 hours in the Indian Ocean. All 320 mules and equipment were lost.

[27] Ibid.

conformation, e.g. generally 1,000 pounds for a 15 hand high pack mule, but "fifty pounds either way will be allowed…." The age requirement remained four to twelve years old, however, when buying four year olds "it should be borne in mind that it is not desired to issue any mules under five years of age. That means that they must be full four year olds…" before being deployed. The amendment to age was because mules did not mature physically or behaviorally until they were five.[28]

The regression to animal transportation created several unanticipated needs. A crucial element to maintaining animal efficiency was horseshoeing. Farriers had been part of the Army since the formation of cavalry in 1777. However, the need for farriers diminished rapidly with the mechanization of the United States military. Records indicate that horseshoeing schools were quickly discontinued once a cavalry unit became motorized. Likewise, horseshoes and shoeing equipment in the Army all but disappeared. By 1941, military horseshoeing schools were scarce, and the shortage of skilled farriers became evident once combat units needed animal power to overcome certain obstacles. One solution was to recruit more soldiers with existing horseshoeing skills. Another answer was to allow private contractors to provide farrier service, particularly for animals located in the United States. Still another solution was to use local farriers in the respective combat zones. If native farriers did not exist, then many locals were given a crash course in the art of horseshoeing, as the Army adapted at home and abroad.

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[28] Memo from Quartermaster General to Officer in Charge of Remount Areas and Commanding Officers of Remount Depots, "Specifications for Pack Mules," 3 August 1944, File 454.2 "General Correspondence 1936-1945," Box 608, RG 92, NARA. The hand is used to measure all equines. One hand equals four inches. To convert inches to hands, the number is divided by four, so a horse or mule that is sixty-four inches tall is sixteen hands high. Any remainder is added after the radix point. Thus, a horse or mule that measures 60 inches is 15 hands high. An animal horse halfway between 15 and 16 hands, or 62 inches tall, is 15.2 hands. When spoken, hands are stated as numbers, meaning a fifteen hand high animal is said to be "fifteen;" an animal that is 15.2 would be "fifteen-two" or "fifteen hands, two inches."

The China-Burma-India (CBI) Theater of operations experienced an acute shortage of farriers, more so than in Italy or the Mediterranean Theater. The AVS was tasked by the theater Quartermaster and the Veterinary Corps with assisting the largely animal-dependent Chinese Army. The Chinese Army had an estimated 22,000 horses in 1945, of which only about ten percent were shod. The AVS taught Chinese Army personnel the benefits of basic veterinary medical care, including the necessity of proper shoeing. Local horseshoeing schools were established, American-made equipment arrived, and horseshoe production increased dramatically in the CBI. The result of such measures was improved efficiency of Chinese Army animals.[29]

The average length of processing mules at Remount Depots was seldom less than 120 days. It was found that issuing animals in less time had risks, particularly a greater susceptibility to illness. Before leaving the Remount Depot, all animals were inspected again, particularly for respiratory diseases, ring worm, and other skin disease. Animals were transported via train from the Remount Depot to a port of embarkation. Army Port Veterinarians inspected the animals immediately upon arrival at the port of embarkation. All animals were re-shod, clipped, groomed, and given special rations of food and water during the two days prior to departure. Animals only remained in each port of embarkation for a few days, cutting down on potential infectious diseases and helping to maintain good physical condition for the arduous voyage ahead. The Port Veterinarian reviewed shot and immunization records as the animals were loaded aboard the transport ship. Transport personnel were usually from Army Veterinary units or animal service detachments. These specially qualified men often accompanied their animal charges into the theater of operations.[30]

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[29] Miller, *AVS in WWII*, 531-533.

[30] Ibid., 539. Animal shipments originated from four ports of embarkation in the Zone of Interior: Los Angeles and San Francisco, California; New Orleans, Louisiana; and New York, New York .

Army Veterinary Corps and AVS officers inspected each ship prior to loading. The transports were inspected on a variety of details that could have a bearing on animal health. For example, the ship's capacity, stall accommodations, feeding, watering, lighting, and ventilation systems were all checked, along with feed and water supplies. All equipment, from loading cranes to curry combs, was checked before any animals boarded. Not all ships were rigged with the most optimal systems, and some deviations were allowed "in view of the fact that none of the American animal transports in use during the war was constructed for such use; at least 18 of them were converted vessels." Most conversions were from Liberty-type ships or troop transports, with a stall capacity of 320 animals. Also, Port Veterinary officers cooperating with the War Shipping Administration designed most of the converted ships. In a brilliant demonstration of on-the-job training, the Port Veterinarians became nautical engineers and designed the conversation of a small fleet of ocean-worthy animal transports. Only enemy bombs and torpedoes could keep these ships from successfully delivering their animal cargo.

Veterinary officers and their assistants, usually at a ratio of one officer and five enlisted men for every one hundred animals aboard, accompanied the animals on a trans-oceanic voyage. The average transport carried about 320 animals. A protocol was closely followed to include exercising, feeding, watering, and cleaning. Manure was removed, and decks flushed daily. Ventilation was constantly adjusted to improve air flow. Horses and men often wore masks of cloth saturated in chloride of lime to counteract the ammonia build up from urine. Any sick animals were separated and treated. The average trans-oceanic voyage took approximately twenty-five days or more. One particular voyage from New Orleans to Calcutta, India via the Panama Canal took sixty-three days. Records indicate that 20,815 horses and mules left

American ports in 1942-1945. Only sixty of them died or were destroyed en route to the war zone, a testimonial to the dedication of the AVS personnel and the hardiness of Army mules.[31]

Occasionally the U.S. Army used British merchant ships to haul mules on their trans-oceanic voyage. The British merchant ship *Theseus* transported some 485 U.S. Army mules across the Atlantic, through the Straits of Gibraltar, the Suez Canal, and on to Karachi, Pakistan. The mules were used by American and British troops operating in the Burmese jungle.

Although a British ship, the experience for those aboard *Theseus* was typical. Cleanliness aboard a ship with nearly 500 mules was a constant battle. Bill Bond, a *Theseus* crew member, observed that upon arrival and unloading, "clean up on the ship began in earnest. Dozens of workers, mainly women, swarmed aboard with wicker baskets to scrape away at weeks of hardened manure. Flies, vermin, and stench were appalling." The ship was fumigated for forty-eight hours, refitted with additional stalls to carry more mules, and dispatched to South Africa, where it picked up another several hundred African donkeys, mules, and ponies. The animals were fitted with body harnesses and loaded using a derrick and winch. The ship now carried more animals, which meant more water and food were consumed. As Bond noted, "we had to constantly muck out the ship by removing manure and straw overboard. It had to be done after dark, under the illusion that this would avoid giving away our position to the enemy." Bill Bond and *Theseus* delivered three shipments of animals to the U.S. and British Army. In the end, *Theseus* was decommissioned as an animal transport and refitted again to carry non-animal

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[31] Ibid., 540-541; see also Andrew Crawford, *Mules Go to War: A Tale of Floating Barns on the High Seas During World War II—Anecdotes from the Port Veterinarian of New Orleans.* Unknown Publisher, 1979, copy at Carlisle, PA: U.S. Military History Institute. Ships sailing to Italy and the Mediterranean Theater simply sailed across the Atlantic. Mules sailing to the CBI Theater took a longer, often circuitous voyage. Some ships left the west coast, sailed to Melbourne, Australia and on to Calcutta, India. Others left the east coast, sailed across the Atlantic, the Mediterranean Sea, through the Suez Canal, and on to Calcutta. A few voyages left New Orleans, sailed through the Panama Canal (to avoid German U-boats off of the east coast), across the Pacific, and on to Calcutta. Many of the voyages taking the latter route travelled for prolonged periods near the equator, forcing men and mules to endure some unbearable temperatures.

cargo. The reason was age: "the acid involved in prolonged animal excreta was playing havoc with her aging plates, and the lack of dry-dock cleaning made matters worse."[32]

Men and mules were undoubtedly relieved upon reaching their port of call. As Buck Cureton observed,

> The mules would get antsy when they got close to port. I was at the dock in Calcutta when a shipload arrived…they'd been at sea for over 100 days. The crew turned them loose and let those mules swim to shore. They swam to the beach and you could tell they were tickled to see the ground. They rolled over on the beach like kids.[33]

Once in theater, the treatment and care for animals was maintained, though the quality of care differed from one theater to the next. Food shortages were widespread, and veterinary resources were primitive. Nonetheless, the AVS was able to ensure that animal efficiency remained high in spite of the abysmal conditions. The Remount Depots at Grossetto and Pisa, Italy processed some 15,600 animals, or about 1,725 horses and mules each month for nineteen months. These animals originated from different places: 3,900 from Britain and France; 1,100 from Italy; 2,400 from Sardinia; 2,881 from America; and over 1,000 recovered animal patients from unknown origins. Disease should have been high from this diverse and constantly changing animal population. However, no serious outbreaks occurred due to the diligent protocol set by the AVS. Once the war ended, thousands of these healthy animals were sold or given to war-torn countries, including Germany, France, Italy, and Greece, to aid the post-war recovery.[34]

The mules were generally quarantined, inspected, and transferred to the front. The method of movement to the front supply line depended on the theater. In Italy, mules were

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[32]Bill Bond, "The Theseus Experience: One Merchant Ship and 485 Mules Go to War." *Army Quarterly* (October 1995): 432-437.

[33]Private Buck Cureton, L Troop, 5332nd Provisional Brigade—Mars Task Force, Personal Interview, February 19, 2011. Hereafter noted as Cureton Interview.

[34] Miller, *AVS in WWII*, 510.

usually loaded onto converted trucks and hauled from port to supply areas. In the Southwest Pacific, such as at Guadalcanal, mules simply swam to shore and were marched to the supply and battle area. Mules sent to India were loaded onto trains, taken to a Remount Depot, and then road-marched after the quarantine period. The theater of operations also determined the type of animal employed. Supply operations in CBI, for example, relied more on American mules on account that the native animal population was considered too small, unhealthy, and scarce. Operations in the Mediterranean (Italy) utilized more native animals because a ready supply of relatively healthy animals existed.

Maintaining animal health and physical fitness was a tedious, often complicated task, as illustrated in the efforts to meet the most basic of needs, forage. The Quartermaster General requested studies because a ration was needed that possessed "the necessary nutrient qualities for animals but considerably smaller in bulk for transport." Indeed, the problem of bulk in forage rations had been among the arguments used by motor and mechanization proponents championing the efficiency of vehicle transport.

The AVS and U.S. Department of Agriculture worked diligently to develop a complete horse and mule feed. Experiments to create the perfect mixture and consistency of ration were conducted. One trial formula included: oats (47%), sugar beet pulp (35%), starch (10%), alfalfa (7%), and salt (1%) in a pelletized form. Results of feeding trials during the fall of 1942 proved unsatisfactory. Army test boards opted for simplicity, and the emergency forage ration included a double-compressed bale of a hay-oat-salt mixture.[35]

The AVS's quest for a perfect ration failed, though undertaken in the Zone of Interior under optimal conditions. Finding forage overseas proved even more difficult. The AVS

[35] Miller, *AVS in WWII*, 528.

attempted to solve the bulk forage dilemma by procuring local resources and developing and possibly improving upon indigenous feed. Using local forage removed the trans-oceanic shipping problem from the equation, but actual procurement or locating forage of any kind was an issue.

The increased deployment of local animals in Italy, for example, caused demands for feed to skyrocket. The Fifth Army alone was using no less than 12,000 mules in the spring of 1944. The strain on forage supplies was immense, especially considering that one mule requires approximately seventeen pounds of forage and ten gallons of water each day to perform normal duties. Procuring forage for these numbers of animals left the Quartermaster and AVS in a quandary. The difficulty was compounded by the German Army's application of scorched earth tactics, including the destruction of cropland and animals during retreats. The availability of forage in Italy improved when AVS personnel found an undamaged feed manufacturing mill in Maddaloni, and several thousand tons of grain in southern Italy and Sardinia. These discoveries, coupled with increased forage imports from the United States and Europe, helped avert a feed crisis in Italy.[36]

An acute shortage of forage plagued operations in the China-Burma-India theater. The Chinese Army's indifference to basic animal care and maintenance, coupled with a virtually non-existent logistical infrastructure left the AVS increasingly frustrated. Yet, the AVS personnel accepted these unsatisfactory conditions and adjusted. Resigned to forage scarcity and declining animal efficiency, the AVS personnel made do.

Operations in CBI were largely cut off from motorized supply lines and were most often supplied through the air or by subsisting off the land. AVS officers accompanied Army

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[36] Fifth Army Medical Service: The Veterinary Service, File "5th Army Medical Service History 1944," Box 6, RG 112, NARA; J.P. Littlejohn, Editor. *History of the Peninsular Base Section, Mediterranean Theater of Operations, in the Italian Campaign, October 1943-May 1945*. pp. 230-250. Unknown publisher, unknown date, copy at Carlisle, PA: U.S. Military History Institute, call # D769.75 A5. 1945; Truscott, *Command Missions*, 263.

reconnaissance teams prior to operations and mapped out routes with suitable airdrop locations and grazing areas. Pre-operation exercises were conducted to determine if animals could subsist entirely off of the land, but it was determined that the mules could not and airdrops were necessary to provide grain supplements.

Animals routinely grazed on trails and consumed large quantities of bamboo, which provided roughage but very little nutrients. Small fields and rice paddies were prevalent, but the rice fields took up most of the arable land, making good grazing areas rare. Among the most favorable places for grazing were graveyards. As one Field Artillery officer noted, "Lay-over areas were always chosen with grazing areas uppermost in mind. Graveyards afforded us more grass than any other type of area in China, so we camped very often in graveyards." As Hank Kinder observed, "When we went into Burma, and especially China, the graveyards were all grown up…not mowed or kept, so we let the mules graze at night. Pretty good grass, too, like blue grass over here. They preferred the grass to feed." Several hundred men and mules interrupting the tranquility of a sacred burial ground paints a dark, comedic image, but it is also illustrative of the Army adapting to their conditions and utilizing all resources available.[37]

Grain supplements were air-dropped to supplement the nutrient-poor grazing. Victualling pack animals by air was clearly uncharted territory for the Army, and numerous problems and mishaps occurred. In the beginning, unmarked, overfilled feed bags with mixtures of grain and cracked barley were kicked out of cargo planes. The 100-pound bags free-fell to the ground, usually bursting on impact; and causing great waste and delay in the collection process. Eventually, the problem was corrected through American ingenuity. Buck Cureton explained: "instead of a 100-pound bag packed full of loose grain, we used a 100-pound bag filled with ten,

[37] Report from Capt. John A. Rand, 613 Field Artillery, to CBI Theater Quartermaster, "Report on Animal Movement," 26 October 1945, File 454 "Animals" 1-42—3-46, Box 1750, RG 338, NARA; Kinder Interview.

smaller, ten-pound bags. The big bag burst when it hit and all the smaller bags scattered on the ground. We could pick them up easy enough and load them onto the mule packs." The once haphazard method of air supply in CBI dramatically improved as the campaign wore on and the troops adjusted.[38]

Another example of AVS adaptability involved working in various theaters with allies that held disparate views regarding animal care. The differences between AVS operations in the MTO and CBI were stark. The Italian Army shared a Western view of animal care and veterinary medicine with the AVS. Both forces were devoted to the basic tenet of veterinary medicine, namely the science and art of prevention, cure, or alleviation of disease and injury in animals. Veterinary medicine in the Italian Army during the 1930s and 1940s was not in the vanguard of development, particularly in medicines, as the AVS discovered during the initial phases of the Italian campaign. However, the Italian Army had a Veterinary Service and Remount Program upon which the U.S. Army could build.

The Chinese Army had no modern standard of animal care, nor did they have a recent history from which to develop a veterinary medicine program. The Chinese Army was still heavily dependent on animal power, but upon arrival in theater American personnel discovered native animals in poor condition. The animals were unshod, unkempt, and according to one CBI veteran, the Chinese "worked 'em 'til they died." The AVS was appalled, frustrated, and determined to impose an efficient veterinary medicine program on the Chinese Army.[39]

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[38] Cureton Interview, February 19, 2011.

[39] Private Harold Burnside, Company C, 5307th Composite Regiment (Provisional) "Merrill's Marauders," Personal Interview, September 3-4, 2010. Hereafter referred to as Burnside Interview; see also "A Brief History of the Medical Department of Y-Force Operations Staff, April 1943-October 1944," File # HD 319.1-2 Y-Force, Box 13, RG 112, NARA.

The stereotypes of American wastefulness versus Chinese frugality did not apply to methods of animal care, and there is a paradox in the contrast between AVS and Chinese veterinary practices. The Chinese could afford to be wasteful because animals, like people, were plentiful. Likewise, the Chinese considered animal care to be degrading duty. Consequently, the Chinese had little concern for animal health, welfare, or efficiency. The AVS and the supposedly wasteful GI, in contrast, made every effort to husband resources in CBI. AVS officers showed Chinese officers and men the importance of proper animal care as a way to ensure animal efficiency, but AVS endeavors to impose a veterinary medicine program on the Chinese were not widespread or enduring.

Some 56,000 animals were mobilized by the Army Veterinary Service, most of which were never deployed; and only 10% of the AVS personnel were actually used for animal care since the majority served as food inspectors during World War II. The service of these men and mules would not meet the usual definition of heroic, and it is not suggested that mules or the men providing them care won the war. Their service, however, was more than just a minor contribution to a massive corporate effort that culminated in Allied victory over the Axis. An examination of the AVS in World War II also provides a microcosm of Twentieth Century America that reveals a penchant for adaptability and organization.

Figure 4-1. American mules unloaded by crane and cargo net at Naples, Italy, September 1944. The mules will be moved to a corral, placed in quarantine, and then trucked to the front supply lines (Army Veterinary Service in World War II).

Chapter 5: Mules on the Boot—Operations in Italy

The Allies secured Sicily on August 17, 1943. Their victory was bitter as most of the Germans retreated to Italy unscathed. American and British forces spent the next four weeks preparing to invade the Italian mainland and pursue the Germans. A few division commanders fretted over logistics, particularly the continued need for animal-powered supply. General Lucian Truscott noted, "After the Sicilian campaign I intensified the training of the cavalry troop and pack train and organized a battery of pack artillery, in anticipation of operations in mountainous country in Italy." Most commanders failed to follow General Truscott's lead or see the need for animal power, and Army supply lines were in disarray shortly after landing on the boot of Italy. [1]

The Allied invasion plan for Italy was simple and direct. American and British troops would land at specific points in southern Italy, and then steadily work their way up the peninsula, converging on Rome. Strategically, Allied leaders hoped to boost morale with a quick Italian capitulation and liberation of an Axis capital. Landing in Italy would also divert German troops from the cross-channel invasion planned for 1944. These strategic goals were eventually met, but not in the rapid manner envisioned by Allied planners. Instead, the Italian campaign became a protracted struggle fought in three grueling phases.

On September 3, 1943, British Eighth Army troops crossed from Sicily to Calabria on the toe of the boot-shaped Italian peninsula. American Fifth Army troops landed further north at Salerno on September 9, 1943. The Italian government soon announced an end of hostilities against the United States and Britain, but Italy's withdrawal from the war did not stop vicious counterattacks by German forces determined to fight a delaying action and tie up the Allies

[1] Truscott, Report: *Army Ground Force Equipment Review Board Preliminary Study*, Fifth Army and MTOUSA Reports Thereon, 14 July 1945. File HD: 314.7, Box 8, RG 112, NARA. General Truscott surmised that if a well-trained cavalry regiment had been available after the Salerno landing, then the costly battles of Cassino and Anzio could have been avoided, and the Italian campaign considerably shortened.

indefinitely. The German army controlled the heights overlooking the Salerno beachhead. Moreover, the Germans controlled the few roads that snaked across the rugged Italian countryside. Following a precedent set in North Africa and Sicily, the German troops resisted stubbornly, and then destroyed these roads as they retreated to the next fighting position. The Allied offensive in Italy immediately bogged down, and entered the first phase of the campaign in southern Italy.[2]

The Allied advance was painfully slow for several reasons. First, Allied commanders, such as U.S. General Mark Clark and British General Harold Alexander, had difficulty conducting coalition warfare. Clark was an openly hostile Anglophobe, and Alexander frequently expressed nothing but contempt for American troops. Second, resources were scarce as the Italian campaign became a sideshow to the impending cross-channel invasion of France.[3] Third, and perhaps of greatest influence, was the terrain. The Fifth Army campaigns of Italy ran over the ridges of the Apennines rather than parallel to them. The Fifth Army history notes, "The trackless waste in which this 'mountain hopping' took place...reduced the pace of the war to a crawl and the means of fighting it to primitive methods." Sweeping movements by combined infantry, artillery, and tanks were impossible, because the rocky masses blocked the southern approaches to Rome. Victory in Italy came largely by small unit actions in desolate, rugged

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[2] John P. Lucas, "Need for Animals in Italy," *The Cavalry Journal* 53 (July-August, 1944): p. 16. General Lucas was the U.S. VI Corps commander in southern Italy during the fall and winter of 1943-1944.

[3] Rick Atkinson, *An Army at Dawn: The War in North Africa, 1942-1943*, (NY: Holt, 2002), and *The Day of Battle: The War in Sicily and Italy, 1943-1944*. NY: Holt, 2007. The animosity between Anglo and American forces was not limited to these two generals, but they were two of the more openly hostile officers and placed at high levels of command in Italy. The seeds of their bitterness were sown in North Africa, ripened during Sicily, and matured during the Italian campaign.

outposts, most often supplied by pack animals, and fought in what Bill Mauldin dubbed a land of "mud, mules and mountains."[4]

Supply operations in Italy employed pack animal extensively, and depended almost exclusively on native animals. The U.S. Army Quartermaster Remount Service procured some 15,000 mules and horses in Italy, and issued over 11,000 to Army forces throughout the campaign. Shipping American mules and forage was prohibitively costly, but reliance on local stock was not only a matter of cost and efficiency. The main reason for relying on local animals was that the Army had made no widespread preparations to use pack animals. War Department planners maintained "an implicit faith in the ability of mechanized forces to move over any type of terrain" until troops in the field encountered obstacles that disproved this belief. The blitz-minded Army faced an immediate supply crisis, and an expeditious solution was partially found in the improvisation of native mule trains attached to Fifth Army units.[5]

The Army's use of Italian pack animals was rife with obstacles, and most of these difficulties stemmed from the impoverished state of Italy's agricultural economy. The Fascist government forced hundreds of thousands of farmers into military service prior to World War II, and continued to impress men and animals into service after war began. Men and animals died, livestock and fields were neglected, and armaments production replaced what little farm machinery produced there had been. Italy could not produce guns and butter, and their agricultural economy was bankrupt when the Allies landed in September 1943.

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[4] *Fifth Army Medical Service History-1944: The Veterinary Service.* pp. 137-145. File name: (A1)-31-AJ, Fifth Army Medical Service History-1944-MTO, Box #6, RG 112, NARA. Hereafter cited as *Fifth Army: Medical Service;* Bill Mauldin. *Mud, Mules, and Mountains: Cartoons of the A.E.F in Italy*, self-published, 1944. Mauldin was a Pulitzer prize-winning war correspondent and cartoonist best known for his Willie and Joe characters.

[5] J.P. Littlejohn, 230-249; Erna Risch and Chester L. Kieffer. *The Quartermaster Corps: Organization, Supply and Services Vol. II*, *United States Army in World War II,* (Washington, D.C.: Office of the Chief of Military History, 1955) 323; Michael F. Parrino, "Notes on Pack Artillery." *Military Review* (July 1955): 51-55.

The Allied arrival did little to alleviate Italy's state of destitution. Fighting between Allied and German forces left thousands of horses and mules killed or wounded, and crops damaged. The destruction became even more widespread when Italy surrendered, because this triggered a German campaign of unrivaled retribution. All means of agricultural production that could not be taken by the German Army were destroyed as they retreated northward. According to Fifth Army documents:

> There was little more than destruction to report. In addition to horses, mules, and fodder which they had carried off, the Germans burned all the saddles they could find. They destroyed all veterinary medicines and instruments. They destroyed all nails and horseshoes. They leveled blacksmith shops to the ground. No detail was too small for them to overlook. The German claim that Italy would prove an economic liability to the Allies was to a large extent true.[6]

The U.S. Army's requisitioning of Italian animals did nothing to ameliorate the crisis. Army supply chains had an acute need for pack animals. Likewise, the local population desperately needed their animals to survive. Civilian needs conflicted with equally urgent military needs, and both sides were desperate. For example, the Army attempted to pay for all animals requisitioned. However, money was often not as valuable as the animal. Requisitioning authorities offered one farmer $100 for his mule. He countered by offering to pay $200 if they would not take his mule.

Animals capable of limited farm use, but unfit for military service, were considered a blessing by Italian farmers. White horses and mules also inspired thanks among the locals because most armies would not use light colored animals since they were hard to conceal. The majority of Mediterranean horses and mules were light in color, so the Army amended their standards and impressed light colored animals into service. Losses of the lighter hued animals were high, but dropped significantly when an American quartermaster, demonstrating an

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[6] *Fifth Army: Medical Service-1944*, 138.

ingenious flair, developed a dye from potassium permanganate that darkened the animals. The mixture was sprayed on the animals, and they maintained a dull coat for roughly one month. Even with such creativity, however, the Army remained desperately short of pack animals in the initial phases of the Italian campaign.[7]

The Army relied upon this depleted source of supply for all activities involving animal transportation, and the dependence never slackened. The Italian campaign required prolonged mountain warfare, thus, "the employment of pack trains was not a freakish throw-back to an outmoded form of warfare" but rather became "an organic aspect of the campaign in Italy."[8]

Animal-powered supply eventually became second nature in Italy, but it was completely improvised, because neither animals nor their equipment were included in Army Tables of Organization and Equipment. The War Department eventually developed a TO/E that included animals and their accouterments. In the interim, the Army collected the "damndest array of horses, mules, and asses" and "gradually grew a weird assortment of Italian, French, English, German, and American tack and gear."[9]

Finding personnel with even a rudimentary knowledge of pack animals was as difficult as finding the animals. Around half of the troops serving in provisional pack units possessed some knowledge of horses and mules, but most men lacked experience with animals and pack equipment. The personnel who ended up in divisional pack trains were from different units within the divisions. Many came from service of supply ranks, including the motor pool. According to the Army Veterinary Service:

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[7] *Fifth Army: Medical Service-1944*, p. 138.; Littlejohn, p. 234, see also Ross and Romanus, *The Quartermaster Corps: Operations in the War Against Germany*, 240; Essin, 167.

[8] *Fifth Army: Medical Service-1944*, 139.

[9] Littlejohn, 233.

> The troops had been transformed into "mule skinners" from their former roles as truck drivers. Though these men possessed the best of intentions, their sincerity unaccompanied by knowledge, proved insufficient to produce happy results in handling their charges.

This assessment, though polite, nevertheless explains why there were high casualties among the limited quantity of animals desperately needed to move supplies in Italy.[10]

The abysmal state of Italy's agricultural economy remained the chief problem. Locals often extorted prices because demand was high. The U.S. Army matched Italian government requisition prices, but profiteering still occurred. A one hundred to three hundred percent mark-up often occurred for mules that were used once. When the mules died from overuse, neglect, or combat wounds, the locals acquired the carcass and made more profit by selling it on the black-market.

Locals were not the only ones taking advantage of shortages during a crisis. Italian farmers frequently received hand-written requisitions when American GIs took their animals. One farmer presented an American Military Government (AMG) official a slip of paper, upon which was written: "Pay to the bearer 120.00 for one horse taken—(signed) Tom Mix." The AMG refused payment, exacerbating poor relations between the Army and local populace.[11]

The shortage of animals was so great that many were requisitioned regardless of condition. Most animals were old, lame, deformed, small, or immature and generally in poor form. Incidents of sickness were uncommonly high, since many animals were stabled prior to

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[10]*Fifth Army: Medical Service-1944*, p. 140; see also *History for 1943 of the Veterinary Service in the North African and Mediterranean Theaters of Operation*. Veterinary Service, 5th Army. File #HD 319, Box 13, RG 112, NARA, cited as *History for 1943 of the Veterinary Service*; Letcher Wigington, "Supply Problems of an Infantry Division in Mountain Operations," *Military Review* (May 1946): pp. 49-51. Particularly insightful is Wigington's assessment of training, leadership, and using untrained civilians as combat infantry and pack train personnel.

[11]Eudora R. Richardson and Sherman Allan, *Quartermaster Supply in the Fifth Army in World War II,* (Fort Lee, VA: The Quartermaster School, 1950), 55, USMHI #03-5.1950/2, hereafter cited as *QM Supply Fifth Army;* Littlejohn, 236; Essin, 160.

purchase and immediately put to hard work. Animal condition was reduced further due to poor quality forage. Years of neglect and the German use of scorched earth left fields barren, and good forage was nonexistent. Tibben, carob, and mangiene were poor substitutes. The only hay obtainable was often musty, moldy, and caked. Several cases of intestinal disorders resulted from bad rations. Low quality feed reduced the condition of animals already in poor shape. The vicious cycle continued until small shipments of forage arrived from the U.S., and, more significantly, the Italian government and Army Veterinary Service gradually rehabilitated the countryside.[12]

November and December 1943 were lean months for animal procurement. The Fifth Army Veterinarian, Colonel Clifford E. Pickering, tirelessly worked to locate animals and pack train equipment. He discovered that a number of Italian Army horses and mules had been dispersed throughout the country to keep them from the Germans. Former Italian cavalry officers and local *carbinieri* volunteered to assist Colonel Pickering procure these animals. The animals were in decent condition and trained for military purposes, which expedited their employment by the U.S. Army. Their use also avoided some of the animosity generated by military requisition of civilian animals. An added bonus was found in a partly demolished animal rations factory at Maddaloni, where a sizable quantity of maize was discovered.[13]

The Fifth Army's luck regarding animal procurement continued to improve. The island of Sardinia fell so rapidly that the Germans had no time to destroy the large number of animals or their equipment. There the Fifth Army found 5000 mules, 1500 horses, 3000 saddles, 2500 each

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[12] *History for 1943 of the Veterinary Service,* p. 12; *QM Supply Fifth Army*, p. 55. Tibben is chopped wheat straw. Carob is an evergreen tree, the pods and pulp of which are used as fodder. Mangiene is a mixture of maize, rice, bran, soy bean residue, and molasses. These low quality rations provided minimal nutrients, and were seldom fed in the United States.

[13] *Fifth Army: Medical Service-1944*, p. 139. *Carbinieri* were members of the Italian national police force.

of horse and mule shoes, and two well equipped veterinary hospitals. The procurement problem was hardly solved, but "the supply of animals and equipment from military sources…proved to be the best found in the whole of liberated Italy." The Fifth Army orders were approved to organize pack trains and move all animals and equipment from Sardinia to the mainland, with the first two trains arriving in December 1943.[14]

Moving these animals and accouterments was a logistical feat of the first order. The management of the links in the supply chain provides a testimonial to Army creativity induced by supply necessities. First, the mules moved via ship to the port at Naples. Second, the mules were unloaded, which proved troublesome. Rarely were mules able to walk off of the ship. Individual mules were placed in slings and "flying stalls," but cargo nets became the preferred method of loading and unloading mules on and off the ships, because two or three mules could fit in each cargo net and then be lowered from the ship to the shore. Inexperienced civilian port labor and daily raids from the Luftwaffe made de-boarding a tedious, time-consuming process, but few casualties occurred. Third, the mules were road marched approximately one mile from port to railhead. Fourth, the mules were transported via railroad to a truck head. Horse vans or trailers were unavailable, so boards were fixed to the sides of Army trucks to transport the mules. Six to seven mules were loaded, tied in place, and hauled by truck to the supply area. Finally, the mules were unloaded, marched to the end of the truck or jeep line, packed with supplies, and led off to the front-line troops.[15]

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[14]Ibid., 140. The trains consisted of six officers, including one medical and one veterinary officer, four hundred enlisted men and approximately 325 animals.

[15] Littlejohn, 239-240. "Flying stalls" were wooden crates or boxes large enough to hold one or two mules. A typical unloading operation occurred in March 1944. Some 865 horses and mules arrived at Naples. The deboarding process was well underway when it was interrupted by a Luftwaffe attack. Italian port workers immediately sought shelter, leaving a cargo net of mules suspended ("swaying and braying" according to one

Another innovative method of animal transport was introduced during the Anzio landing. Landing craft or Landing Ship Tank (LST) moved these animals. The animals were packed and then loaded into trucks. The trucks were equipped with eighteen-inch side planks, and the floor of each truck was covered with dirt or sand to improve footing. Seven animals were loaded onto each truck and placed alternately head to tail. Halter shanks were passed under the first two side boards and over the third before being tied to the truck body, leaving nose clearance over the top board. The trucks backed onto the LST and parked on the upper and lower decks. The weather was foul, and the sea was rough, but no mishaps occurred. Upon arrival at Anzio, the trucks quickly exited the LST and drove to the beachhead supply area, where the mules unloaded and packed supplies to the front.[16]

Animal procurement continued to improve. One unlikely source for pack animals proved to be the German Army, particularly as German forces retreated. Some animals suffered from shrapnel wounds, many were lousy, and almost all were malnourished, but most horses and mules captured from the Germans were in generally fair condition. Their condition could have improved with a little rehabilitation. Unfortunately, the Army lacked time, forage, and veterinary supplies to provide more than basic subsistence to the newly acquired animals.

The first year of the Italian campaign was lean for the Army and the animals supplying them. One of the most widespread problems was veterinary medicine. Provisional pack trains supplied combat operations shortly after landing at Salerno in early September 1943. Yet, only two veterinary hospitals existed at the end of 1943, one of which was run by the Italians and the

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eyewitness) between the ship's hold and loading docks. It took around 22 hours to unload and move the mules to the railhead. No casualties were reported; *History for 1943 of the Veterinary Service,* 22.

[16] *History for 1943 of the Veterinary Service*, 18. The movement of mules by landing craft proved successful on Sicily, and small numbers of mules moved by landing craft from Sicily to Salerno. However, moving supplies on packed mules riding loaded trucks aboard landing craft was a first at Anzio.

other run by the French. The shortage of veterinary equipment and medicine was so severe that both of the hospitals and the provisional pack units replaced veterinary drugs and instruments with regular medical supplies.[17]

The Veterinary Service of the First Armored Division recognized the need for pack animals to supply elements of the division fighting in the mountainous Volturno River region. Horses and mules were procured from the locals, and a provisional pack train was formed and immediately thrust into service. Animal casualties were high, exacerbated by the severe shortage of veterinary medicine. Yet, the few veterinary officers available managed to adapt. According to division records, "Regular veterinary supplies were not available, so with improvisations and what equipment was available from the Medical Service, a workable chest of materials was made up, and proved to be adequate."[18]

The Veterinary Service of the Thirty-Fourth Division formed provisional pack trains in November 1943. But veterinary supplies, pack equipment, and shoeing tool were scarce or nonexistent. Once again veterinary medicine and equipment were improvised from Medical Service stores, which were desperately needed because of rising troop casualties. The Thirty-Fourth Division went into the line on December 27, 1943 in the Cassino sector, operating a pack train of seventy-five mules. When the division was relieved in mid-February, 1944, only thirty mules remained; the other forty-five were battle casualties or missing.[19]

Providing and maintaining shoes were another problem. Men with horseshoeing skills were scarce, and material was virtually nonexistent in the Italian theater. According to the

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[17] Ibid., 14.

[18] Ibid., 16. The 1st Armored Division was one of the first units to convert from horse-mounted cavalry to mechanized armor. It proved beneficial for divisions to maintain a Veterinary Service when fighting in mountainous terrain, though the policy seemed incongruous and sharply criticized by motorization and mechanization advocates.

[19] Ibid.

Thirty-Sixth Division, very few enlisted men had experience as veterinary assistants, and only one man in the division was found who had experience shoeing horses. Likewise, "Horse shoes were very difficult to obtain, those being found were largely made from scrap iron and three-eighths inch rod." [20]

The First Armored Division returned to mountain warfare in June 1944 during operations near the Po River. German forces left the area in haste and a large quantity of German horses and mules were discovered. The animals were in very good condition, except they lacked shoes. According to the Veterinary Service of the First Armored Division:

> No available blacksmith equipment, shoes, or nails could be procured from Army sources, so a search was made…for an Italian blacksmith. One was finally located in a small town which had been taken by the Americans a few days previously, and it was agreed that he would be taken with the Division and stay in the area with the horses, and move along with them. A contract was made with him whereby he furnished the equipment, including his own horse shoes and nails, and would be paid twenty lire (twenty cents) per hoof shod. His equipment, including the shoeing tools, anvil, and the shoes were loaded in a jeep, and he departed rather reluctantly amid the wailing and crying of his wife and two small children, who thought he was being taken away for good…. He was kept with the Division for about a week, and having fulfilled his mission, was returned to his home. In this manner, the horse shoeing problem was taken care of very well.[21]

Battle casualties among the pack animals were common and treatment, while generally given promptly, was strictly on the fly. Triage areas were established as near the frontline as possible. Enlisted personnel with any veterinary first aid training worked in these areas. The more seriously injured animals were evacuated to the few hospitals in the rear. According to one veterinary service report, "Most of the wounds to animals resulted from artillery shells. Many times a pack train came back…with ninety percent of the animals slightly wounded with shell fragments." Once the fragments were removed and the wounds treated, most of the mules

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[20] Ibid. American troops turned any form of metal and scrap into horse shoes. A prolific source came from the iron stakes of German beach defenses obstacles. Each stake produced about sixteen shoes.

[21] Ibid.

returned to duty the next night. Treating the more serious cases involved improvisation and the use of Medical Supply medicines generally applied to human wounds. The report continues, "Wounds penetrating the abdominal cavity were successfully treated by drenching the animals with three large doses of sulfa powder a few hours apart…and results were excellent." Division veterinarians made field modifications to treat their wounded animal charges, and the supplies continued to move.[22]

In order to marshal their limited animal resources and, more importantly, improve supply to front line troops, the Army needed a better system of care for wounded animals. A remount program was also necessary to rehabilitate animals that were unfit to serve, which included almost all of the animals procured locally or captured from the German Army. The first veterinary hospital was built at Persano, Italy in late 1943 from vestiges of the Italian Army's horse breeding station. The station was in poor condition. The Italian staff lacked food and clothing and had gone unpaid for months. Animals, likewise, were unkempt and untreated because the Germans had seized or destroyed all veterinary instruments, veterinary supplies, and food. The Army's first veterinary hospital in Italy emerged from these austere conditions.[23]

The Fifth Army Veterinarian, Colonel Clifford E. Pickering, was in charge of all veterinary activities, including procurement, equipment, forage, and maintaining animal health. Colonel Pickering's strain and responsibility was immense, partly because of shortages, and also because of the unanticipated need for pack animals in the supply chain. The Fifth Army Veterinarian partnered with associates in the Medical Service and obtained medical supplies and instruments for rehabilitating sick and wounded animals. Four Italian veterinary officers were

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[22] *History for 1943 of the Veterinary Service,* 18.

[23] *QM Supply Fifth Army*, p. 52-55; Miller, *AVS in WW II,* 508-510; *Fifth Army: Medical Service,* 138.

also found and placed in charge of the Italian personnel operating the hospital. Eventually, the care of pack animals serving in Army supply trains was vested almost exclusively in the hands of Italian veterinarians. According to Fifth Army records, "This allotment of responsibility was dictated not only by their evident professional capacities, but by the stubborn fact that they were the only personnel available for this service." The requirements of supply forced the Army to adapt, relying on creativity and the utilization of local resources.[24]

Men, mules and material discovered on Sardinia continued arriving on the Italian mainland through January 1944. The number of Italian animals increased slowly as a French veterinary company that was transferred from North Africa augmented them. The French Expeditionary Corps eventually moved approximately 4,300 animals from North Africa to Italy. The Sardinian and French contingents formed the Fifth U.S. Army Provisional Veterinary Hospital, and became the foundation of veterinary hospitals serving Army pack animals in Italy.[25]

Moving wounded animals to hospitals was plagued by persistent difficulties. Muddy trails, blown bridges, and a lack of transportation complicated quick evacuations. Finding suitable facilities was difficult because most buildings were destroyed. Cooperation between the coalition forces regarding the evacuation and treatment of each army's pack animals was not a problem. French pack train casualties were transported by U.S. Army trucks to an Italian veterinary hospital, treated, and returned. Allied forces recognized the importance of supply and, in this instance, the necessity of supply trumped national pride.[26]

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[24] *Fifth Army: Medical Service,* 139.

[25] Ibid., 150; Miller, *AVS in WW II*, 508, 586-585.

[26] Ibid., 141, 143.

Combat divisions landing at Salerno quickly realized that pack animals were needed for supply, and commanders ordered division veterinarians to organize pack trains. As the division veterinarians scrambled to develop provisional pack trains, they also rushed to implement a corollary remount system to maintain pack animal health. The daunting task was difficult because prewar Army supply doctrine focused on motorized transportation and no longer included animal power. According to the Quartermaster General of the Mediterranean Theater, "The Remount Service in Italy was organized and functioned without the guidance of War Dept. Tables of Organization and Equipment or the established experiences of predecessors." Remount was an impromptu affair in Italy and "it was necessary for the unit to develop…its own organization, systems, and solutions as it progressed and came to meet its problems." [27]

In mid-September, 1943 an Italian Army remount station was discovered at Persano and, though it was largely staffed by Italians, the Fifth Army Veterinarian "undertook the replacement of the animal losses in the divisional pack trains." Other remount depots were established at Santa Maria and at Bagnoli over the next three months. The first remount depots originally provided longer term care for wounded animals evacuated from the front-area veterinary hospitals. The role of the remount depots gradually changed to providing rehabilitation, reconditioning, or "remount" in every sense of the word.[28]

A sizable remount depot was set up at *Capanello Hippodromo*, a large race track on the southern outskirts of Rome. Once Rome fell on June 4, 1944, the remount depot moved to

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[27] Littlejohn, 233. One cannot argue that the Remount Service operated without a TO/E in the MTO. However, the statement that it operated without "*the established experiences of predecessors"* is debatable. It was to the Army's great benefit that enough experienced predecessors created and successfully employed an outmoded system of supply.

[28] Miller, 509; Littlejohn, 231. The depot at Santa Maria opened on November 15, 1943 and Bagnoli on December 16, 1943. The depots were some 18 miles from Salerno and 145 miles from Rome, and both were located in close proximity to combat operations.

Grossetto, one of three Italian Army remount sites prior to World War II. Grosseto served as the largest holding, reconditioning, and recuperating station for Army animals in Italy. The Bagnoli depot was relocated to Pisa in September 1944 as fighting moved northward. The Persano depot moved in October 1944, when roughly half of all American remount personnel transferred from Italy to Southern France.[29]

The second or central phase of the Italian campaign began after Rome fell in June 1944. The terrain north of Rome was relatively flat and coastal compared to southern Italy. The area was heavily cultivated and included a road network, which allowed for less dependence on animal power. Fortunes improved in the summer of 1944 for Army pack units. Animal procurement was no longer a problem. The quantity and quality of local animals improved, largely because of increased agricultural production and an ever-improving remount program. American animals and supplies began to arrive, though this caused unique problems. The Tenth Mountain Division was due to land in late November 1944, bringing some 6,000 mules from the United States. According to a Fifth Army supply officer:

> This is of great concern to me in that the arrival of this unit will present us with a new supply problem. No doubt this unit is equipped with large Missouri mules and their equipment so adapted to these large mules.

He also worried that replacements for the American animals and their Phillips pack equipment would not come from the United States. Replacement mules and gear arrived from America, but another problem developed.

By this stage of the war, pack trains were served almost exclusively by Italian Army muleteers and pack troops. The Italians worked well with native animals, but found the American mules uncooperative and difficult to load due to the mules' enormous size. The

[29] Littlejohn, 231. The Grosseto Remount Station covered 12,000 acres in a beautiful valley dotted with shade trees, brightly painted buildings, and numerous paddocks. At one point there were approximately 4,000 mules at the Grosseto Remount Station.

standard Army-issue Phillips pack saddle weighed just over one hundred pounds and proved almost impossible for Italian packers to place on the back of an American mule. Likewise, the Phillips pack saddle would not fit on smaller Italian mules, so equipment was not interchangeable. Luckily, the number of American mules used in Italy was small compared to the number of native animals employed by supply units.[30]

The Germans also augmented the growing stock of Army pack animals. The number of captured German supply animals steadily increased as the Germans retreated. Allied forces discovered thousands of horses and mules after the fall of Rome (June 1944) and particularly during the Po River campaign (September 1944). German forces hastily abandoned their supply animals, most of which subsequently were impressed into service by Allied supply units.[31]

The quality of Army supply animals also improved because forage stocks increased. The availability of more shipping space allowed for larger shipments of barley and oats from the United States. Similarly, the Italian countryside experienced rehabilitation. Rural areas once devastated and fallow were planted and harvested, producing bumper crops. The feed available for each animal steadily increased, producing a rapid upturn in animal condition. Food supplies for Army pack animals ceased to be a major concern by the end of 1944.[32]

Veterinary medicine and supplies, such as shoes, nails, halters, and saddle packs also arrived from the United States in large quantities. Even the burden of transporting wounded

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[30] *QM Supply Fifth Army*, 59. Army mules were usually 15 hands high, meaning the two packers had to lift the 100 lb Phillips saddle five feet. The Army tried to use troops that were over 6 feet tall, but most Italian troops fell below this height requirement.

[31] Littlejohn, 241-242.The condition of captured German animals varied. Most were able to go into immediate use. Some were sent to remount stations, rehabilitated, and then deployed. Still others were in such poor shape that they were dispatched. In the chaotic retreat of the Po River campaign, the Germans set supply wagons and trains ablaze without unhitching or untying the horses and mules. The animals suffered severe burns to the face, neck, and hind-quarters. These animals were dispatched immediately by AVS personnel.

[32] *Fifth Army Medical Service History*, 142.

animals eased when typically motor-minded Americans found a solution. For over a year, Colonel Pickering, Fifth Army Veterinarian, requested that the Army provide provisional pack and veterinary hospitals with motor vehicles. His appeals were answered in December 1944, when "all three Italian veterinary hospitals and the majority of Italian pack trains were supplied with reconditioned U.S., 6x6, GMC trucks." Motorized transport would now move critically wounded and desperately needed supply animals.[33]

The quantity and quality of Army pack animals improved as the war progressed, but bad terrain strained supply chains when the Italian campaign entered its third and final phase. Land north of Rome is relatively flat, and the tactical need for pack animals diminished, allowing them a brief respite. Operations against the Gothic Line and Po Valley, however, were in terrain and conditions more difficult than the campaign preceding the assault on Rome. According to Fifth Army records:

> Pack trains were moved from their rest areas and committed to battle. Once again, heavy rains, flash floods, washed out bridges, snow drifts, landslides, and perpendicular trails and enemy fire provided the background against which the pack trains operated. An index to the character of the fighting is provided in the casualties which took place among animals during the period of 9 September to 31 December: 1110 were killed and 765 were wounded.[34]

Combat operations during the winter of 1944 and the spring of 1945 were as fierce and difficult as any previously experienced, and supplying the front line troops was daunting. Fortunately, enough improvements occurred in the quality and quantity of pack animals to ensure that breaks did not occur in the supply chain. One report lauding the efforts of pack units and the vital nature of supply noted:

> They rarely failed to bring their precious cargoes to men fighting atop steep mountains and precipitous cliffs. Though the supplies they brought on a single trip would

[33] Ibid., 144.

[34] Ibid.

> hardly have filled a trailer truck, these supplies often meant the difference between advance or retreat, victory or defeat….[35]

The uses of mules in mountain fighting were not limited to supply roles. They often assisted troops in direct combat. The chorus to a pack artillery song noted:

> For when there's trouble brewing
> They always send for me
> To start the fun with a mountain gun
> From the mountain battery

Pack artillery in which horses or mules transported artillery pieces and accompanying ammunition was largely replaced by motor-drawn guns when World War II began. However, the Army regressed to a more primitive method of moving artillery when terrain was impassable for motor vehicles. Pack artillery was the only effective method of providing fire support to infantry troops in the treacherous mountains across Italy.[36]

One must examine the details of a typical pack artillery battalion to appreciate fully the work required for these units to function. Animal power, particularly mules, was the crucial element. A pack artillery battalion consisted of three firing batteries and one headquarters and service battery. The service section moved ammunition and general supplies by means of some fifty mules led by two mule-mounted men and a bell mare. The headquarters section involved communication and the fire direction center (FDC) elements and was serviced by approximately fifty more mules. The wire section, which was vital to communication, had three teams of two

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[35] *Quartermaster Supply Fifth Army*, 57.

[36] W.B. Woodruff, Jr. *Pack Artillery and the Light Infantry Connection*, (Decatur, TX: self-published, 1988), call # UC303.W66, USMHI, 1.

men and one mule. Each mule carried two large spools of wire, mounted on either side of the pack saddle, and unreeled at a walking pace, laying wire from the FDC to the firing battery.[37]

A firing battery had four gun sections. Each section consisted of one 75mm pack howitzer, eleven men, and ten mules. The howitzer weighed 1,300 pounds and was transported by six mules after the gun was disassembled. The mules were numbered and assigned specific tasks. The heaviest piece was the front trail, weighing 240 pounds. The tube (barrel) weighed 223 pounds. Four men used steel bars to load and unload these two pieces. Each piece made a full load, and only the stoutest mules in the section carried these pieces. The other four mules carried various items, such as the breech block, front and rear trail, and recoil mechanism. The number seven mule carried the pioneering kit, which included a shovel, pick, axe, and sledge hammer. The remaining three mules carried ammunition.[38]

Gun section personnel were the chief of the section, a gunner, and nine numbered cannoneers. The chief supervised gun placement and transmitted fire commands. The gunner made settings, adjusted sites, and posted aiming stakes. The Number One cannoneer fired the gun, Number Two loaded, Numbers Three and Four adjusted charges and fuse settings, and Number Five shifted the trail (rear piece) of the gun after firing. Number Six was armed with a Browning Automatic Weapon (BAR) and maintained security. The remaining cannoneers took care of the mules that were picketed behind the guns and also provided security to the rest of the gun crew. The eleven-man crew was hardly excessive. Additional men and mules were needed

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[37] Woodruff, 5. The headquarters and service battery of the pack battalion also included veterinary personnel and pilots and crews of forward artillery aircraft, which were organic to many field artillery battalions. Each spool of communication wire weighed about 75 pounds, and it was not uncommon to lay 5 miles of wire daily.

[38] Ibid., 6; see also Bradley, 404-407. Each round of 75mm ammunition weighed over twenty pounds, and mules carried nine rounds packed in a "cloverleaf" tube containing three rounds each. The number given to each artillery or gun mule corresponded to their job. For example, the Number One mule carried the wheels and breech block, and was unloaded first to assemble the gun in sequential order. Subsequent numbered mules were unloaded and the howitzer quickly assembled. The Number Six mule carried the 220 pound tube (barrel) and was usually unloaded last.

during combat, though they were seldom available and quite often pack artillery sections were short-handed.[39]

Prewar Army TO/Es for pack artillery battalions proved inadequate, and after only a few months of combat, the units ordered more mules. Battalion commanders requested ninety additional animals per pack artillery battalion: twenty-one to carry ammunition for the firing section; seven for the maintenance section to carry feed because good grazing was not available; and twenty-five mules for the Headquarters/Service section, including two for wire, two for radios, twelve for ammunition, and seven for packers to ride since it was too difficult for packers to keep pace with a rapidly moving pack train. The Fifth Army chief, General Mark Clark, approved the request, but procuring additional mules and men to handle them took time before actual changes occurred in the TO/E.[40]

The shortage of animals was exacerbated by the poor condition of local mules According to a pack artillery report, healthy animals "cannot be expected to carry over 200 pounds pay load, while animals issued here which are in such poor condition…cannot carry 200 pounds, if that much." The poor condition of local animals necessitated reduced loads, which diminished a combat unit's performance. For example, the TO/E called for three ammunition mules per gun. Experience showed that at least five ammunition mules carrying ten rounds each were needed to deliver a minimum amount of fire per gun. Ten rounds per animal were excessive, even for large, healthy mules. Poorly conditioned Italian mules struggled to carry a reduced load of six rounds,

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[39] Ibid., 6-7. When preparing to march, three mules were positioned at the front of the gun facing forward and three positioned at the back facing rearward. The gun was quickly disassembled and loaded, which was no mean feat. Most of the components weighed over 200 pounds, were lifted up (around five feet high), passed over the mule's rear and placed on the pack saddle. Once all pieces were secure, the gun, crew, and mules moved out.

[40] Memo to Commanding General, NATOUSA from Commanding General, Fifth Army, *Request for Animals in Excess of T/E Allowance*, March 8, 1944, FABN 601-01-9150 History—601st Field Artillery Battalion (Pack) April 1942-October 1944, File: Unit History, Box #1750, RG 338, NARA, p. 1; hereafter cited as 601st FAB (Pack) Unit History; Memo from General Mark Clark, *Equipment for the 601 and 602 FA Bn (Pk)* 13 April 1944, 601st FAB (Pack) Unit History.

or only thirty rounds per gun. In an army reliant on mass fire-power, more mules were needed to deliver more ammo.[41]

The 601 Field Artillery Battalion (Pack) demonstrates the vital nature of supply and typifies Army adaptability, particularly units depending on animal power. The 601st arrived at Naples on 29 February 1944, where they were assigned to the Fifth Army and moved to the nearby remount depot at Persano. The 601st and their fellow unit, the 602nd FAB, underwent intense conditioning and training for almost six weeks. The local mules that arrived were in poor condition but met the TO/E requirements. The 601st appeared ready for duty, at least on paper.

All officers over the rank of captain in the 601st FAB toured the front and "obtained ideas of tactical employment." The officers noted that French and Italian pack units "had at least one mule driver per two animals on the march." The Army method of letting mules loose in a herd to follow a bell mare was not practical. Pack trains congested the narrow trails and the mules required more guidance. An additional sixty men were requested by pack artillery battalion commanders to serve as mule drivers in the Service platoon.[42]

The 601st was attached to the 88th Infantry Division. Just prior to occupying tactical positions, the battery made provisions to improve transportation and supply in rough terrain. The battery was divided into a forward and rear echelon. The rear echelon moved supplies by truck as far forward as the "truckhead." The forward echelon moved supplies by mule from the truckhead to the fire sections or guns. Evacuation of wounded troops was only available by mule. Requests

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[41] Ibid., 1.

[42] *Narrative Account of Operations*, 601st Field Artillery Battalion (Pack) 29 February—7 June 1944, 601st FAB (Pack) Unit History, p. 2; see also Lt. Col. Edwin C. Mattick, Battery Commander, *Narrative of Activities of the 601st Field Artillery Battalion (Pack) to accompany the Unit Journal prior to 1 November 1944*; *Brief History of the 601st Field Artillery Bn. (Pack)* 10 November 1944, 601st FAB (Pack) Unit History. The 602nd Field Artillery Battalion (Pack) mirrored the 601st pack artillery battalion. Both battalions were deployed to the same theaters, supported the same Armies, but different divisions. The 601st and 602nd attended basic training at Fort Sill, Oklahoma, advanced training at Camp Hale, Colorado, and deployed to Kiska, Alaska on 15 August 1943. Both batteries withdrew from the Aleutians, returned to Fort Sill, and eventually sailed for Italy on 2 February 1944.

for an ambulance were denied, so a jeep was rigged with litter racks and trailer. The jeep was permanently posted at the truckhead and transferred mule-bound casualties to the nearest field hospital.[43]

The forward echelon of the 601st received its battle indoctrination on the night of 15-16 May 1944. Moving in the darkness over broken ground was hard. Heavy artillery fire from positions close to the trail spooked the men and animals and enemy aircraft bombed the area, which "excited the men and animals as to create chaos for about an hour." On 19 May, the attack on Itri began. The 601st provided artillery support and Itri was taken, but there were animal casualties, and evacuation proved difficult. Several wounded animals were shot while in the mountains because evacuation was impossible. The nearest veterinary hospital was fifty miles away, and vehicles were not available. Eventually the 601st battalion commander designated a truck for animal evacuation from the truckhead.[44]

Movement and marches quickly became more grueling. According to unit records, "The whole march was a series of spurts with no halt being long enough for the loads to be removed from the animals." On one occasion the battery marched seventeen hours, and "at no time was it possible to remove the loads from the animals." In action north of Itri, "A" Battery's mules had the loads on continuously for sixteen hours and had not been able to remove the pack saddles for over twenty hours. Animal losses rose as a result of exhaustion and minimal rest.[45]

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[43] Ibid., 3.

[44] Ibid., 4. Itri is located approximately half way between Salerno and Rome.

[45] Ibid., 7. Standard pack transportation procedures called for halts every few hours to adjust packs or remove loads, but protocol was often broken during rapid movements, leaving mules to labor over extended periods with loads exceeding 300 pounds. Supply lines grew longer as the guns advanced, making it further for the over-strained mules to travel. One report noted "it was possible to move the truckhead to within 10 miles of the gun positions," indicating that only marching ten miles was something of a relief.

Infantry units often took trails over which mules could not move, so it was necessary to reconnoiter rapidly for alternate routes. Infantry frequently moved at night, which was disastrous for pack trains and many mules were injured or killed. Batteries moving in the dark generally took all night to move over trails that normally took a few hours in the daylight. Optimally, pack trains operated from daybreak until about 11:00 a.m., then resumed movement from about 15:00 until just prior to dark. Optimal circumstances for combat operations, however, were the exception in Italy.[46]

Mule casualties also rose because of poor maintenance. The TO/E called for each gun section to have one blacksmith, a forge, and farrier's equipment. It was often impossible to set up a forge because fire for the forge drew enemy gunfire, or there simply was no time. Mules threw shoes and became casualties that could have been easily avoided with proper care. Army farriers eventually found an alternative by tying four pre-fitted replacement shoes onto each pack saddle. Instead of a full array of blacksmith tools, farriers only carried a small tool roll and a few nails. Saddlers were also limited in what they could do. According to one eyewitness, "Riggings were changed to new mules without the packmaster having much time to work them over," and "halter shanks went as fast as the mules ate them up."[47]

Each animal casualty meant a diminished capacity for the pack artillery to perform its mission. One report noted:

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[46] Ibid., 7; Captain Alvin C. Powers, Battery "A", 601 Field Artillery Battalion (PK), *Comments on the Italian Campaign*, 601st FAB (Pack) Unit History, p. 2; Sergeant Thomas E. Kelly Jr., 601st Field Artillery Battalion (PK), *Reports on the Italian Campaign*, 15 November 1944, 601st FAB (Pack) Unit History, p. 2-3.

[47] *Narrative Account of Operations*, p. 10; Sergeant Richard J. Hughes, *Some Difficulties the Pack Artillery Encountered during the drive on Rome, Italy*, 601 FAB (Pack) Unit History, p. 2. Part of the Phillips pack saddle's accouterments were several soft pads. These soft pads were placed between the saddle and mule's back at various pressure points to avoid rubbing sores on the animal. Packmasters adjusted these pads after initial wearing to ensure a proper fit on individual mules. The time-consuming process was neglected by untrained packers or men in a great hurry.

> Ammunition supply becomes more critical as the operation progresses away from the main routes. With the present number of animals, including those authorized in excess of T/E, it is not possible to maintain sufficient level of ammunition to adequately support attacks. This was demonstrated on at least two occasions, in which the batteries exhausted their ammunition before the mission was accomplished. A larger number of ammunition mules would be helpful, although this necessarily means more pack drivers.[48]

By far the most common theme in 601st FAB after-action reports was the lack of ammunition, or the fear of running out and being unable to support the infantry. According to Staff Sergeant Floyd H. Kadel:

> Supply was a little shaky. Mostly in regard to ammunition. A couple times I didn't know whether there would be enough or not. If we had had a counter-attack I'm afraid we would have run short of ammunition, in the mountains.

Staff Sergeant Thomas E. Kelly Jr. made a similar observation, "If any large amount of firing had been done it would not have been possible to get in enough ammunition."[49]

An army dependent on firepower needed more healthy mules. Yet, a myriad of complicating factors diminished pack animal condition. A nagging problem during the first several months of campaign was forage. According to a 601st FAB battery commander, "The more forage a unit can carry the longer its animals will remain in condition to do their work." Unfortunately, hay supplies were not available due to a lack of animals to transport it. Grazing was not an option because of grass shortages. Mules were forced to carry their own feed, which reduced their load of military ordnance. Long marches without adequate feed weakened the

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[48] *Narrative Account of Operations*, 11.

[49] Staff Sergeant Floyd H. Kadel, *Reports on the Italian Campaign*, Headquarters and Service Battery, 601st Field Artillery Battalion (PK), 601st FAB (Pack) History, p. 1; Staff Sergeant Thomas E. Kelly Jr., *Reports on the Italian Campaign*, 601st FAB (Pack) History, p. 3.

animals, requiring frequent rest stops, which "dramatically reduced their rate of march by as much as half."[50]

The widespread loss of weak mules had a rippling effect that threatened supply chains and, in turn, reduced pack artillery capabilities. Sergeant Richard Hughes observed:

> The mules often slipped and got down on their knees. Tired mules with heavy loads had to be unloaded before they could stand again. Some of the trails were very steep, and on the side of a cliff with hundreds of feet almost straight down. Once two mules, with gun loads, slipped off…and went tumbling down the side of the mountain. Both mules had to be replaced by ammunition mules.

Of course, replacing gun mules with ammunition mules meant discarding precious ammunition, since other animals could not carry the extra weight. Injury to all mules was common and unwanted, but injury to gun and ammunition mules was particularly troublesome. According to Sergeant Hughes:

> Often we left the trails and had to climb over big rocks and other obstacles. On these the mules had to take high steps causing their stifles to bump the rear boot hook. After hours of this kind of climbing the mules would hesitate, their stifles became very sore and swollen. We cut the boot hooks off the gun riggings which solved the problem for these mules, but the ammunition mules had to take it, because the boot hooks were needed to tie ammunition and supplies. We all agreed that the front trail was the hardest load for a mule to carry. More front trail mules "played out" than any other mules.[51]

Field modifications were made by Sergeant Hughes and fellow packers, which protected animal health and allowed maximum amounts of ammunition and supplies to be transported with a minimal number of mules. Sergeant Hughes reported:

> We discarded our wooden wheels for rubber tires, as we like them better and found (the) same to our advantage in many different ways, altho (*sic*) the tires were

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[50] Captain Alvin C. Powers, *Comments on the Italian Campaign*, Battery "A," Commanding, 601st Field Artillery Battalion (Pk), 601st FAB (Pack) History, p. 2.

[51] Hughes, Staff Sergeant Richard J., *Some Difficulties the Pack Artillery Encountered during the Drive on Rome, Italy*, 601st FAB (Pack) History, p. 1. The stifle is best compared to the human knee, and it is located on the back legs of horses or mules. When mules took high steps going up hills or large rocks, gear on the back of the mule bumped/banged/swung into the stifle (knee). The "front trail" was the 240 pound component of the gun. The load of a gun mule using the 90-plus pound Phillips pack saddle often approached a weight of nearly 350 pounds, which rapidly exhausted the healthiest mules.

> heavier than the wooden wheels, and required an extra mule, we were able to utilize the space between the wheels by placing a few rounds of ammunition there. We were also able to carry the camouflage net without overloading the mule. On the breech mule we carried the sight box, and tool box, therefore we only used seven gun mules and eight ammunition and ration mules.[52]

An obvious source of animal losses was enemy fire. Batteries moving in haste to keep pace with infantry often found themselves well within range of enemy fire. "Due to the extreme proximity of the enemy, the howitzers were unable to neutralize the machine guns…, and these enemy weapons were able to inflict casualties in the gun squads…." Operating in positions directly behind the infantry often proved too close for pack artillery. According to Captain Alvin Powers, "Our casualties were too great due to the fact that we were within easy enemy mortar range." Enemy pockets were by-passed by the infantry, leaving snipers and machine gun nests to wreak havoc on gun crews and their mules. Enemy positions could be too close for the howitzer (a high angle firing piece) to operate. Pack artillery gun crews relied on small arms and Browning Automatic Weapons (BARs) to hold the enemy at bay. Gun crews and their animal charges braved the fire, and as one sergeant observed, "All mules behaved well under mortar and artillery fire…the animals stood and took all the enemy had too, without being tied." Yet, as laudably as the animals performed under fire, their losses were hard to replace, and supply strains mounted as casualties rose.[53]

Aside from pack animal casualties, supply in general was a nightmare in the rugged terrain of Italy. Constant communication with forward elements was vital, but maintaining good communication was a complicated process that involved a forward observer, liaison officer, and

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[52] Ibid., 2. The 75mm pack howitzer was still equipped with large wooden wheels, similar to those on horse-drawn caissons, carts, or wagons. Rubber "road wheels" eventually became standard and allowed for motorized towing (particularly jeeps), but only after pack howitzers were first field modified by pack troops.

[53] *Narrative Account of Operations*, p. 6; Capt. Alvin C. Powers, *Comments on the Italian Campaign*, p. 2; Staff Sergeant Andrew Vravick, *Some Difficulties the Pack Artillery Encountered…,* p. 2.

artillery liaison plane. Standard communication procedures called for mules to lay wire between the Fire Direction Center and gun sections. Laying wire was difficult. The path of least resistance was trails, but wire on trails was easily cut by men, mules, and machines or by German fire zeroed in on mountain trails. Laying wire off of the trail was hard because the terrain was broken.

Another communication problem was the cumbersome nature of Army radios. The SCR 284 radio took thirty minutes to unpack, set up, break down, and repack, so it was impossible to carry out this procedure on a ten minute hourly halt. Field and pack artillery adjusted, eventually relying on battery-operated radios, which were lighter and easier to set up. Battery shortages were a problem, but they were fairly easy to supply since the batteries were light. Radio batteries were often dropped from L-5 forward observation aircraft. Three radios accompanied each firing battery, and the radios were set up in relay stations. One radio stayed with the guns, one radio was placed on the highest point and acted as a relay, and one radio stayed with the FDC. All in all, the battery-operated radios and relay system worked pretty well.[54]

Supplying troops with food was also a headache, and next to ammunition shortages the most common complaint regarded mess. Hot food was almost impossible to prepare because mules transported field ranges, like all other items in the pack artillery section. The portable field ovens took too long to set up and were less mobile than anticipated. Meals were frequently left half cooked when the men were ordered to move, wasting food and leaving troops unfed. As a

[54] Captain Charles A. Dieterlen, Battery Commander, *Some Difficulties the Pack Artillery Encountered…,* p. 2.

gun section chief noted, "We just ate when we had the time, even on halts, many of the boys would…open a ration and call it their dinner or supper."[55]

Heating food on open fires was dangerous because of enemy fire. Some troops carried individual Coleman stoves, but these were primarily used for heating coffee. Troops generally ate cold K, C, and "ten in one" rations. These rations filled the void but did not satisfy troop hunger or needs. According to Sergeant Andrew Vravick, "One ration a day was not enough for the average man in the pack artillery. Men (in pack artillery units) are larger and do strenuous work therefore requiring more rations."[56]

Mess sergeants became masters of efficiency. Experience showed that the gasoline-fueled field oven, or "buzzy cot," could be folded and packed with one piece inside another. The "buzzy cot," along with one pot from the pack kitchen and a few days ration of coffee, could all fit on one mule. The pack battery's water mule was loaded with four five-gallon cans of gasoline and carried about three days of fuel. Water was sacrificed, but as one mess sergeant noted, "Believe me a hot cup of coffee for a mule packer is worth this extra effort."[57]

The pack troops made sure that the most important supplies—ammunition, coffee, and a little food—were available. According to Sergeant Leonard, "We started dropping everything that we didn't have to have and took rations in place since our supply lines were so long…." Rapid advances meant troops moved further from supply depots at the truckhead. Mule attrition rose as supply lines grew longer, and mule shortages forced substitutions, or robbing Peter to pay

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[55]Sergeant Howard W. Smith, Stable Sergeant, *Some Difficulties the Pack Artillery Encountered…,* p. 4-5; Sergeant Wilmoth O. Leonard, Chief of Gun Section, *Some Difficulties the Pack Artillery Encountered…,* p. 6.

[56] Sergeant Andrew Vravick, *Some Difficulties the Pack Artillery Encountered…,* p. 3. K-rations were individual daily rations, including breakfast, lunch and dinner, and each provided about 1,000 calories. C-rations were six cans of assorted foods, and D-rations were fortified chocolate bars. Ten-in-one rations supplied one meal for ten men.

[57] Sergeant George Trujillo, Mess Sergeant, *Some Difficulties the Pack Artillery Encountered…,* p. 5.

Paul, to keep supplies moving. Sergeant Leonard observed that the maintenance section "was no more than an ammunition train…it took every spare mule to keep ammunition and rations at the gun positions. There was no such thing as empty mules."[58]

Occasionally, operations penetrated deep into the mountains and required more than one day to make a round trip to the truck head. Additional pack trains could have assisted in covering the growing distance from truckhead to gun positions, but animals were not available. One worst case scenario occurred during operations near Spigno when it took four days round trip to reach the truckhead and return to the guns. The poor condition of supply mules reduced ammunition loads down to six rounds, and required impressments of riding mules and kitchen mules for those minimal ammunition loads.

Poor animal condition, personnel shortages, and unbelievably bad terrain forced gun crews to adapt. According to Major Edwin C. Mattick:

> The old pack artillery custom of unloading the gun loads at ten-minute hourly halts had to be abandoned when the present Tables of Organization were adopted, due to the shortage of men available to do the job and still take care of the mules. On the steep and narrow trails, over which we operated most of the time, this unloading would have been a physical impossibility, no matter how many men or how much time was available.[59]

Terrain improved after the Allied breakout north of Rome. Pack artillery was unnecessary, allowing pack mules to recuperate. The respite was short-lived. Operations north of the Po River saw terrain and roadways deteriorate, and pack transportation resumed. Offensive operations were limited because resources were sent to other theaters, namely North and South France. The terrain was bad and fighting in northern Italy became a stalemate. However, improved animal condition, better trained personnel, and other transport upgrades reduced

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[58]Sergeant Wilmoth O. Leonard, Chief of Gun Section, *Some Difficulties the Pack Artillery Encountered…,* p. 6.

[59] Mattick, Major Edwin C., Report: *Recommendations for Tactical Employment of Pack Artillery (Mule) When Attached to Infantry Units in Mountainous* Terrain, Headquarters 601st Field Artillery Battalion (Pk), 15 June 1944, p. 3, 601st FAB (Pack) History.

supply burdens and pack artillery was effectively employed in spite of the rugged terrain of northern Italy. The 601st and 602nd pack artillery battalions did not enjoy these improvements, because they were transferred to Southern France in the fall of 1944.

Figure 5-1. Private William J. Peters loads plasma and medical supplies on an Italian donkey. (U.S. Army Signal Corps, NARA).

Figure 5-2. Muleskinners with the 92nd Infantry Division improvise shoes from iron stakes of German beach defenses. Each stake produced about 16 shoes. (U.S Army Signal Corps, NARA).

Figure 5-3. Mule train passes overturned Army truck in the rugged Italian countryside. (U.S. Army Signal Corps, NARA).

Chapter 6: Mules on the Riviera: The Campaign across South France and the Vosges

The decision to invade Southern France, codenamed Operation Anvil, was not without controversy and had serious political and military ramifications. The British opposed Operation Anvil because it pulled limited resources away from Italy. The British favored ramping up operations in Italy, pushing northward and possibly landing in the Balkans, which would divert German troops from Western Europe. Also, an Anglo-American landing in the Balkans could deny territory in Eastern Europe to Soviet invaders.

The Americans supported Anvil for a several reasons. First, it would relieve troops breaking out of Normandy, France by diverting German forces southward. Second, the seizure of Toulon and Marseille in southern France could provide sizable port facilities from which desperately needed supplies would flow to the fuel-starved Allies moving across northern France. Finally, Americans had little desire to fight in the Balkans after mountain warfare experiences in Italy. In the end, the American position prevailed and Operation Anvil was set into motion, but the details of the final plan largely depended on transportation resources.

Allied leaders supported the cross channel invasion of Western Europe, but the Allies lacked the lift capacity to execute a large-scale amphibious assault. The shortage was painfully apparent during the Anzio landing in January 1944. Army planners operated under strict time constraints so that the limited number of landing craft used at Anzio could then deploy to England for the Normandy invasion. Transportation resources to move troops in Italy, land troops at Normandy, and simultaneously put troops ashore in southern France did not exist. The Joint Chiefs of Staff reluctantly provided additional resources to Europe that had originally been allocated to the Pacific. Planned operations in Southeast Asia to relieve China were cancelled,

which freed up more landing craft. Likewise, the Joint Chiefs agreed that Anvil occur shortly after Overlord, which gave the Anvil invasion force time to procure landing craft from the Overlord operation.[1]

The landing craft shortage counters the "brute force" argument that America overwhelmed opponents with mass quantity. In 1944, America was still operating on a shoestring and robbed Peter to pay Paul when conducting major, or sometimes minor, military operations. Brute force was unequivocally used, but it was seldom the first option for the U.S. military. After two years of fighting, American war production was rising, but the production of transportation means to move the men, beans, and bullets still lagged behind. The invasion of southern France illustrates how transportation concerns forced the Army to make strategic and tactical adjustments. The landing site was decided primarily on port and rail availability. The number of divisions landing was determined by landing craft availability or "lift capacity." And once underway, supply was determined by the resources available, which included ports, rails, trucks, and, when the terrain changed, mules.

The Seventh Army, including three Army divisions and an airborne task force, executed Operation Anvil, with several French divisions as follow up forces. The plan had three principal objectives: the establishment of a suitable beachhead, capturing the ports of Toulon and Marseilles, and driving north to join Allied forces breaking out of Normandy. The Anvil landing area was a fifty-mile wide strip of beach about thirty miles east of Toulon. The beaches were

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[1]Clarke, and Smith , *Riviera to the Rhine*, United States Army in World War II, (Washington, D. C.: Center of Military History, Department of the Army, 1993), 7-13; the Anvil name was changed to Dragoon just prior to the landing, but for simplicity the operation is called Anvil throughout this chapter. Admiral Ernest J. King, Chief of Naval Operations and JCS member, grudgingly re-allocated landing craft from the Pacific Theater to the MTO/Southern France, providing enough lift capacity to deliver two divisions in the Anvil assault. The final plan for Anvil delivered three fortified divisions. Landing craft used at Anzio, Italy (January 1944) were quickly moved to England for refurbishment, then used at Normandy (June 1944), and finally employed in South France (August 1944). Landing craft often showed signs of damage and heavy use since there was little time for repair in between operations. see also Maurice Matloff, "The Anvil Decision: Crossroads of Strategy," in Kent Roberts Greenfield, ed., *Command Decisions*, (Washington, D.C.: Center for Military History, GPO, 1960)

approachable, with a good area for breaking out and pushing inland, and good coastal roads existed for the westward push to Toulon, once German resistance broke.

Anvil planners expected heavy German resistance. Thus, the landing force was heavily loaded with guns and ammunition for a lengthy battle. Mobility was not initially anticipated, so very little fuel or vehicles were delivered. The decision to overload the assault force with arms and ammunition was very reasonable. Operations at Sicily, Salerno, and Anzio showed that bitter fighting could be expected, but the landing in southern France was unlike any previous operations in Europe or the Mediterranean Theaters.[2]

Operation Anvil was launched on 15 August 1944. The landings went unexpectedly smoothly. The Third Infantry Division experienced some difficulty on the soft, sandy beaches of their landing area. However, the veteran division quickly adapted and, using logs from German beach obstacles, built roads from which to exit the beach. German resistance was light, and most of the landing force moved inland unimpeded. Some 86,000 men and 12,000 vehicles were ashore by nightfall. Toulon and Marseilles were taken by the end of day two. The tough landing and heavy fighting never materialized, and Seventh Army combat forces quickly moved inland by the end of August.[3]

Logistical problems soon developed. Contemporary land armies required a continuous supply of fuel and ammunition to engage the enemy successfully, and the Seventh Army was no exception. They depended on a logistical pipeline that originated in America, crossed the Atlantic Ocean, and moved inland into the European continent, stretching several thousand miles from point of origin to final destination. The methods of transport varied as well, from ships and

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[2]Jeffrey Clarke, *Southern France: Army Campaigns of World War II*, (Washington, D.C., U.S. Army Center of Mililtary History, 1992), 5-8.

[3] Clarke, and Smith, 200.

trains, to trucks and mules. Army supplies went on an odyssey fraught with potential bottlenecks. Operation Anvil demonstrated how successful campaigns depended on avoiding these obstructions or quickly breaking the jams once they occurred.

Unlike the Normandy operation, the invasion of South France experienced an unanticipated, rapid break-out with troops advancing well beyond projected distances. For example, American units pushed beyond points by D-plus 30 that they were not scheduled to reach until D-plus 120. Replicating the "Red Ball Express" used in northern France was not an option, because there was not enough intrinsic truck strength in the limited number of units in southern France; and rail networks had been degraded by tactical air prior to the operation to stop German counter attacks.

One of the most serious miscalculations was the anticipation of heavy fighting on or near the landing areas. The assault forces were top-heavy with guns, ammunition and combat troops. Service personnel, transport equipment, and fuel were missing from the Anvil assault force. When resistance was light and the invasion moved quickly inland, supply lines became clogged because personnel and equipment were unavailable to keep supplies flowing. Local labor was hired, German POWs were impressed into service, and fine port facilities were in operating order. Nevertheless, supply bottlenecks occurred on the beaches, and the rapid advance of combat troops quickly overstretched supply lines. Months passed before supplies caught up, and by then the fighting had moved to dramatically different terrain.[4] General Truscott, the aggressive Sixth Corps commander, pushed the three American divisions and made great strides across South France in August and September 1944. In early October, the Seventh Army entered

[4] Ibid., 202.

the foothills of the Vosges Mountains, where a wicked combination of fatigue, supply shortages, bad terrain and foul weather brought their pursuit to a standstill.

The Vosges are 70 miles long and about 40 miles across. Hilly farmland guards the approaches, quickly becoming thickly forested large hills and mountains. Prevailing north and westerly winds produce heavy rain clouds that feed the dense forest. As a German general observed, fighting in the Vosges was comparable to jungle fighting. The few roads cutting across the Vosges follow stream and river valleys, dominated by heavily forested high ground. September generally begins a long, rainy season, and 1944 was no exception as rain began earlier than anticipated. Constant rain and fog reduced visibility, and air support was almost non-existent. Rain turned to snow when winter arrived, and veterans of Italy were reminded of the misery to which they had to look forward.[5]

The Germans held every possible defensive edge in the Vosges. When the Army could move supplies, then they countered most German advantages. Yet supply shortages still dogged the Seventh Army. The Seventh Army requested rail delivery of approximately 4,500 tons of supplies and ammunition daily but received only an average of 2,270 tons. Seventh Army ammunition expenditures for 5 October totaled some 1,000 tons, but only 20 tons of ammunition was received. Mortars, artillery, and small arms ammunition was dangerously low, and severe rationing was the only immediate solution. For example, the minimum howitzer allotment was sixty rounds per day, but the allowance was reduced to about thirty rounds. Supply troops were stripped of thirty caliber ammunition, the standard for M-1 rifle and light machine guns, and their ammunition was given to combat units. Railroads could not deliver adequate supplies. Trucks took up the slack, but the trip from port to the front was around four hundred miles.

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[5] Ibid., 241-242.

Trucks were in short supply, and maintenance of the vehicles was limited. Bad weather, deteriorating roads, and rough terrain added to the supply crisis facing Seventh Army entering the Vosges. The terrain problem was partially solved when General Truscott requested the re-deployment of supply trains and pack artillery from Italy to South France.[6]

A quick look at the map indicated that Seventh Army forces would encounter mountainous terrain. The need for pack trains and pack artillery was obvious to General Truscott. The time-table for when these resources were required was less clear. The rapid advance of Seventh Army elements to the Vosges Mountain area meant pack animals were needed sooner rather than later. In mid-July, 1944, the 601st and 602nd Field Artillery Battalions (Pack) were relieved from Fifth Army service and assigned to the Seventh Army. The Seventeenth Veterinary Hospital accompanied both pack artillery battalions on the South France campaign. The men and animals rested, reconditioned, and then joined the Seventh Army.[7]

The 602nd traveled from Italy to France by glider, and their mules followed by ship. On 15 August 1944, the one year anniversary of landing at Kiska, Alaska, the 602nd landed at LaMotte, France. The 602nd provided fire support missions throughout September, but by 4 October there was a widespread ammunition shortage. Firing was suspended for about 6 hours "to permit the evacuation of some of the civilian population. Orders were also received limiting the ammunition expenditures to thirty-three rounds per gun per day." The ammunition shortage effectively cut fire missions by half, but the battalion still manage to fire 8, 078 rounds for October.[8] The 602nd was reorganized into four detachments: three were motorized, and one

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[6] Lucian K. Truscott, *Dragoon: The Secondary Attack Against Fortress Europe*, VI Corps Correspondence-1944-September, Box 12, Folder # 9, Truscott Papers, Marshall Library; Clarke and Smith, p. 292-293.
[7] Report: *The Veterinary Service*, p. 143, File: Fifth Army Medical Service History, 1944, (MTO), Box 6, RG 112, NARA; Bradley, 393.

[8] *602nd Field Artillery Battalion*, *Unit History*, p. 12, Box 1750, RG 338, NARA.

remained an animal detachment, including 200 men and officers, and 124 mules. The animal detachment served with the 442nd Regimental Combat Team (RCT) in November 1944 after combat echelons and fighting moved to the Vosges Mountains.[9]

The 601st Field Artillery Battalion (Pack) departed Italy on 13 October and arrived at Nice, France on 15 October, 1944. The pack artillery battalion provided fire support to the 1st Airborne Task Force throughout October and early November. Like their sister battalion (the 602nd), the 601st was not immune to the ammunition shortfalls, but supply problems were not limited to ammunition. Animal equipment and forage were so low that pack animal operations halted.

Shortages of the most mundane items broke the supply chain. A prime example was mule shoes. The 601st battalion commander acerbically noted: "26 November, emergency requisition of mule shoes, none received; although 500 lbs or 10% was promised…." The commander added:

> 30 November 1944, received information that the 500 lbs of mule shoes promised on 26 November are not available. A mistake was made in reading the invoices at Marseilles and no mule or horse shoes of any size are available there.

Two officers from the 601st and 602nd Field Artillery Battalions went to Marseilles to obtain the equipment, but were unsuccessful. The 601st commander continued:

> With regard to mule shoes the animals of this battalion have been without the most desirable size of shoe, namely size 3. Since the battalion arrived in France no shoes of this size have been received. This is a critical item due to the nature of the terrain upon which the battalion is operating. Due to freezing wet weather it is essential that all animals be shod with calks to prevent their slipping on the ice and in the mud. At least 50% of the animals need this size shoe and at present time at least 30 animals are without shoes. Within a period of two weeks I estimate that 20% of all our animals will be unable to work unless shoes are obtained at once. It must be remembered that even when shoes become available the horseshoers can only shoe from 16 to 20 animals a day. At present the horseshoers have had to discontinue work entirely due to the lack of shoes.

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[9] Ibid., 14.

> As to the feed situation it has been a serious problem also. At several times the battalion has been without a grain ration for a twenty-four hour period; and regarding the supply of tibben, a very unsatisfactory substitute for hay, there have been as long as seventy hours between rations. The quantity of feed received had been below the minimum daily requirement of working mules until a special effort was made by the G-4 of 1st ABTF (Airborne Task Force) and a larger allowance was obtained.
>
> As a result this organization is in no condition to engage in an active campaign as pack artillery and cannot be until we receive such items.[10]

Local French farmers helped with the hay shortage. Supplies of mule shoes and animal equipment gradually improved with the arrival of a quartermaster pack company and overall improvements in rail and truck transportation.

Army combat effectiveness decreased as supplies diminished, and battalion and division commanders noted this during the Vosges campaign. However, a German soldier observed that Americans fought "stubbornly and tenaciously," and they often "took up the artillery battle, with great consumption of ammunition...." Any German attempt at maneuvering and overrunning American positions was met "by lively air reconnaissance to guard against further surprises." German forces were cautious to press any attacks since "there was no indication that ground would be given up, as the enemy (American) troops were fighting hard for their positions." In spite of bad weather and little air support "the troops, with few exceptions offered stubborn resistance…."[11]

Terrain difficulties, supply shortages, and fierce German resistance tested Army mettle in the Vosges. The Germans occupied heavily wooded, mountain strongholds. Some were avoidable, but most could not be bypassed and tough fighting always ensued. A case in point occurred when three American divisions attacked St. Die amidst the Vosges. An enemy

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[10] Lt. Colonel Edwin C. Mattick, Commanding, 601st FAB, Memo: *Equipment and Supplies*, 30 November 1944, FABN-601-0.1 (9150) History 601st Field Artillery Bn., April 1942-October 1944, 1-2.

[11] Kurt Hold, *The Winter Battle in the Vosges*, Foreign Military Studies [English], U.S. Army Europe Series, 1948, File #B-767, Box 56, USMHI.

stronghold in the Domaniale de Champ forest threatened the American flank, so the Thirty-Sixth Division assaulted the German positions in the heavily forested hills. The Americans advanced well until the Germans launched a vicious counterattack. By the morning of 25 October, the battalion command post was overrun and 241 troops of the First Battalion, 141st Infantry Regiment were completely cut off. The only contact First Battalion had with headquarters was through the radio of an artillery forward observer. Efforts to relieve the encircled Americans failed for nearly one week. Desperately low on ammunition, food, and medical supplies, necessity birthed invention in the baleful Vosges woods. An attempt to air-drop supplies failed, as the radio communication recorded:

> 141st HQ to 1st Bn: Two aircraft at one time will drop—total of ten planes—where to drop them?
> 1st Bn to HQ: One hundred yards short of the crest.
> HQ to 1st Bn: Give coordinates where last supplies dropped.
>
> 1st Bn to HQ: We could not find the things we were looking for….

Bad weather stopped air drops, so a clever solution was devised to deliver emergency supplies by firing smoke shells to the battalion. Using a special wrench, adroit artillerymen removed the base-plate of the smoke shell and took the smoke canisters out. Then, the shell "was reloaded with six D-ration bars, (in there cellophane wrapper) the cardboard box…removed." Medical supplies included gauze, adhesive tape, iodine swabs, wound tablets, morphine syrettes, and halazone tablets. "The chocolate and medicinal supplies were firmly wrapped in about 1 square foot of burlap, securely tied on the ends and taped up all around." The package was then placed in the shell, and the base plate was replaced.[12]

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[12] *Report of Artillery Acitivites in connection with "Lost Battalion,"* 131st Field Artillery Battalion to Commanding General, Thirty-Sixth Infantry Division Artillery, 2 November 1944, General John E. Dahlhquist Papers, Miscellaneous Correspondence Part 1, Box 6, File-Official Papers 1923-1956, USMHI.

Field modification of the shells was relatively simple. Delivery required more cacalculations. According to the report:

> In firing the shells time fire was used. They were fired to burst 200 feet in the air at a range of about 8,000 yards. The supply shells weighed four pounds less than smoke. Since the difference in weight of projectiles was 4 pounds, the range variation was approximately 27 yards…. Smoke was used in adjusting fire. Lt. Blonder was unable to pick up the first round but heard it go over his head. The range was decreased by 200 yards. It was still over. The range was decreased 400 yards and he reported "Range correct, fire for effect."

Changing from smoke to the supply shell led to rounds falling short. The forward artillery officer ordered the correction, "Increase the range 50 yards and keep 'em coming, all you've got." Nineteen rounds were fired before the "cease fire" was given. Weather finally improved, and aircraft delivered more supplies, including ammunition, K-rations, water, and radio batteries. Finally, on 30 October at 1600, headquarters received the message "Patrol 442 here," when members of the 442nd Regimental Combat Team relieved the trapped battalion.[13]

American creativity was applied to efficiently maximize fire power in the Vosges. The 601st began replacing wooden wheels on their howitzers with rubber tires, allowing the guns to be towed. French roads in the mountains allowed jeeps to tow howitzers on several occasions. The guns were quickly and quietly deployed, firing on enemy strong points or infantry positions deep in enemy territory, and then quickly retreating. The battalion commander reported, "This would have been impossible…with mules due to their rate of march as well as their presenting a much more noticeable target." He furthered recommended "It would be both tactically and

[13] Ibid.; see also Clarke and Smith, *Riviera to the Rhine*, 329-331. Aircraft dropping emergency aid to the battalion were P-47s, which were ground attack and fighter planes, and not designed for supply missions. Nonetheless, the pilots and crews made field modifications and accurately delivered their payload. The 1st Battalion made the news as "the Lost Battalion" in reference to some 600 troops cut off in the Argonne Forest during World War I. The 442nd RCT was comprised of Japanese-Americans and served with distinction in Europe since they were not allowed to fight in the Pacific.

economically sound if pack battalions could be equipped with both mules and jeeps." The commander, however, asserted that mules were irreplaceable and cautioned:

> It is not desired that this plan be in any way interpreted to mean that we feel that jeeps can replace the mules. This battalion has supported infantry through many miles of terrain through which jeeps could never travel. I strongly feel, however, that with both methods of transportation available this battalion would be of greater value to the service in the majority of locations where the present war is being fought.[14]

The commander advocated an odd marriage between old and modern means of transportation to better apply brute force against his enemies.

The bad terrain of the Vosges was not a surprise and the need for animal power was not overlooked in plans for the post-Anvil break-out. Indeed, nearly half of the 6742nd Quartermaster Remount Depot in Italy moved to Southern France in October 1944, where it evolved into the 6835th Quartermaster Remount Depot. The headquarters was eventually established in Chaumont, France. A veterinary hospital and large remount facility were established. The depot kept a reserve of some 600 mules and fifty horses at all times. Mules came directly from the United States, while horses were procured locally. The depot at Chaumont processed some 1.800 animals and issued approximately 750 mules to the 513 Quartermaster Pack Company (QMPC) and pack artillery units from November 1944 to May 1945.[15]

The 513th was an all-black unit comprised of Supply and Quartermaster troops. The company was activated on 17 July 1944 and trained for active duty in Southern France at the Persano Remount Depot from 25 August to 17 October 1944. The training regimen included conditioning of men and mules, animal management, and packing cargo. Training was rigorous.

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[14] Mattick, Lt. Colonel Edwin C., Memo: *Proposed Plan for Employment of Mule Pack Artillery as Jeep Drawn Artillery, Headquarters*, 601st Field Artillery Battalion (Pk), 25 November 1944, 601st FAB (Pack) History, 1-3.

[15] Miller, *AVS in WW II*, 511; Ross and Romanus, *The Quartermaster Corps: Operations in the War Against Germany*, 242-243.

According to the unit history, "Southern Italy's rugged mountains, winding trails, and rainy weather was ideal for pack training," replicating well the unit's next tour of duty.[16]

On 4 November 1944, the unit's two officers, 75 men, and 298 mules departed Naples, Italy. Six days later "the unit debarked at Marseilles, mounted their mules and rode through the city to their bivouac area." The 513th moved by train approximately 400 miles to Epinal, France, where it received orders to join the 45th Infantry Division fighting in the Vosges Mountains. There were not enough trucks to transport men, mules, and equipment from the railhead at Epinal, providing a "splendid chance" for the unit to put their pack training in practice. Animals were packed, riding animals were saddled, and the supply train headed for the front. Trucks picked up the First and Second Platoons three days into the march, but the Third and Fourth Platoons made the complete march riding their mules.

The 513th was immediately put into service and received their baptism of fire. Under the heading of "Quartermaster in name only," the unit history noted:

> The Army Quartermaster goes as far forward as the division quartermaster dump. The Division Quartermaster goes as far forward as the forward CP (command post). The 513th Quartermaster Pack Company takes supplies to the infantry in the front lines.[17]

The links in the supply chain began with rear echelon ease and safety, such as the 7th Army Quartermaster depot (at Marselles) moving supplies via train or truck to the 45th Division supply dump at Epinal. The last link in an incredibly long supply chain required the arduous packing of ammunition, coffee, cigarettes, and any other useful items squirreled away on a Missouri mule. Finally, units such as the 513th made the hazardous journey to join a combat outfit (e.g. the 442nd

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[16] *A Complete History of the 513th QM Pack Co*., File QMCO-513-0.1 (30628) History, 513th Quartermaster Pack Company, Box 17960, RG 407, NARA. Mules of the 513th spent precious little time on "the Riviera," and were quickly transported to a less hospitable and picturesque environment. The 513th QMPC was the only all-black pack unit to serve in Europe. On numerous occasions the all-black 513th supplied the Japanese-American 442nd Regimental Combat Team while operating in the Vosges.

[17] Ibid.

RCT) on some numbered hillside in the High Vosges Mountains. The 513th eventually delivered supplies to all three infantry divisions operating in the Vosges. The Company was divided into four platoons, and the platoons served various combat units, delivering ammunition and rations almost constantly from December 1944 to February 1945. The pack troops operated frequently at night to reduce casualties from German fire, and resupply efforts seldom failed even in the most difficult terrain.[18]

The great threat to a successful supply run was not just German artillery, mines, booby traps, or treacherous terrain, but rather shortages of supplies for the supply animals, particularly forage. Hay was difficult to procure, and operations during winter left grazing out of the question. Men scoured the countryside for hay but found little. Requisitions for forage travelled slowly up the supply chain, from the company to the division quartermaster, and finally to the Army Quartermaster. Responses from upper supply echelons were often slow. Troops and officers at the lower levels generally found solutions on their own, as a division's G-4 (supply) journal read, "Requested permission for a civilian to take a wagon to Zittersheim tomorrow morning for a load of hay. Permission granted." The wagon returned two days later with hay, temporarily solving the 513th's forage crisis.[19]

Combat and supply operations in Vosges during November and December 1944 were slow. Weather was abysmal and shortages continued to plague combat and supply troops alike. Also, December 1944 through January 1945 witnessed two major German offensives in the Ardennes and Alsace, both of which required maximum Allied effort to stop. The 513th moved supplies to combat units operating in Alsace until the end of February and then moved into the

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[18] Clarke and Smith, p. 292. The segregated African-American troops of the 513th often supplied the Japanese-Americans of the 442nd.

[19] *G-4 Journal-Alsace-German Campaign-45th Infantry Division*, November 1944-May 1945, File #345-4.2, Box 9357, RG 407, NARA.

Rhineland in March 1945.[20] The 513th remained heavily engaged supplying combat units. According to one report:

> On 15 March 1945, four platoons were on the front. Three were with the 42nd Infantry Division and one was with the 103rd Infantry Division. The men were under artillery and small arms fire for fifteen (15) days and doing an excellent job.

The 513th enjoyed a dramatic decline in action by the end of March 1945. The Company history noted:

> On 28 March 1945, all four platoons have been returned to CP at Langensoultzbach, France as the regements (sic) are through the mountains and do not require the use of the mules any longer. The men and mules have done a superior job and have been praised by all the units they worked with.

The 513th QMPC Headquarters transferred by vehicle to a new bivouac area at Leistadt, Germany on March 30, 1945. The Fourth Platoon, including four wagons and 300 mules, mounted up and marched to Leistadt, Germany, arriving two days later.

Terrain improved in the Rhineland, but the four platoons of the 513th continued packing ammunition and supplies to various infantry units. Each platoon had 55 mules, all of which required daily care and upkeep by the pack troops. The Company received 250 additional mules to help supply several infantry divisions. Extra pack troops were not included, so members of the four pack platoons improvised. The Company journal noted, "All the platoons are training and teaching men in the various regements (sic) to pack, as we don't have sufficient men to supply the extra animals." Even at this late stage of the war, personnel were still pulled from the ranks and given a crash course on packing supply animals.[21]

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[20] Clarke and Smith, The Campaign for Alsace, in *Riviera to the Rhine*, p. 449-527; see also *Ardennes-Alsace*: The U.S. Army Campaigns of World War II; *Rhineland*: The U.S. Army Campaigns of World War II.

[21] Report: *Company History*, 513th QM Pack Company, 18 April 1945, File # QMCO-513-0.2 (18950) History 513th QM Pack Company, March-July 1945, Box 17960, RG 407, NARA. The Hardt Mountains lie east of the Low Vosges and Strasbourg, France.

Members of the 513th received a commendation for "work done in December and January, under artillery and small arms fire, with the 45th Infantry Division." Another letter from the 222nd Infantry Regiment commended the 513th "for keeping a battalion supplied with ammunition and food during the campaign through the rugged terrain of the Hardt Mountains." The vital nature of supply and crucial service of the 513th, a segregated unit no less, was recognized by the combat troops serving at the end of the supply chain.[22]

On 3 May 1945, the 513th, including two officers, 75 enlisted men, and 286 mules was relieved of duty with the 42nd Division. The Company was bivouacked at Neckargemund, Germany when an official end to hostilities was announced on 9 May 1945, resulting in "great celebration by the unit." No supplies were packed or hauled after this date. Troops with enough points returned to the United States, but most of the Company remained in Germany over the next four months. The 513th became part of the 6835th Remount Depot, assisting remount and veterinary units care for some 541 mules, in addition to their own 286 mules. Exercising, feeding, and maintaining the facilities were daily tasks. Hay quantities were adequate during the summer, and procuring forage was certainly not the challenge it had been in the winter of 1944. Keeping the animals in good condition was the daily routine until decisions were made regarding what to do with all of those mules.[23]

The situation was similar when World War I ended. Once again, the mountains of surplus equipment required disposal and the Army either sold or gave away the excess material to avoid shipping it back home. Food, clothes, weapons, equipment, and pack animals were all put up for sale or donation. There was little interest in returning the animals to the United States, and Army

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[22] Ibid., 2.

[23] Report: *Company History*, 513th QM Pack Company, 18 July 1945, 1-2.

animals quickly became part of the post-war effort to rebuild a continent. The Army dispatched six Veterinary Corps officers from the Zone of Interior to Europe one year before the war ended. Their primary functions were to oversee the rehabilitation of veterinary services in war-torn areas. Disease control, vaccinations, breeding, and the redistribution of surplus animals were all part of the Veterinary Corps officers regimen.

Plenty of animals were left behind. In Italy, the 2610 Quartermaster Remount Depot (Overhead), formerly the 6742nd Quartermaster Remount Depot, was caring for some 15,600 mules and horses when the war ended in May 1945. The 6835th Quartermaster Remount Depot had around 1,800 animals (mostly mules) in France and Germany on V-E Day. The primary objective of both remount depots was the disposal of Army mules and horses. The last six months of 1945 witnessed the rapid liquidation of Army surplus animals. Most were sold to foreign governments or given away by the American Military Government (AMG) to foreign governments. Likewise, the United Nations Relief and Rehabilitation Administration (UNRRA) facilitated animal transfer from the Army to governments and citizens across Europe.[24]

Thousands of horses and mules went to rebuild the war-torn countries of Italy, France, Germany, and the Low Countries. UNRRA efforts to send Army mules to Poland and East Europe were eventually thwarted by Russia, but Greece received 2,500 mules, many of which supplied the Greek Army during the civil war of the early 1950s. About 2,000 were given to the British military as repayment for reverse Lend-Lease pack animals given to the Army in North Africa. Most of the mules, however, did not continue their military service. Instead, the majority of the animals returned to their pre-war job, working farms and experiencing more pastoral

[24] Miller, *AVS in WW II*, 510-511, 533-534.

employment as Europe rebuilt. Military planners intent on getting the troops home quickly and returning to business as usual did not give much thought to animal power.[25]

The fighting in South France did not reveal an American Army exploiting superior resources to crush an opponent through "brute force." Indeed, the shortage of ammunition and subsequent lack of mass firepower was chronic throughout the campaign. True, the Army and Allied forces had supplies in greater quantities than the Germans, but Allied forces fighting in South France were hardly a juggernaut of material. Shortages influenced strategic decisions as planners divided limited resources between the continued fighting in Italy, the recent Overlord landing in Normandy, and South France. Shortages also influenced operations at the tactical level, from cutting the daily fire mission of pack howitzers in half to having unshod mules moving the guns. Army strategy and tactics relied on brute force, but it was difficult to apply while operating on a shoestring.

The campaign in South France exposed a number of details about the Army. First, the Army was still troubled with limited resources in 1944, which is a point often overshadowed by statistics. Any survey text of U.S. history, or scholarly work, such as Richard Overy's *Why the Allies Won*, depicts a decisive material advantage by the U.S. military over the Axis. It must be remembered, however, that these resources were dispersed to forces simultaneously fighting around the world on multiple fronts. A study of Operation Anvil provides a stark contrast to the stereotypical image of GIs supplied from mountains of material.

Second, Operation Anvil and the South France campaign illustrate the importance of making the proper strategic call regarding the use of limited resources. For example, loading the assault force with guns and ammunition instead of fuel because of expected heavy resistance

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[25] Ibid., 511; Essin, 188-189.

proved incorrect. When an unexpected dash across South France ensued, supply lines were stretched to the limit with no means of transporting supplies from the beach to the battle as part of the plan. The existence of resources was not always the problem in South France, but rather allocating and transporting them.

Third, Army adaptability and talent for scrounging up material, first seen in North Africa, then Sicily, and Italy, was prevalent in South France. Officers and troops adjusted throughout the campaign, kept grinding down their opponent, and were actually able to apply aspects of "brute force" by waging a war of attrition.

Finally, the campaign across South France shows the enormous task and difficulty required to defeat the Germans. The standard big picture shows that strategically the tide turned against Germany by late 1944. American production of ships, planes, tanks, and trucks were reaching phenomenal levels, thus allowing "brute force" to overwhelm the rapidly crumbling German military. However, it was less apparent at the tactical level, particularly to the men assaulting another wooded hill or the packers slogging through the snow bringing supplies.

Figure 6-1. Members of the 513 QMPC prepare supplies for 7th Army units in Alsace, France, February 1945. (U.S. Army Signal Corps, NARA).

Figure 6-2. Private Lather Moon, Alexander, Alabama, a member of the 513th QMPC, 7th U.S. Army, leads a mule laden with supplies through knee-deep snow somewhere in Alsace, France. February 1945. (U.S. Army Signal Corps, NARA).

Figure 6-3. 7th Army truck loaded with mules moves through Saarebourg, France, March 1945.

Chapter 7: Jungle Mules: Part I—the Southwest Pacific

Japanese Admiral Isoruku Yamamoto claimed he would "run wild in the first six months of war with America." He was correct. The Japanese produced an impressive succession of victories over America and the Allies, including seizure of the Philippines, Malaya, and dozens of islands across the Central and South Pacific. Australia and New Zealand were directly threatened, and the United States, one of the few countries that could interfere with Japanese operations, faced a strategic crossroads. Unquestionably, Japan must be contained. However, Allied planners also determined that the best strategy to defeat the Axis was the "Germany first" policy. Thus, early American strategy against Japan was limited to token resistance using scant resources already present in the Pacific.

Similar to Allied forces in the Mediterranean and Western Europe, the U.S. military in the Pacific and Asia were strapped for resources. Planes, warships, transports, men, and equipment were in short supply and required sharing. Indeed, one of the keys to American success was the Joint Chiefs and theater commanders' ability to compromise and distribute limited resources. Axis opponents were hardly smothered by an avalanche of material by Americans applying brute force. Superior firepower and massive expenditures of supply did occurr in the Pacific, but resource shortages were always a serious concern and influenced almost every strategic decision during the first phases of the war.

The Allies divided the Pacific War into at least two theaters: the China-Burma-India Theater and the Pacific Theater, which was subdivided into the North, Central, and South Pacific Areas. At no time did the United States possess enough supplies and transportation to provide overwhelming forces simultaneously to these theaters. American strategy was dictated by the

amount of supplies available at any given time. It was not until the last six months of the war that the U.S. military could comfortably conduct offensive strategy without chronic supply shortages; and this was not widespread, but limited to the Central Pacific drive and the Philippines.

The Japanese ran amok during early 1942, attacking New Britain and capturing the bastion at Rabaul in February. The New Guinea towns of Lae and Salamaua fell to the Japanese in March, as did several Solomon Island posts. Japanese forces moving with impunity launched an attack on Port Moresby, Papua, along the southern coast of New Guinea in May 1942. On May 7-8, 1942, five months after Pearl Harbor and within a few days of Admiral Yamamoto's prediction, troop transports headed for Port Moresby were turned back at the Battle of Coral Sea. The battle was a tactical draw, but it was the first significant strategic setback for Japan. A month later, the Japanese suffered an epic defeat at Midway, from which the Japanese never fully recovered their offensive capabilities. Of course, American war planners did not recognize the full implications of Midway and continued preparing for Australia's defense, including the protection of South Pacific sea lanes and communication lines with the United States.

A logical place from which to defend Australia was New Caledonia, an island some nine hundred miles off Australia's northeast coast. New Caledonia possessed a deep water harbor, was relatively defensible, and provided protection should the Japanese maneuver and hit Australia's populated east coast. New Caledonia was also a vital link in the supply chain between the United States and Australia, along with the New Hebrides, Fiji, and American Samoa. The island's value was obvious to American planners and Army reinforcements were sent to New Caledonia in March 1942. New Caledonia experienced a military build-up in preparation for a defensive showdown with the Japanese. Once the imminent threat of Japanese

invasion subsided, New Caledonia quickly became a staging area for future offensive operations in the Solomon Islands.[1]

One group reinforcing New Caledonia was the 97th Field Artillery Battalion (Pack). They arrived, sans mules, in March 1942. Animal procurement was to be "furnished at destination." The U.S. Army Horse Purchasing Board allocated funds, the Army Veterinary Service prepared a remount depot, and battalion veterinarians scoured the island for local stock. Unfortunately, procuring native animals in the South Pacific was even more problematic than in North Africa or the Mediterranean Theater. According to the 97th FAB commander, "The roundup was never completed, as we soon found that these animals were totally inadequate for our purposes." The small, grass-fed ponies and horses lacked the size, strength and endurance required for packing artillery. "They could not work two or three days in succession under pack artillery loads without deteriorating to the point of uselessness."[2]

The 97th FAB expanded their procurement efforts to Australia, discovering very few mules, but a large quantity of horses. According to the battalion commander, "Many of these made fine mounts, but the buyer informed me that the type of animal we needed for pack just did not exist in quantity." The Australian Army shipped several hundred horses to New Caledonia. "We broke and partially trained 300 of the Australian horses. When they proved no better than the island horse for pack, we sent an order for mules to the States."[3]

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[1] Essin, 171; see also Louis Morton, *Strategy and Command: the First Two Years*, U.S. Army in World War II, The War in the Pacific, Office of the Chief of Military History, Washington, D.C.: GPO, 1961, 67-91 for the debate over Europe and Pacific strategy and resource allocation; and 198-224 regarding Australian defense and maintaining lines of transportation and communication with the United States.

[2] Miller, *AVS in WW II,* 499; Colonel Henry Demuth, "A Pack Artillery Battalion in the Pacific," The Field Artillery Journal 34 (February 1944), 93.

[3] Ibid.

On 6-7 July 1942, Troop A of the 252nd Quartermaster Remount Squadron arrived on New Caledonia. The squadron brought 481 mules from the Zone of Interior, which were stout American stock described as "fine young mules—Fort Reno's orneriest." Additional ship loads of mules arrived from the Zone of Interior and the Panama Canal Department in August, bringing the number of mules on New Caledonia to around 1,200. Thanks largely to the naval victories at Coral Sea and Midway and ground operations on Guadalcanal, the threat of a Japanese assault on New Caledonia passed in the summer of 1942. The 97th FAB and their animals began to train for offensive action in the nearby Solomon Islands and New Guinea.[4]

America's first major land offensive in the Pacific began on 7 August 1942, when the First Marine Division landed at Guadalcanal. The Japanese vigorously defended the South Solomon Island base, and a grinding war of attrition ensued. Expenditures of naval, air, and ground troop resources were high. When operations on Guadalcanal finally ended in February 1943, more troops had been committed to fighting in the Solomon Islands and nearby New Guinea than in Europe. Pressing the initiative was logical to Pacific planners, particularly General Douglas MacArthur, Admiral Ernest King, and Admiral Chester Nimitz. However, the "Germany first" policy overruled any major commitment of resources to Pacific operations. Thus, offensives in the Southwest Pacific continued, but at a much slower tempo and always

[4]Everett Miller, *AVS in WW II,* 504; Bradley, 394; Essin, 172. The relatively quick response to the demand for American mules occurred because shipping priorities were not yet established. Future requests for American mules, equipment, and supplies were filled much slower because of shipping space shortages. Animals and troops from the Panama Canal Department were preferred because the similar tropical climate reduced the time to get acclimated. Approximately 3,000 horses and mules were assembled on New Caledonia by the end of 1942; by mid-1943 New Caledonia remount depot served as a processing point for animals going to CBI.

with minimal resources. Army adaptability eased some burden of fighting war on a shoestring, particularly on Guadalcanal.[5]

Operations on Guadalcanal illustrate American dependency on supply, firepower, and a knack for adapting to ensure that both were on hand. The 97th FAB and their full complement of 947 horses and mules moved to Guadalcanal in January 1943. America's first offensive was winding down and the 97th FAB provided fire support and supply transportation to U.S. forces moving up the North coast. Moving supplies through heavy jungle and mountainous terrain required a variety of transportation modes. Trucks could only travel around twenty miles per hour on the few existing roads, but the front-wheel drive 2½-ton trucks successfully negotiated logs, mud, and sand. The venerable jeep also moved supplies and evacuated wounded across rough terrain where most vehicles could not travel.

Much of the fighting occurred along the coast, where supplies were brought ashore by small boats, canoes, and outriggers. No port facilities (docks) existed, no supply equipment (cranes) was available, and most landing craft did not possess drop-down ramps to ease unloading. Cargo was hoisted over the sides and hand carried to the beach. Supplies were loaded onto trucks and moved down the few roads, which were often being cut out of jungle trails by engineers and combat troops. Supplies dumps were then set up at the end of the truck line.

Moving supplies was a labor-intensive, time-consuming process. Supply dumps were set up as far forward as possible, but often the last link in the supply chain was a soldier's back. Average march speed on a jungle trail was about one mile per hour. Frequently trails did not

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[5] Matloff, *American Military History*, 503-505. Army General Douglas MacArthur was Commander, South West Pacific Area. Admiral Ernest King was Commander in Chief, U.S. Fleet and Chief of Naval Operations. Admiral Chester Nimitz served as Commander in Chief, U.S. Pacific Fleet, and Commander in Chief Pacific Ocean Area; see also the following from the U.S. Army Campaigns of World War II series: Charles R. Anderson, *Papua 1942-1943*, CMH # 72-7; Charles R. Anderson, *Guadalcanal 1942-1943*, CMH # 72-8; Edward Drea, *New Guinea*, CMH #72-9; Stephen J. Lofgren, *Northern Solomons*, Center of Military History (CMH) Publication #72-10. All Campaigns series sources can be found at http://www.ibiblio.org/hyperwar/USA/index.html .

exist, requiring troops to hack their way through dense foliage with machetes and reducing progress to about a half mile an hour. American troops adapted to their environment and utilized what resources were available. Guadalcanal was crisscrossed with large streams. Instead of moving supplies over land, rafts and outboard motorboats moved supplies along the inland waterways. The labor-saving system worked well since initial operations occurred frequently along rivers and streams.[6]

Fighting on Guadalcanal moved further inland, outpacing road construction, reducing waterway access, and encountering mountains. Pack mules were a logical solution to the transportation hurdles, but animal power encountered a multitude of hardships on Guadalcanal. The first snag was unloading, since few port facilities existed to get mules from ship to shore. Mules most often disembarked using small hoists and cargo nets, though some were removed by "flying stalls" and in rare cases, some were forced overboard and swam to shore.[7]

Another serious problem for pack units on Guadalcanal was forage. Procurement was not too difficult. Army Veterinary Service (AVS) studies were conducted to develop the best ration. A major priority for the AVS was reducing the bulk to facilitate transport, which was done by using compressed oat hay chaff instead of loose hay in the daily forage ration. The Australian Army used this type of ration, and it was readily available in compact bales or packed in bags. The compressed rations were adequate and included oat hay, alfalfa, oats, bran, and salt. The Quartermaster Corps procured the compressed bale forage from Australian suppliers through reverse Lend-Lease and Army Veterinarians inspected the rations. The most frequent problem

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[6] John Miller, Jr. *Guadalcanal: The First Offensive*, USAWWII, (Washington, D.C. Dept. of the Army, 1949), 313-314.

[7] Everett Miller, *Army Veterinary Service in World War II*, 544. "Flying stalls" were wooden crates in which the mule was placed and then hoisted to a waiting boat. These were slow to construct and difficult to operate. Allowing the mules to swim ashore was fast and mules are decent swimmers. However, convincing the mule to go overboard was troublesome, and so was catching some of them once ashore.

with the ration was bran fermenting in the hot, humid, jungle conditions. The bran was removed from the ingredients, considerably reducing fermentation.[8]

Finding quality forage was possible, but the transportation of such massive quantities was a different story. For example, each firing battery in the 97th FAB had 193 men and 117 mules for moving the 75mm howitzer and 200 rounds of ammunition. One ammunition section from the Service battery included 66 mules, which supplemented the movement of ammunition to the Firing batteries. Each mule required eight pounds of grain or oats and 14 pounds of hay every day, meaning the 182 mules that kept the four guns in action needed 1,500 pounds of oats and 2,600 pounds of hay daily. Trucks, if available, often could not move such a large amount of feed, and the mules in the firing battery offered no assistance because they could not haul the howitzer components, ammunition, and their own feed.[9]

Supplying the supply animals proved an almost insurmountable task on Guadalcanal. Truck transportation was difficult enough, but the presence of animals and trucks complicated already serious logistical problems. Mules on the island had difficulty maneuvering across boggy ground or muddy banks and could not always traverse the same ground as a man. Thus, the pack mules generally travelled on roadways. Pack mules normally travel around four miles per hour over good terrain, but mules on Guadalcanal only covered about one mile per hour. The slow pace of the pack animals caused traffic jams, further impeding the flow of supplies.[10]

The primary asset of pack transportation was the animal's ability to travel where motor vehicles could not go. However, the tropical conditions of the Solomon Islands created

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[8]Ibid., 529.

[9] John Miller, 314. Water was another dietary necessity. One mule needs about 10 gallons of fresh water daily. Water was plentiful on Guadalcanal, but it was often contaminated with disease.

[10] Ibid.

unanticipated problems for pack animals. First was the mud. Mules are more sure footed than horses and are preferred when traveling on rough, rocky ground, but the mule's smaller hooves often sank in the mud. Once the pack mule was mired in the mud, then troops had to perform the time-consuming, labor intensive task of unloading the pack and freeing the trapped animal. The generally sure-footed mule had difficulty navigating the muddy traces crisscrossing the island.

Likewise, the jungle climate was a haven for diseases, further reducing pack animal performance and complicating supply transportation. The most common diseases among pack animals were thrush, quittor, and separations of the sole and feet. Such problems thrived in wet, unsanitary conditions and with poor routine foot care, both common on Guadalcanal. Other maladies included fungal dermatitis, sunburn, and a plethora of infectious skin diseases. Vaccines for most of these diseases did not exist. The most effective prevention was routine maintenance and a strict sanitation regimen, neither of which was a priority of troops slogging around the jungle fighting the Japanese.[11]

A medical evacuation system would have ameliorated some of the pack animal health problems and, thus, improved supply transportation. No veterinary hospital or remount depot developed on Guadalcanal, even though around 1,000 mules were deployed. Sick and wounded pack animals were evacuated back to the veterinary hospital at New Caledonia. An indicator of disease prevalence among Army mules serving in the Solomon Islands is an AVS record, which noted that 534 animals suffered from diseases out of 856 processed through the hospital. Most

[11] Everett Miller, 505; Essin, 172. Thrush is generally caused by bacteria and fungi that thrive in damp, unsanitary conditions (e.g. a muddy, poorly drained pen). The bacteria or fungi enter a wound and attack the frog, which is the triangular shaped material on the horses hoof. The frog acts like a shock absorber for the foot when it makes impact with the ground, decreasing the force placed on the bones and joints of the leg. Thrush causes the frog to disintegrate, producing extreme discomfort to the animal when walking. Quittor is a chronic inflammation of the collateral cartilage or side bones of the animal's foot. Infection is introduced, usually from a penetrating wound through the sole, followed by inflammation, swelling, and an abscess, resulting in lameness.

of these animals suffered from various foot ailments, which greatly inhibited their ability to deliver supplies.[12]

In spite of disease and poor conditions, animal power still performed a valuable service on Guadalcanal. Pack artillery and pack trains delivered much needed supplies and provided weary infantry a break. The island's relatively small size allowed for shorter supply lines and a quick turn-around. Thus, pack mules of the 97th FAB Service battery moved supplies for their firing batteries as well as various infantry units.[13]

Some of the hardest fighting on Guadalcanal occurred around the area called the Gifu. The terrain was cut by ravines, covered in heavy jungle undergrowth, and surrounded by hills. Combat required countless small unit actions using rifle and machine gun fire, hand grenades, and flamethrowers to destroy Japanese strong points. American troops also utilized their characteristic mass firepower and heavy artillery against the Gifu. The 75mm pack howitzer was too light, unable to penetrate thick jungle canopy and Japanese fortifications. The 105mm and 155mm artillery pieces were more than adequate and provided excellent service.

Americans liberally used their artillery on Guadalcanal. According to a Japanese report, "Preceding an attack by the American Army, there is always [an] artillery bombardment for at least 12 hours." This was not hyperbole. A typical attack against a Japanese stronghold saw 5,700 rounds fired by six field artillery battalions in about thirty minutes. One of the most effective artillery tactical adaptations was time-on-target (TOT) fire, in which all initial rounds hit their targets simultaneously. The tactic required multiple calculations including the distance from each battery to the target, velocity of each gun, windage, and any other atmospheric

[12] Everett Miller, 605.

[13] Demuth, 93.

condition that might affect the travel time of each round shot. Troops on the receiving end of artillery were often warned to take cover when shells from the nearest battery landed before the main barrage arrived. TOT fire avoided giving an enemy any early warning, wreaking greater destruction on troops caught in the open.[14]

Americans fighting in the Gifu faced Japanese in hillside positions and in deep ravines. Naval gunfire, which had a flat trajectory, was largely ineffective against enemy positions in defilade. Field artillery was only a slight improvement over naval guns, both of which often overshot the target. A higher angle of fire was needed. One field modification that produced marginal success was propping artillery pieces against steep slopes to achieve higher angles of fire. The incoming rounds fell almost straight down onto targets in defilade.[15]

Another solution was airpower. Naval, Marine, and Army air support provided some of the best results against sheltered enemy positions. One of the most impressive American innovations in close air support occurred while fighting around the Gifu. Navy dive bombers loaded with 325-pound depth charges proved remarkably effective. An artillery officer with the 25th Infantry Division recounts the discovery, use, and results of this unorthodox method. According to Colonel Jay D. Vanderpool:

> Right behind the mountain [Austen] there was a big canyon that was, I guess, the logistics area and the reserve area for troops. Because they were down there in that canyon the Naval gunfire couldn't get to it. We fought around there for a good while….Finally, we even got some light tanks up there. They weren't real effective…. In the meantime we were burning up everything that would burn and trying to level everything…with artillery and aerial bombs. The Japs were taking a terrific beating. The Japs wouldn't get out of that canyon, and we didn't want to go down into it. So, we

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[14] John Miller, *Guadalcanal: the First Offensive, Appendix D: A Japanese Analysis of American Combat Methods on Guadalcanal*; see also 262-264 for details regarding TOT. On 10 January 1943 the 25th Infantry Division artillery fired the heavy concentration of fire (described on the preceding page) at a watering hole near Hill 66 near the Gifu. The TOT "shoot" was probably the first divisional combat TOT firing by American artillery during WWII.

[15] Anderson, *Guadalcanal 1942-194*, 26.

> decided to sit on the hill and drop ammunition on them. Somebody had a bright idea, some Navy liaison officer said, "I think we'll get some good echo effects down in that canyon, why don't we try it [dropping depth charges]." We were willing to try almost anything to make it easier getting across that damn deep ditch. The Naval liaison officer brought some depth charges in on Navy planes. I don't know how many. Oh, they were noisy! He dropped dozens and dozens of depth charges down into that canyon. When we finally went across the valley, I'll bet we didn't see 200 men who wanted to fight. They were dead on the ground, blood running out of their ears, eyes popped out of their faces. A lot of them were just in shock. I've never seen such a horrible thing in my life as a bunch of people hit by high compression sound waves. It really knocked them out. Anyway we got across.

Colonel Vanderpool's story is a prime example of "brute force" in action, reinforcing the argument that Americans won the war by relying on mass firepower. However, the story also provides unquestionable evidence of American adaptability and creativity when applying superior firepower.[16]

The climax of combat operations on Guadalcanal occurred in late January 1943 when Americans wrested Mount Austen from the Japanese. According to the 97th FAB commander:

> With the end of organized resistance, there was no present use for the battalion as pack artillery. All available animals and the necessary packers were formed into a temporary pack train. In the latter part of February it was used to pack a battalion of the Infantry into the mountains to round up straggling Japs.

The campaign for Guadalcanal was over. The first major offensive in the Pacific taught the U.S. military many lessons, particularly Japanese ways of war. One of the biggest lessons learned was in supply. Improved logistics were required if future campaigns were to succeed. The U.S. military, a mass consumer of resources, must learn to move and judiciously use their limited supplies. Mules still factored into these logistical equations and this mode of transportation was not abandoned, even though pack animal performance was dubious on Guadalcanal. The jungle

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[16] Colonel Jay D. Vanderpool interviewed by Lt. Colonel John R. McQuestion, Senior Officers Oral History Program, Project # 83-12, U.S. Army Military History Institute, Carlisle Barracks, PA, 1983, 43-45. PDF available at: http://ahecwebdds.carlisle.army.mil/awweb/main.jsp?flag=browse&smd=1&awdid=12 .

conditions Americans were guaranteed to encounter during future campaigns left few alternatives except animal power.[17]

[17] Demuth, 93; John Miller, 314.

Chapter 8: Jungle Mules Part II—China-Burma-India

Japanese forces took Rangoon, Burma in March 1942, and steadily moved northward. British and Chinese forces were powerless to stop the Japanese, and an American contingent led by General Joseph Stilwell failed to stem the Japanese tide. In May 1942, Stilwell bitterly professed that America and its allies "got a hell of a beating" and should regroup and retake the lost land. Military planners agreed and, though a sideshow to the main drives across the Central and South Pacific, American forces organized and launched an offensive to expel Japanese forces from Burma and China.[1]

American political and military planners determined that keeping China in the war was vital to defeating Japan. If the United States could rejuvenate an anemic Chinese military, then the Chinese could become a crucial member in the Allied coalition. American adherence to the "German First" strategy remained steadfast, and the ETO took priority regarding resource allotment. However, many Americans believed that China was a worthy, reliable ally and would pull their weight against Japan. According to Maurice Matloff, America sought "great aims on the Asiatic mainland at small cost."[2]

General Stilwell had the unenviable task of "improving the efficiency of the Chinese Army."[3] The Chinese would be forged by the United States into a force capable of expelling the Japanese from Burma. Once Burma was secure, the land line between India, Burma and China

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[1] Charles F. Romanus and Riley Sunderland. *Stilwell's Mission to China, CBI Theater, U.S. Army in World War II*, (Washington, D.C.: Dept. of the Army), 1953, 143. Stilwell and his contingent of Chinese and American troops regrouped at Ledo, while British and allied forces retreated and regrouped further south at Imphal, India. British and allied troops used Imphal as a staging area, which was struck by the Japanese. The Japanese move into India was thwarted after bitter fighting at Imphal and Kohima from April-June 1944. In the mean time, American and Chinese forces fought to expel Japanese forces from northern Burma and reopen the Burma Road.

[2] Matloff, 522.

[3] Ibid.

could be re-established, from which a steady flow of supplies could funnel into China. A well-supplied China would keep the Japanese busy in East Asia, relieving pressure on American forces fighting across the Pacific.

Similar to the Mediterranean, the CBI Theater became a sideshow. Nevertheless, the Allied campaign in CBI helped halt Japanese expansion in South Asia. Allied operations in CBI also occupied Japanese troops who would have been fighting in the Pacific. As a CBI veteran claimed, "our job was to entertain as many Japs as possible and keep them tied up in China, and so we did."[4]

Taking Myitkyina airfield or reopening the Burma Road during the latter course of the conflict had a negligible impact on the war's outcome. Still, the CBI campaign highlights an army prevailing over supply and transportation barriers through adaptability and ingenuity. Japan's initial success was remarkable as they humiliated the Western Allies. Eventually the British and Americans beat Japan at their own game by using jungle-trained units to infiltrate, cut supply and communication lines, and then annihilate their enemy. The U.S. Army proved particularly adept at modifying tactics, such as aerial re-supply, and beating an allegedly martially superior foe. The strategic value of the CBI Theater is debatable, but one cannot question America's tactical success based on brute force and adaptability. Few theaters were more challenging than CBI concerning combat and supply operations, which is why CBI is perhaps the finest example of Army adaptability and, not surprisingly, pack animals were an integral part of Army success.[5]

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[4] Cureton Interview.

[5] Riley Sunderland, *Stilwell As Corps Commander, Burma, 1944*, rebuttal to Scott R. McMichael, *Parameters*, Summer 1986, found under Correspondence, McMichael Papers, ARCH Collection, USMHI.

Strategically, a primary reason for American operations in CBI was to supply the Chinese military, and keep them fighting against Japan. Tactically, the war in CBI was also dominated by logistics and complicated by a supply chain that could begin on a Missouri farm and end 12,000 miles away atop a mountainside in North Burma. Supplies entered the CBI Theater from ships at Calcutta, India, then were moved northeast by rail over one thousand miles on a journey taking around 65 days. Supplies were transferred from the railhead to trucks and hauled over poor roadways or placed on ferries and moved up a number of navigable rivers to the North Indian province of Assam. The supply chain from India to China passed through Burma, which was occupied by the Japanese in early 1942. Thus, China was effectively sealed off from all overland supply lines. The only method of supplying the feeble Chinese Army was by air.[6]

Ledo in Assam was the depot from which China's air supply began its flight over the Himalaya Mountains, or "the Hump," to Kunming, China. The approximately 475-mile air link in the supply chain was beset with obstacles, the most obvious being the Himalaya Mountains. Pilots flew over or around 15,000 foot peaks and terrain with its own unique weather patterns, including vicious updrafts, snow storms, lightning, and blinding downpours. Early air supply missions also had to contend with Japanese fighter planes. Operating primarily from a large air base at Myitkyina, Burma, these Japanese interceptors posed a serious threat to the aerial supply line until America established air superiority.

The transport aircraft were not obsolete but were hardly in prime working condition. Routine maintenance of aircraft was difficult because of an aircraft shortage, resulting in overuse of the planes available. Paucity of replacement parts further complicated aircraft upkeep. The

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[6] U.S. Army Campaigns of World War II: *India-Burma*, 3-5, at http://www.ibiblio.org/hyperwar/USA/USA-C-India/index.html , hereafter cited as *Campaigns: India-Burma*; see also *Burma 1941-1942* at http://www.ibiblio.org/hyperwar/USA/USA-C-Burma/index.html; and *Central Burma 1945* at http://www.ibiblio.org/hyperwar/USA/USA-C-Burma45/index.html; from Campaign series.

"Germany First" strategy meant that the lion's share of resources, including transport aircraft, was allocated to buildup for a second front in West Europe. Similar to Mediterranean operations, the CBI Theater was seriously underserved.[7]

The fact that any air supplies arrived at Kunming, China was remarkable considering the obstacles. The Army Air Transport Command (ATC) and the Tenth Air Force accomplished a great logistical feat and demonstrated Army adaptability by pilots, loadmasters, and ground crews. Eventually these pioneers developed an air supply system second to none. However, in the first few years of operation (1942-1943), it proved too difficult to move sufficient quantities of supplies by air transport alone. The Chinese, under the leadership of Jiang Jieshi, demanded more supplies. American General Joseph Stilwell also believed that the supply shortage hampered China's fighting ability and accordingly insisted on building a land route from India to move more supplies into China. He presented a plan to reclaim Burma as a first step to opening a flood of Allied supplies for the beleaguered Chinese.[8]

Early 1943 found CBI in a state of flux. Return "Hump" flights brought Chinese manpower back to India, where American advisors equipped and trained them into a fighting force. Jiang Jieshi and Chinese Nationalist forces continued receiving life support by air from India. Simultaneously, U.S. Army engineers were extending the Ledo Road through the jungles

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[7] *Campaigns: India-Burma*, 6-7; see also John D. Plating, *The Hump: America's Strategy for Keeping China in World War II*, (College Station, TX: Texas A&M University Press) 2011.

[8] Romanus and Sunderland, *Stilwell's Mission to China,* 163-167, 283-287. As part of the Army Historical series this provides a top-down view on the shortfalls of air supply in the early year(s) of the war and the ramifications of supply shortages on political-military relations between the U.S. and China. Jiang Jieshi was the often divisive leader of the Chinese Nationalist Party (or Guomindong), whom the United States supported during World War II. The Guomindong frequently battled Chinese warlords of northern China while also fighting Japan. Shortly after hostilities ended with Japan, civil war erupted in China primarily between the Guomindong and Chinese Communist forces until the Guomindong was expelled in 1949.

and mountains of North Burma in the hopes of linking up with a reopened Burma Road, though the Japanese must be expelled ahead of the road's construction.[9]

American war planners were unsure how to proceed. Few besides Stilwell wanted to invest too heavily. An unlikely source of inspiration for the United States came from British Colonel Orde Wingate. Described as "often brilliant, sometimes insane, but always convincing," Wingate proposed using "long range penetration groups" (LRPG) to go behind the lines to harass the enemy. General Wingate experienced some initial success by personally leading a LRPG into Burma, and proving that such operations were possible. Americans were attracted to the long range penetration concept because they required a minimal investment.[10]

LRPG success depended on two components: continuous re-supply by air and pack animal transportation once the supplies were received. Wingate led 3,000 "Chindits" supported by 1,000 mules some 200 miles into the jungle behind Japanese lines. General Wingate's force produced some tactical success, though at a great loss of men and mules. Only about two thirds of his force survived the mission, and most of those were deemed unfit for further duty. The pack animals suffered almost 100 percent losses. The attrition on men and mules raised questions regarding the value of long range penetration missions. The LRPG missions involved a minimal risk of resources but also produced minimal results, and the few resources that were deployed suffered very high casualties. But the LRPGs produced a propaganda bonanza for the Allies on the home front; and, more importantly, the Wingate mission served as a template from

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[9] *Campaigns: India-Burma*, pg. 10.

[10] Bradley, 398. Wingate survived the first foray into Burma by a long range penetration group. His success was/is debatable because the attrition was so high that most of the troops participating either died or were too unfit for future service once the mission concluded. However, the long range penetration group concept survived, evolved, and was refined by the British and U.S. Army.

which the U.S. Army refined the LRPG concept and turned air supply and mule transportation into an art.[11]

Allied leaders, particularly Churchill and Franklin Roosevelt, agreed to continue LRPGs in Burma. Wingate, promoted now to general, rebuilt his Chindits and led a second mission. The Americans agreed to create their own LRPG, but fierce debate occurred over whom would lead the American force. In the end, General Stilwell's anti-British sentiments prevailed and his demand that an American command American troops was met. Brigadier General Frank D. Merrill commanded what was officially known as the 5307th Composite Unit (Provisional) or "Merrill's Marauders" on Operation *Galahad*.

Operating from bases in northeast India, General Stilwell planned to strike in North Burma. The general objective was to open a supply line following the trace from Ledo, India and linking up with the Old Burma Road that ran east toward Kunming, China. Two Chinese armies, Y and Z Forces, would launch a campaign to open the Ledo-Burma Road. Z Forces was the product of the Americans' program to train Chinese troops in India. The larger Y-Force was a Chinese formation equipped and trained by Americans in Kunming. The two forces were to converge and establish a land corridor between China and India through northern Burma.

Spearheading *Galahad* into North Burma was Merrill's Marauders, a brigade-sized unit that included three battalions of volunteers. The American unit was to follow the British model, taking volunteers with jungle training, and experience in air supply and pack animal transportation. The primary goal of *Galahad* was Myitkyina, the only significant air base in

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[11] Essin, 173; Bradley, 399; *Campaigns: India-Burma*, 10. General Wingate's brigade-sized group of raiders was called "Chindits" after a mythical beast that guarded Buddhist temples. Disease killed more men than combat deaths. Evacuation was not possible, so wounded and sick were often left (died or taken prisoner). Mule attrition was nearly 100 percent. The mules were often butchered and eaten by the half-starved men as supplies were depleted. Wingate's force retreated to India and, in order to hasten their escape and also deprive the Japanese any use of abandoned pack mules, the order was given to kill nearly all of the remaining mules.

northern Burma. Seizing "the Mitch," as the Marauders soon knew it, was crucial to clearing the path for the Ledo-Burma Road to China. The Marauders operated closely with the Chinese 22nd and 38th Divisions moving from India into northwestern Burma. The Chinese advanced down the Hukawng Valley toward Myitkyina while the Marauder vanguard disrupted Japanese supply and communication lines.[12]

Galahad was promoted by the War Department as a "hazardous mission" from which heavy casualties were expected. A mixed bag of volunteers joined the operation. Only about one third of the men had jungle experience, coming from the Southwest Pacific and the Caribbean Command. The majority were state-side Midwestern farmers and city dwellers. Some of the latter had animal experience, but almost none had the requisite jungle training. Robert E. Passanisi was a prime example of a volunteer with no animal experience. According to Passanisi,

> I was a kid from Brooklyn. I sure didn't know anything about mules, but I knew a lot about radios. Our radios were big and had to be loaded and carried on mules, so I got acquainted with mules when I became the battalion's radio man.

The military request for troops with jungle experience and a certain amount of horse sense went largely unfulfilled. Fortunately, Passinisi and hundreds like him were quick studies, and the unit materialized after a short amount of on the job training.[13]

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[12] U.S. Department of the Army, *Merrill's Marauders (February-May 1944).* (Washington, D.C.: Center of Military History, 1990) 1-5; see also Charlton Ogburn, Jr., *The Marauders*, (New York: Harper and Brothers, 1959), 9; Charles N. Hunter, *Galahad*, (San Antonio, TX: Naylor Publishing, 1963), 1-6; Fred E. Randle, *Hell on Land, Disaster at Sea: The Story of Merrill's Marauders and the Sinking of the Rhona,* (Paducah, KY: Turner Publishing, 2002) 12-15; Essin, 177. Operation *Galahad* was to include 3,000 men (1,000 men per battalion) and 1,000 mules for supply transportation. General Stilwell opposed the overall LRPG concept, leaving some field commanders (e.g. Colonel Hunter) and enlisted men to feel slighted by Stilwell regarding supply priorities.

[13] Robert E. Passanisi Interview, Saturday, September 4, 2010, Merrill's Marauders Reunion, Minneapolis, MN, Friday, September 3--Sunday, September 5, 2010. Passanisi worked with electronics as a kid. Passanisi's skills in radio communication were put to use when the ship's radio went out on the journey to India. He went on to serve as a Marauder radio operator for White Combat Team, 1st Battalion.

Galahad accrued about 2,900 of the 3,000 men requested and fewer than 400 of the 1,000 mules requisitioned. The number of *Galahad* mules was drastically reduced when the animal transport, *Jose Navarro*, was torpedoed. The ship began to sink, and the crew and pack troops abandoned ship. According to Hank Kinder:

> We floated around in the water all night, the ship had not sunk, but there was all sorts of things bobbing around like bales of hay and feed bags. Some of the mules got loose and they flailed around in the water a long time until the drowned. You could hear those still on board braying. A couple of times the submarine fired more torpedoes. I was in the water with a group of guys, and one (torpedo) went right by us. Finally, another torpedo hit the ship. It sank and we lost all our mules and gear.

All 320 mules aboard the *Jose Navarro* were gone. The deadline for the operation was looming, and the operation could not wait for future shipments of pack animals from America. Thus, in the end only around 360 mules supported *Galahad*. Around 300 Australian horses and local animals supplementing the operation brought *Galahad's* total animal strength to approximately 700, but the Australian horses had not performed well in the Southwest Pacific and the smaller native animals were in poor condition.[14]

Men and animals left Ledo, India on February 7, 1944 and road-marched some eighty miles down the completed portion of the Ledo Road. The entire force could have moved by truck, but General Merrill ordered the march to better condition them. Men and animals were worn out by the time they reached the end of the road. On February 24, 1944 the force moved off the road and into the jungle, and their ordeal really began. Merrill's Marauders struggled through almost impenetrable jungle, up mountains, and across countless rivers, and occasionally

[14] Kinder Interview; Randy Colvin, *Mule Boats of WW II*, self-published, no date/no place; see also, Essin 177-178. The *Jose Navarro* left New Orleans on November 1, 1943, sailed across the Atlantic and Mediterranean, and was sunk by an enemy submarine on December 27, 1943.

fighting skirmishes with the Japanese. The Marauders encircled and destroyed Japanese forces as they pushed on to their objective at Myitkyina, Burma.[15]

Conditions grew worse as the Marauders and their Chinese allies moved further east. Supply lines grew longer, and casualties from combat and disease mounted. Following the particularly vicious and depleting battle at Nhpum Ga, the Marauders pressed on toward Myitkyina. A crucial part of the operation was the timetable. Capturing Myitkyina must occur before the monsoons began, otherwise troop movement and supply difficulties would be compounded. Thus, a grueling march was ordered by General Stilwell to save time. The troops moved some 65 miles up and over the 6,000-foot Kumon mountain range, but not before the monsoon started. Drenched and struggling through a sea of mud, the exhausted men and mules inched forward and eventually reached the Myitkyina airfield on May 16, 1944.

General Stilwell was jubilant when receiving word that Myitkyina airfield was in American hands, but any real triumph was short-lived. Chinese efforts to capture the town of Myitkyina failed, forcing them to retreat to the American-held airbase. The American troops offered little help because their ranks were riddled with disease and fatigue. A two month long siege ensued, during which American casualties steadily rose. On August 3, 1944, Myitkyina was secured as the last Japanese were killed or retreated across the Irrawaddy River.[16]

The next American objective was Lashio, the western terminus of the Burma Road. American forces needed to secure the area ahead of engineers working around the clock to

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[15] *Campaigns*: *India-Burma*, 16. Walawbum and Nhpum Ga were two of the larger battles fought during Galahad. Walawbum cost the Japanese some 800 troops and the Americans lost 200 killed. Nhpum Ga was an even larger battle involving an 11-day siege by the Japanese against an American battalion trapped on a ridge. Fighting was fierce, conditions deplorable, and, again, losses were high on both sides.

[16]Ibid.,18-20; see also Romanus and Sunderland, *Stilwell's Command Problems*, USAWWII, Chapter 5 and Chapter 6; and U.S. Army publication #100-4 "*Merrill's Marauders*" from the American Forces in Action Series 1945 (1990 reprint), both of which provide a narrative of the strategic decisions and tactical operations involved with Operation *Galahad*. The controversial end involving the capture of Myitkyina is also assessed, and a more polemical account is found in Hunter's *Galahad*.

lengthen the Ledo Road to its juncture with the Burma Road, completing the overland connection to China. The mission was similar to *Galahad* in that it called for the entrapment and destruction of Japanese forces by a long range penetration group. The bulk of the original *Galahad* members were too spent to participate in the second phase, so the Army activated and deployed a new LRPG known as the 5332nd Brigade (Provisional). The organization and training of the 5332nd took place while Operation *Galahad* was underway. Indeed, members of the 5332nd, known as the Mars Task Force, avoided a great deal of the suffering experienced by Merrill's Marauders. The U.S. Army adapted as lessons were learned from the first LRPG experiment, ensuring that the Mars Task Force was dramatically improved**.**

Galahad was hurriedly put together and always short on men, mules, and supplies. Far greater attention was paid to the organization of the Mars Task Force. The 475th Infantry Regiment and the 124th Cavalry Regiment were the nucleus of the brigade. The majority of the 124th Cavalry Regiment were Texas National Guard troops, who served the Mars Task Force as dismounted infantry. Their knowledge of animals proved quite valuable since Mars depended on a large number of pack animals for supply transportation and artillery. The Mars Task Force also included the few hundred Merrill's Marauders still fit for combat. As the unit history noted, "the leaven of veteran jungle fighters was mixed with the freshness of volunteers" to form a truly formidable LRPG.[17]

Another major improvement with the Mars Task Force was in support units. *Galahad* had no field artillery, depending on heavy artillery for tactical or close air support. Two pack artillery battalions deployed with the Mars Task Force. Each pack artillery battalion included sixteen guns and 286 mules. Six Quartermaster Pack Troops transported supplies. Between pack

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[17] Report: Narrative History—5332nd Brigade (Prov), 26 July 1944—9 February 1945, File 92-TF6-0.3, RG: 407, NARA, cited hereafter as *5332nd Brigade Narrative History*.

artillery and pack transportation, Mars deployed some 3,000 pack mules, a staggering increase compared to the roughly 700 mules and horses supporting *Galahad*. Two Veterinary Companies, a Veterinary Hospital, and two Remount Squadrons provided medical care for such a large number of pack animals. The Mars Task Force was thus much better equipped and supported than its predecessor after the Army recognized changes were required.[18]

The Mars Task Force still had to perform an arduous mission as they struggled over the most grueling terrain in the CBI Theater. The Mars men also experienced hard fighting and strong Japanese resistance as they secured the area preceding the Ledo Road. On January 25, 1945 the first truckload of supplies moved down the Ledo Road, connecting with the Burma Road. Finally, the mission of a land route from India through Burma, and into China was attained. Several Mars Task Force members accompanied these supply convoys, which included the movement of several thousand pack mules earmarked for the Chinese Army.[19]

The U.S. Army realized that transporting supplies in CBI required pack animals. Animal power had had limited success at Guadalcanal, where unconditioned animals and logistical problems produced a poor showing for animal power. Americans were still convinced that animal power was the only alternative in the harsh terrain of CBI. Lend-Lease, in support of

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[18] Memo: Animals for 612th F.A. Battalion, File 454 Animals, Box 1750, RG: 338, NARA; Report: Narrative History—5332nd Brigade (Prov); see also Essin, p. 179; Bradley, p. 401. Mars TF included 7,000 men and 3,000 mules. Support units included: the 612th and 613th F.A.B. (Pack), the 31st, 33rd, 35th, 37th, 252nd, and 253rd QM Pack Troops, the 1st , 2nd and 7th Veterinary Service Companies (Separate), 78th Veterinary Hospital, and the 252nd and 253rd QM Remount Squadrons. *Galahad* was not provided artillery because the emphasis was on mobility. The lack of heavier fire support was not remedied until Nhpum Ga, well into the mission, when two 75 mm pack howitzers were airdropped and quickly put into action. The disparity between *Galahad* and Mars regarding equipment, training, and support fostered some resentment between members of the two groups.

[19] *Campaigns: India-Burma*, 24.

General Wingate's Chindits, brought American animals to CBI. By the time Americans decided to send their own LRPG, it was understood that pack animals were the lynch pin to CBI supply.[20]

The U.S. Army required American animals for the CBI campaign, unlike the MTO in which the Army relied almost exclusively on local stock. The Army Veterinary Service believed that native animals needed to support the task in CBI were not available in quantity, nor could these animals withstand the rigors of pack animal service. The assumption was only partially correct. Animals native to CBI were smaller, but they were acclimated to the jungle environment. American mules were much larger and stronger, but susceptible to jungle diseases. All animals supporting supply operations in CBI, regardless of origins, suffered heavy losses.

American Remount Depots were extremely active collecting animals for CBI deployment. In all, some 10,703 Army horses and mules disembarked at Calcutta, India to serve in CBI. Approximately half were "veterans" transferred from the Southwest Pacific and recent action at Guadalcanal and New Guinea. A small number transferred from the Caribbean and Hawaiian Commands. The Zone of Interior provided 4,760 fresh recruits.[21]

U.S. troops preferred American stock, but often supplemented operations with Indian and Burmese ponies. American troops requisitioned countless local animals. According to one Mars man:

> While we was training we found a little pony, just wandering around out there by himself, so we cabbaged on to him and it got to where he didn't want to leave the mules. The night before we left out, we checked the picket line to make sure the mules hadn't wondered off, and when we checked, Eight Ball was gone. First battalion was heading out that morning and Eight Ball was with them. Well, we decided to take him back, so a brawl started, and I mean a good one. We got to keep him, and he was with us the whole trip, and what that little pony did was he could haul four packs. Well, there were five of

[20] Essin, 177. General Stilwell did not support the LRPG concept. One aspect of these missions that Stilwell enthusiastically agreed was the use of American pack mules. Native animals were diminutive and, according to Stilwell, "Mules are dependable and steady while horses are all prance, fart, and no sense."

[21] Miller, *AVS in WW II*, 506, 607.

> us in each group, so one day out of five you had to wear your own pack, but we had a real luxury having Eight Ball with us.[22]

Veterinary officers were dispatched by the Army Veterinary Service as early as September 1942 to help supervise the Chinese training facility at Ramgarh, India. Army Veterinary officers also helped receive and distribute lend-lease animals to the British Army. The Army Veterinary Service established a provisional Remount Depot at Ramgarh, and then moved to Ledo as American combat teams deployed to North Burma. Though incomplete, the Army developed a good system of veterinary care for the animals.

Inexperience with pack animals was widespread, and during the early stages of the CBI campaign the pack troop selection followed little protocol. According to Randy Colvin:

> I was sent to Fort Bragg, North Carolina, for my basic training. Well, there I took basic in a 105 (mm) motorized vehicle. One day they lined us all up, they had a bar 5-foot ten inches, so we went up and if you hit that bar, they took your name and you went this way and if you was short you went another way. We wound up in Muskogee, Oklahoma, which was Camp Gruber. Well, one of the first things we said when we got off the train was where's the trucks. This one corporal there he looked at us and laughed, said you SOB's have seen your last truck. You're in the mule pack. We said what the hell is a mule pack?[23]

Randy Colvin at least experienced some animal training prior to deployment. Others were simply picked on the spot in the field. According to Pete Ewing:

> After Myitkyina we was pretty shot up, so before we started the second part of the Central Burma campaign they asked for people that had any knowledge working with mules. Of course, I was a kid from the farm in Indiana and it wasn't no big deal with me to say "Yeah, I know how to handle a mule." And so that's how I got into that. They took five of us and taught us how to pack, and it just became a natural thing. There was no real training program or anything like that; it was really just using common sense.[24]

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[22] Merrill "Pete" Ewing Interview, Saturday, September 4, 2010, Merrill's Marauders Reunion, Minneapolis, MN, Friday, September 3--Sunday, September 5, 2010. Pete Ewing was a scout in Intelligence and Reconnaissance, First Battalion, 475th Infantry. Based on his farm experience with mules, he became a natural pack trooper when volunteers were called before the Mars TF embarked.

[23] Bradley, 401.

[24] Ewing Interview..

The early campaign in CBI saw little uniformity or regulation regarding pack troops. The Army realized that experience would be beneficial, as seen in the request for volunteers "qualified in jungle training" and with air and animal transport experience, but there was hardly time to enforce any rigorous standards. The Army compensated for any deficits in experience by relying on adaptability and the American talent for on-the-job training.

The Army recognized the value of well-trained pack troops. As one report noted:

> The mission of a Pack Company is to transport weapons, equipment, and whatever other supplies are required for mountain troops where the terrain is so difficult that not even specially designed vehicles can move over the hazardous trails and slopes. The Pack Company, though not a tactical unit, is frequently with the frontline combat troops. Each man is trained to handle his individual weapon and equipment; to saddle and manage the pack mules and care for the cargo.[25]

Though often omitted when discussing special forces, pack troops were quite specialized and often served as the last link in the supply chain. Those who underwent training with a pack troop experienced rigorous training. The 33rd Quartermaster Pack Troop was eventually assigned to Merrill's Marauders and experienced a prime example of training hardships. The 33rd QMPT trained near Fort Bliss, Texas, often marching in the July heat into the mountains of nearby New Mexico. Aside from pack animal training, the men took refresher courses in infantry tactics, first aid, and infiltration.[26]

Veterinary companies also underwent specialized, hard training. The 44th Veterinary Company trained at Fort Riley, Kansas before deployment to CBI. A report on activities by the company noted:

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[25] History and Mission of the 35th QM Pack Company, File: 35th QM Pack Troop—History 1945; Box #5569, RG: 338, NARA.

[26] Organizational History, 33rd QUARTERMASTER PACK TROOP, File: QMPT-33-0.3 33rd QM Pack Troop, 20 January 1943-4 November 1945; BOX #5569, RG: 338, NARA.

> On July 10, (1944) unit departed Fort Riley, Kansas enroute to Marysville, Kansas, a distance of some 78 miles. Mounted men riding the total distance with three bivouac areas in between averaging 26 miles a day. All movements being made in blackout conditions. Problems (tests) included map reading, scouting, and patrolling and concealment of bivouac areas. Entire problem lasted from 10 July to 21 July, 1944.

Observers related that moving some 360 mules at night was done with remarkable stealth and that concealing the animals from aerial observation proved difficult but possible.[27]

Transporting the transportation (i.e. the mules) was an arduous job. The journey usually began with rail transport from an Army Remount Depot in the United States to a port of embarkation. Mules were loaded onto an animal transport and shipped out. A typical voyage recorded that "after an uneventful voyage of 18 days," the transport arrived at Melbourne, Australia. The mules were not allowed to deboard due to Australian quarantine laws, and "after 14 uneventful days at sea" arrived at Bombay, India. The transoceanic voyage by animal transports or "mule boats" may have been "uneventful," but the taxing trip was far from over after arriving in India.[28]

A total of twenty nine shipments brought 10,703 Army mules to Bombay or Calcutta, India. The voyage took an average of sixty days. Some mules were marched off the ship, some were placed in "flying stalls" or cargo nets, and some just swam to the beach. The mules were immediately collected and moved by train from Calcutta to Ramgarh, India or Ledo. The trip by train took an average of 60 days.[29]

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[27]Memo: Annual Report of Medical Activities, 44th Veterinary Company; File HD: 319.1-2 (44th Veterinary Company, Separate) IBT 1944, Box #12, RG: 112, NARA.

[28] Report: *613 FAB Unit History*; File: 613 Field Artillery Battalion, 17 October 1943-8, September 1945; Box #1750, RG: 338; see also Chapter 3 regarding the labor-intensive task required to move 350 mules some 12,000 miles over 60 or more days.

[29] Miller, *AVS in WW II*, 506; see also *Campaigns: India-Burma*; Essin, 181; Bradley, 408.

The Army Veterinary Service preferred moving live stock by train in the Zone of Interior. Railroad transportation in India was completely different, and serious health problems developed in the herds. The greatest problem was the rapid loss of condition while confined to the train, often for eight to ten days at a stretch. Aboard ships, the mules frequently exercised at least every other day or two, but exercise aboard trains was not possible. Six to ten mules or horses were loaded on a freight car or "animal wagon," usually with five on each end facing inward, with food and water placed in the middle. The steel cars were poorly ventilated and became insufferably hot. Stops for water were infrequent and most often the animals were not unloaded. The rail gage changed further northward, requiring stops to switch trains. This provided some exercise for the animals, but it also lengthened the overall trip.

The 1,450 mile trip to Ledo ended with a road march or truck ride from the railhead to the Remount Depot, a part of the trip that was beset with problems.[30] Hauling the mules by truck proved unsuccessful because inexperienced, careless drivers and twisting, poor grade roads often left mules seriously injured. [31] A safer alternative to truck transportation was road marching, though this method was not without its own difficulties. To avoid the travails of moving mules in monsoons, the mules usually moved in the dry season. But herding several hundred mules in the stifling heat reduced the already marginal condition of the animals. Choking dust accompanied a road march, and was more than an irritant for it damaged material and wore down the men and mules. According to a Mars trooper, the fine sand turned to dust and, "[I]t never settles. It never disappears, but it's just solid dust and we ate that stuff all day and I've never

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[30] Miller, *AVS in WW II*, 551-552.

[31] Ibid., 553. Truck transportation of mules improved very little once American forces entered China, where a high casualty rate occurred among animals moved by truck. Ten percent losses in a single haul were not uncommon.

seen a group of men this tired." Equipment was quickly abandoned to reduce the load, and this was before even entering the combat area.[32]

Army regulations were very specific regarding the movement of large herds down roadways. Training called for the herd to follow a bell mare as pack troops rode a mule and guided the loaded mules down the road. The herding principle worked well and the transportation of supplies was relatively fast until the pack troops were integrated with a moving column of infantry. The mule herd moved faster than the walking infantry, overtaking the men and causing congestion. The pack train could not lead the column when in close proximity of the enemy, nor could it play catch-up because the infantry often needed their supplies quickly. The problem was solved when the Army adopted the "brigade" system, in which one pack trooper accompanying the infantry column led one or two mules. As a unit history noted, "Although previous training of the mules had been along herding principles, the Brigade system of a mule leader to each mule paid rich dividends."[33]

Bell mares normally guided and motivated herds to cross rivers. The absence of bell mares in Burma necessitated alternative methods of river crossings. Crossing rivers required great physical strength and skill to induce a mule to cross bodies of water, an almost daily occurrence. According to Colonel Charles Hunter:

> Where there is a gradual slope into the water, you can line up about six men, pass a rope under the beast's haunches, and propel him into the deep water with a rider already on his back and yell "sink or swim you bastard." The mule starts to sink, paws the water, gets vertical, and swims to the far bank...should a mule get too much water in his ears he

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[32] Bradley, 411. Mules were fully loaded and men started out with about 100 pounds of gear. The men dropped any material deemed non-essential. By the end of the first day their packs were reduced to about half, and by the end of a mission most men reduced their personal effects to a blanket, poncho, spoon, and toothbrush.

[33] *5332nd Brigade Narrative History,* p. 2; see also Don L. Thrapp, "The Mules from Mars," *Quartermaster Review*, May-June 1946, p.2 accessed on 20 May 2012 at http://www.qmmuseum.lee.army.mil/WWII/mules_of_mars.htm . Bells were tied to the neck of mature, well-trained female mules and horses, which then led the entire herd. .

> may lose his sense of equilibrium and drown. So in order to recover the carcass…,t is well to attach a float by a long cord to the halter before entering the water. Mule meat is quite edible if the carcass is recovered promptly.[34]

Even with the untimely loss of a prized pack mule, GIs demonstrated a fair amount of ingenuity.

Meandering rivers and streams are a prevailing feature in the Burmese low lands. Units often crossed the same river multiple times in one day. Fording rivers was a skill LRPGs developed into an art. According to Hank Kinder, "[W]e built bamboo rafts to take supplies across, and unloaded the mules and let them swim." They built split bamboo footbridges, "the wider the better, but never more than a few feet across. The mules crossed them too." If time permitted, engineers constructed crude bridges from pontoons and planks. According to Randy Colvin:

> They had a bridge, oh it was about four foot wide, looks like it was made of bamboo. It was just right down on the water. Of course it gave with the water and when you're walking with mules it's going down some….every once in a while they get skittish and one or two of them did fall into the river and was washed away. But as a whole, we made it and the river was at least a quarter of a mile wide.[35]

The smallest streams became a dangerous torrent during the monsoons. Army engineers overcame these obstacles by placing platforms on top of several small motor boats to fashion make-shift ferries. Several mules were herded onto the deck, and the men, operating outboard motors, drove them across the river. Most often time was of the essence, so the ferries usually had no rails and occasionally mules jumped overboard. Likewise, mules should have been unpacked for safety, but, lazy, harried troops often left the mules fully loaded during the ferry ride, which was a time-saving though risky practice.[36]

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[34] Hunter, 8-9.

[35] Kinder Interview; Randy Colvin quoted in Bradley, 415.

[36] Bradley, 417.

Monsoon season also turned the low-lying areas into swamps and bogs. Heavily loaded mules easily fell victim to the marshy ground, at times sinking up to their heads. Trapped animals were unloaded, then troops dug under the mule, uncinched the pack saddle, and broke the mule free from the mire. Depending on the size of the swamp, troops fell timber and fashioned log roads to bridge the bog. As Pete Liddy noted:

> They went out and cut these mammoth trees, and they was teak wood. And that's really expensive today…they'd just cut these huge trees and then we'd lay them across and they'd call it a corduroy road. And we'd come along and put a little dirt on it. Just anything to keep them out of the swamp.

No amount of time, labor, or expense was spared to extract the trapped mules and ensure that supplies kept moving.[37]

The most innovative method of moving pack animals to frontline troops was by airplane. The technologically regressive application of pack animals in a war dominated by machinery was surprising, and moving mules via aircraft was supremely ironic. Indeed, the reason a motor-bound military needed animal power was that motorization failed in the harsh environment of CBI. Yet, the successful marriage between modern and archaic modes of transportation demonstrated a real talent for adaptability by the Army.

One of the first to express an interest in moving pack animals by airplane was a veterinary officer at Fort Riley, Kansas. In 1932, the Cavalry School veterinary noted that it was reasonable "in a relatively few years we may expect to witness the practical rapid movement of limited numbers of horses and mules by airplane or dirigible." Eleven years later on New Guinea the 98th Field Artillery Battalion conducted movement of pack units by air. By 1944 mules were frequently flying from India into Burma, or over the Himalaya "Hump" to China.[38]

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[37] Pete Liddy quoted in Bradley, 418.

[38] Miller, *AVS in WWII*, 553.

In the spring of 1944, the British Army became the first to deploy pack animals via aircraft in the spring of 1944. The British Chindits, with the help of the U.S. Army Air Corps, moved some 9,000 men and 1,300 mules, by C-47 cargo planes and Waco gliders during Wingate's second foray behind Japanese lines. Using American planes, equipment, and mules, the British successfully landed in Central Burma and demonstrated that pack animal transportation by air was quite feasible.[39]

Air transporting mules was difficult, and American air crews and veterinary officers constantly improved the practice. First, the transport aircraft was modified. Temporary stalls were constructed from bamboo poles, wired together, and mounted in the plane's cargo area. Special tie-downs, d-rings, and lead ropes were installed. The floor was covered with plywood, tarpaulin, and hay to prevent slippage. Mules were loaded, two at a time, directly from the truck to the plane and lashed down. Altogether, five or six mules were loaded, along with the pack saddles. Some twenty minutes later the mules and crew were ready for takeoff.[40]

Mules were agitated and fidgety prior to takeoff. Crew chiefs tried to keep the animals calm, and were armed with pistols and carbines in case the animals could not be subdued by other means. The mules quickly calmed once airborne. Upon reaching an altitude of 12,000 feet the mules became quite drowsy. Landing was similar to take-off in that animals became unsettled. Again, the armed crew chiefs did their best to comfort the animals, but they were trained in the proper procedures to put a mule down if the animal panicked. Mules were quickly

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[39] Essin, 174; see also John Masters, *The Road Past Mandalay*, (New York: Harper, 1961), 136. The British and U.S. Army both relied on the U.S.A.A.C. group dubbed the Air Commandos under Colonel Phillip Cochran.

[40] Miller, 555.

unloaded and moved to the supply depot. Occasionally, the animals were left in their pack saddles during the flight, which expedited transportation of supplies to the front.[41]

The U.S. Army Air Corps moved flew over 7,000 mules for the British, American, and Chinese Armies. Air transportation of pack animals seemed unorthodox at first, but was easier on the animals and cheaper than road marching. A Remount officer wrote:

> The fact that animals can move under their own power seems to be the only argument in favor of their being marched over long distances. However, it is felt that such a contention is ill founded in view of the numerous problems involved in such a method of movement.[42]

Road marches could be as debilitating on mules as combat operations. Exhaustion, wounds from ill-fitting packs, and lameness due to improper shoeing often accompanied road marching. Road marches often diminished pack animal capacity to transport supplies, and thus, good animal care while on the move was vital to overall mission success.[43]

Sound animal care and sound veterinary practices ensured that the animal link in the Army supply chain did not break. Procuring adequate forage was a primary concern. A typical working mule needs 17 pounds of grain and grass and 10 gallons of fresh water daily, though in CBI the feed/hay ration was reduced to 12 pounds. The Army Veterinary Service diligently worked at home to develop the perfect ration. Considerations included nutritional value to maintain peak animal health, along with compactness to reduce bulk and facilitate transportation.

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[41] Ibid. It was particularly important for crew members to control the animals during take-off and landing because sudden weight shifts from fractious animals could cause planes to crash. Records indicate that only two animals were shot during air transportation.

[42] Memo: Transportation of Animals, to Theater G-3 from Captain John A. Rand, Remount Officer, File: 454 Animals Pack, Box 1750, RG: 338, NARA. Captain Rand was the officer in charge of moving 900 mules from Myitkyina, Burma to Kunming, China after Mars Task Force combat operations ended.

[43] Miller, 554. The Army eventually employed both methods of moving mules: 5,397 were road marched from India-Burma to China; and 4,964 flew over the Hump destined for Kunming, China.

Veterinary officers in theater matched AVS efforts on the home front to produce quality forage. Of particular interest to Army Veterinary Service officers was efficiency, which seemed (in the mind of AVS officers) completely lacking in China. An example of AVS efforts to improve Chinese efficiency was in hay production.

> In the China theater, the Army Veterinary Service took energetic steps in requisitioning hay-baling machines from the United States and having them airlifted over the Himalaya Hump into China in order to introduce and to provide hay in baled form to…Chinese military forces which had been using unbaled loose hay.[44]

Efforts to create a compressed ration produced generally good results. Mixtures of barley, wheat bran, straw, sugar, and salt were steamed and compressed into small cakes. The cakes were wrapped in paper and packed in waterproof boxes. The boxes could be easily hauled, which addressed one component of the ration equation. An aspect of the ration problem that was harder to solve was nutritional value. If used in emergency or short-term feedings, then these rations were adequate. However, prolonged feeding of these compressed rations generally produced weight loss and gastrointestinal ills, which diminished ultimate transport capacity.

Forage supplies in CBI were short and they never caught up. A lack of shipping prevented the importation of feed from the United States. The quality of local forage was also lacking. Most of the grasses provided roughage, but little nutritional value. Operations in areas with kunai and elephant grass provided satisfactory grazing, but there was little good grazing in the mountains and jungles where most of the pack animals and troops operated. Bamboo was one of the only edible items in the jungle, and it had poor nutritional value and caused intestinal impactions if eaten too often.[45]

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[44] Miller, 529.

[45] Ibid., 529-530.

Good forage was crucial to mission success, and since there was a widespread paucity of grazing areas a primary job of veterinary officers was to locate grazing sites prior to combat operations. During June and July 1943, Army veterinary officers set out on foot to make a reconnaissance of North Burma and "to locate and mark areas where animals might be grazed…, and to determine whether animals would be able to subsist entirely off the land without supplementary forage." Operations were scheduled to begin in February 1944 and knowledge of feeding locations was essential to planning.[46]

A key part of efficient animal transportation was the mundane task of keeping animals shod. Shoeing animals was a problem in the MTO, but it was nightmare in CBI. The supply of shoes was short, and not likely to improve. Shoe-making equipment was virtually non-existent, and there was a complete absence of trained farriers. The Medical Service tasked the AVS with introducing rudimentary veterinary medicine and modernizing Chinese military animal care, and a primary objective in that mission was shoeing animals. As the AVS noted, "[F]or the first time in the modern history of the Chinese military forces, proper attention was given to care of the feet and shoeing animals." [47]

Approximately ten percent of Chinese Army animals were shod in 1942, and raising this dismally low number was a challenge. Efforts by Army Veterinarians to start a farrier training course were hampered by the shortage of shoe-making equipment, and instructing the handful of Chinese "volunteers" in the mechanical art of farriery was nearly impossible. Besides the language barrier, the lack of equipment meant a shortage of teaching materials and visual aids for hands-on learning. Small quantities of equipment, including anvils and portable kilns, arrived

[46] Miller, *AVS in WW II*, 531. The area was occupied by several thousand Japanese troops.

[47] Ibid., 532.

from the United States, but most equipment was improvised in theater by the Army Veterinary Service, the Quartermaster, or the Service of Supply.[48]

Importing shoes in large quantities was a slow process. Shipping space was still at a premium and hauling a boat-load of horse and mule shoes was low on the Army's priority list. Assuming a shipment of shoes actually arrived from the United States, there was still the backbreaking task of moving shoes from Calcutta to a Remount Depot in Ledo. In stome cases, the last leg of the journey saw planeloads of horse and mule shoes flown from Ledo over the Himalaya Hump, to Kunming, China. Importing shoes proved too time-consuming and cost prohibitive. The only solution to the shoe shortage was to produce the shoes in theater. The AVS built three horseshoe factories and oversaw initial operations until the Services of Supply, Chinese Army took over factory control.[49]

Another long-term solution to improving Chinese Army animal care was training. Army Veterinary officers at Ramgarh, India and Kunming, China trained some 750 Chinese men. Aside from resource shortages, the Army ran into cultural differences that proved hard to bridge. For example, animal care was not a priority within the Chinese military, which considered certain jobs, such as farriers, to be for inferiors. Thus, a lack of incentive and appreciation for the importance of proper animal care produced a tug of war between Army efficiency and what appeared to be Chinese apathy.

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[48] Ibid., 533.

[49] Ibid., The horseshoe factories were at Kuei-yang, Chih-chiang, and Kunming. The Army estimated a need of some 250,000 shoes per month in 1944, which was "a quantity that could not well be flown over the Himalaya Hump even if they had been requisitioned from the United States." The consumption of horseshoe nails was around 10,000 pounds per month in June 1945, most of which were imported because the quantity and quality were lacking from local sources. A C-47 carried a payload of approximately 6,000 pounds, so two aircraft were required to fly over the Hump each month delivering the requisite amount of horseshoe nails.

Allied troops in Italy reconstructed a remount and veterinary service from the remnants of an institution that had existed for decades, but China lacked the foundation and history of a modern military veterinary service. Part of persuading the Chinese to adopt a more modern veterinary medicine program was starting schools. The Army had already developed schools for the Chinese Army for specific services, including the Instructional Schools in Infantry Training and the Instructional School in Field Artillery. On that model, the Army Veterinary Service established the Instructional Veterinary Medical Service within the Chinese Army.

Eventually, 756 officers and men were "given instruction in First Aid, Animal Management, Communicable and Non-communicable Diseases of Animals, Restraint, and Proper Use of Common Drugs." A great percentage of instruction was devoted to basic animal management and shoeing, a fundamental in animal care. Each division throughout the CAI (Chinese Army in India) established forges; and under AVS supervision "horseshoe, horseshoe nails, and horseshoeing tools were manufactured from salvaged metal (broken auto springs, truck frames, etc.)...." American-trained Chinese farriers throughout the CAI divisions, making fundamental improvements in animal care and animal efficiency, shod animals.[50]

A provisional veterinary hospital was set up by the AVS in August 1942 at Ramgarh, India to care for Chinese animal evacuees. The veterinary hospital was formally organized by the Army in July 1943 when the 1st Veterinary Company (Separate) arrived for duty. The 1st Veterinary Company (Separate) accompanied American and Chinese forces moving to Ledo and established a veterinary hospital and remount depot to support combat operations in North Burma. The 1st Veterinary Company (Separate) experienced shortages of men and material, which was a common problem shared by all units sent to CBI. According to the unit history:

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[50] Report: A Brief History of the Medical Department of Y-Force Operations Staff, April 1943—October 1944, File-HD: 319.1-2, Box #13, RG: 112, NARA.

> On May 16, 1943, hospital received its first animal patient from the Chinese Army. The unit does its own evacuation, accomplished by converting a 6 x 6 GMC cargo truck into a stock rack.[51] Supplies have been adequate with the exception of…equipment necessary to an organization having animals. Transportation is sufficient except for the evacuation of animals. The receipt of semi-trailers and tractors assigned to this organization and believe to be enroute, will alleviate the situation. The problem of exercising animals with insufficient personnel available was solved by the construction of corrals and feed racks for hay, animals thereby providing themselves with some exercise and availing themselves of feed, simultaneously. The shortage of stable equipment has made it necessary to utilize other tools and construct some from available material. Since insufficient tools were available it became necessary for the horseshoers and carpenters to construct scoops, shovels, forks, and rakes from available scrap materials. Since no animal and cargo portee trailers were available for use as animal ambulances and because of the need for motor transport to cover the extended routes of evacuation, it became necessary for the organization to construct two stock racks, the racks being placed on a 2 ½ ton GMC Cargo truck chassis. These have both been very satisfactory.[52]

From muckrakes to M-4s, Army adaptability overcame the most mundane or most pressing obstacles.

The AVS established additional veterinary companies and veterinary evacuation hospitals as operations moved across Burma. The next veterinary hospital and remount depot was at Myitkyina. The necessity and size of both grew because the number of animals in the Mars Task Force increased dramatically. No system of animal evacuation existed when *Galahad* began in February 1944, resulting in an almost ninety percent loss of animals during the Myitkyina offensive. By way of comparison, the Mars Task Force implemented an evacuation plan for their pack animals, which included a platoon from the 7th Veterinary Company, and the 18th Veterinary Evacuation Hospital. Animal casualties for the Mars Task Force were under five percent, even though they used several thousand more mules than their *Galahad* predecessors.

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[51] Memo: History of Unit, File: 72004.3, 1st Veterinary Company (Sep) CBI/IBT, 1 June 1943--31 August 1945; Box 12, RG: 112, NARA.

[52] Memo: Unit Historical Record for 1943, File: 72004.3, 1st Veterinary Company (Sep) CBI/IBT, 1 June 1943--31 August 1945; Box 12, RG: 112, NARA.

Once operations moved out of Burma, the primary function of Army veterinary units was relocating mules to China. The 7th Veterinary Company (Separate) air transported some 5,000 animals into China. The 43rd and 44th Veterinary Companies (Separate) cared for animals in India and Burma but were stopped by the War Department when redeployed to China. The Chinese objected to the use of black troops in their country, and both companies were racially segregated units. Volunteers from the two field artillery battalions and the Quartermaster Pack Troops supporting the Mars Task Force assisted with a road march of some 900 mules to Kunming, China after offensive operations ceased in Burma. Regardless of their method of movement or the group responsible for their transfer, all Army mules serving in Burma were sent by the War Department to China.[53]

The strategic goal of keeping China in the war was largely determined by supply. The impact of supply on achieving tactical goals was just as acute. Once the Army moved into the rugged terrain of North Burma, keeping the troops supplied proved as difficult as fighting the Japanese. Operations began in the Assam province of India, which includes a combination of formidable land features. The offensive started from Ledo, where upper lowlands are dominated by tropical rainforest. Trees, some twenty feet in diameter and rising up to one hundred feet, form a dense canopy of foliage and produce a dank, gloomy underworld. Very little underbrush exists, but a three- to four-foot deep mat of moldy, rotting vegetation lines the forest floor and impedes movement. Innumerable rivers and streams etch the landscape, forming lowland jungle.

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[53] Miller, *AVS in WW II*, 356, 594-596. The term "separate" in Army terms was and is applied to units that were not officially incorporated into a larger unit, but which operated on their own. Thus, for example, the 1st Veterinary Company (Separate) operated as its own entity. Units bearing the Separate designation were often racially or ethnically segregated, such as the 7th Veterinary Company, which was an all-black unit. The official Army designation of "Separate," however, was related to a unit's organization and its relation to other units within a Table of Organization and Equipment, and did not necessarily designate racial segregation.

The river valleys are riddled with dense brush, walls of vines, and bamboo thickets, and are scattered throughout mountains ranging from 4,000 to 10,000 feet.

Humidity in Burma is always high, but marked wet and dry seasons occur. January through April is the dry season. May through September is the wet season, with yearly rainfall totals reaching 250 inches. Temperatures are hot during the dry season and average 90 to 100 degrees in the lowlands. Temperatures drop dramatically as altitude increases. There were numerous cases of men passing out from heat exhaustion in the river valleys but waking up the next morning with frozen canteen water after mountain climbs.[54]

Disease was rampant in the diverse, jungle environment. Malaria and dysentery were widespread and nearly all of Merrill's Marauders suffered from at least one of these illnesses at some point. Typhus was another disease that afflicted Army ranks in Burma. Immunization against the various strains of typhus was ineffective, and American casualties to scrub typhus were high.[55]

The inhospitable environment of Burma also lacked roads, and thus pack animals were required to move supplies. The absence of a transportation network, combined with the nature of long range penetration group operations, meant that the only method of re-supply was by air. The complicated task of re-supplying armies by air was never mastered by the Japanese. The Americans, on the other hand, successfully incorporated two very diverse modes of transportation, aircraft and mules, to keep ground forces supplied and mobile. No Marauder or Mars man would claim that he was lavished with supplies, and he would vehemently disagree that the Americans beat the Japanese with "brute force" or smothered them with material.

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[54] U.S. Army, Center of Military History, *Merrill's Marauders* (Washington, D.C.: Historical Division, War Department, 1945) CMH Pub 100-4, 16-21, hereafter cited as U.S. Army, *Merrill's Marauders*; also available at http://www.history.army.mil/books/wwii/marauders/marauders-fw.htm .

[55] Ibid., 22.

Instead, it was innovative thinking in the realm of logistics that yielded battlefield success against an arguably martially superior foe. The skill and talent with which to apply brute force was equally as important as the firepower itself. One example of this talent was developing air power and obtaining complete air supremacy over Burma, which kept American forces supplied and able to defeat the Japanese.

Re-supply by air required the utmost planning. Packing, loading, and unloading supplies involved great skill and cooperation to ensure the last links in the supply chain did not break. Supplies were ready at all times, and reliable communication between combat and supply troops was imperative. The lifeline was radios, some of which weighed over 100 pounds and were packed by mule. Radio communication worked remarkably well, and requests went directly to supply depots adjacent to airfields at Dinjan, thirty-two miles west of Ledo.

Major Edward T. Hancock, the Marauder's supply officer at Dinjan, commanded 250 enlisted Marauders essentially serving as air transportation and flight crews. Their duties included cargo packers, riggers, and container droppers. Once requests arrived, a flurry of activity occurred as crews loaded planes from pre-packed supplies. Planes arrived over the drop zone as pilots of the 1st and 2nd Troop Carrier Squadron maneuvered at dangerously low levels to improve accuracy. Marauder flight crews frantically pushed, shoved, or kicked containers out to anxious comrades below. Food, medicine and ammunition containers dropped from around 200 feet. Clothes and grain free fell from around 150 feet. Collecting containers was haphazard at first. Mule packers placed some containers on mules and moved them while other troops

manhandled the cargo to collection areas. The infantry formed an assembly line of sorts and mule packers attempted to distribute supplies.[56]

Suitable drop areas were difficult to locate. Flat ground was preferred but scarce in a land of hills and mountains. Close proximity to bivouac areas was optimal, reducing the distance and effort of the men and mules to move supplies. Heavy foliage easily obscured drop zones from the air, and even the best efforts to mark a landing area with smoke occasionally went unseen. Parachutes hung in tree-tops, slowing the recovery process if not losing the precious cargo outright.

Maintaining stealth was nearly impossible and the group's position hardly remained a secret during an air drop. If Japanese forces were within range, drop zones quickly became favorite targets for enemy gunners. According to Harold Burnside, when the Japanese had the drop area zeroed in, "it was the one time we didn't mind letting the Chinese rush the drop zone, so the Jap mortars got them instead of us." Drop-time was particularly stressful and a sense of urgency built with the first noise of approaching planes.[57]

The air re-supply process quickly evolved and became more efficient. The first air drops were a mad scramble to recover supplies. Everyone picked up any container available, accumulated the contents, and parceled out items on a first-come, first-serve basis. More efficient steps were adopted after a few drops, including better organization and distribution. All troops continued helping with the collection process, but pack masters oversaw the removal and

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[56] U.S. Army, *Merrill's Marauders*, 23-26. Containers came in two sizes. The A-4 was a canvas container approximately 12" x 24" x 30" enclosed in a reinforced webbing harness and lined with two corrugated pasteboard boxes. The parachute was attached to the webbing harness. This container weighed 115 pounds and primarily held medical supplies, signal equipment, and other similar semi-fragile cargo. The A-7 consisted of two 6-foot adjustable webbing straps sewn together at right angles to enclose boxes of supplies. The parachute was attached at the junction of the two straps. The A-7 container weighed 125 pounds and generally held small-arms ammunition and other durable items.

[57] Burnside Interview.

loading of containers from the drop zone and they allocated the contents among the troops. Troops received ammunition and rations wrapped in a small burlap bag, including food, salt, halazone tablets for water purification, and cigarettes.[58]

Another improvement included the use of colored chutes to indicate the contents of each container. Air transport crews color coded chutes at supply bases to expedite retrieval in the field, such as red or pink chutes for ammunition containers or white chutes for food containers. The heavy weapons platoon needing machine gun or mortar rounds focused on gathering containers with red chutes, while medics gathered containers attached to white chutes. Color coding supply chutes by air transport crews was time-consuming, but it expedited supply distribution by ground troops.[59]

The free drop of grain also improved. Early air drops of mule feed used unlabelled bags. Some bags contained pure oats, while some bags contained other ingredients, such as molasses, barley, and legumes. Pack troops blended the contents of both bags and produced the mule's grain ration in the field. Troops often gathered multiple bags of the same ingredient. When the troops stopped to mix the animal feed, some troops only had oats while others only had grain, and neither could be fed by itself without making the animal sick. Labeling the bags solved this problem. Eventually, the grain was premixed, thus saving time for troops in the field and ensuring a better ration for the mules.

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[58] *Merrill's Marauders*, 26. The pack master was usually a non-commissioned officer, often called the pack sergeant, and always a veteran pack train driver. Muleskinner was a term applied to any pack troops experienced with pack mules, including enlisted men and non-commissioned officers.

[59] Yardley Interview. Parachute material was good for bartering with natives, particularly the Kachins, who greatly assistance American forces in Burma; see also, Chapter 3: The India-Based Air Effort, 95-100, 102-108, for an examination of the air supply mission in Burma, including aircraft specifications and modifications, sorties flown, tonnage dropped, and cost break-downs per container. To drop a ton of supplies using parachutes called for, among other things, fourteen 24-foot parachutes at $72.00 each, or a total of $1,012.00. Free-dropping a ton of supplies called for $14.75 of drawstring bags and stencil equipment. Less than one percent of the parachutes were recycled.

Early air drops of animal feed used 100 pound bags. The bags, filled to capacity, usually burst when free dropped to the ground, wasting time, effort, and grain as troops scooped up the scattered contents. Air transport crews replaced the one hundred pound bags with fifty-pound, double-burlap bags and made sure to not over-fill the bags. The fifty-pound bags did not burst but were heavy. Feed mules carried three to four bags, and the contents were subsequently distributed by pack masters to individual packers and their mules. The most efficient method of grain delivery appeared toward the end of the campaign. A Mars Task Force member recalled,

> Instead of a 100-pound bag packed full of loose grain, we used a 100-pound bag filled with ten, smaller, ten-pound bags. The big bag burst when it hit and all the smaller bags scattered on the ground. We could pick them up easy enough and load them onto the mule packs.[60]

One hundred pound bags of free-falling grain made drop zones hazardous. Several troops were injured, and some killed. According to a Marauder, "They would free-fall double bags of feed. I watched this Chinaman get killed when he got hit by one…."[61] Colonel Charles Hunter, the second in command of Operation *Galahad*, observed:

> I headed to the drop zone to observe the drop already in progress. As I approached the open area, there…was a lone Chinese soldier. I was informed that the dead soldier was Colonel Huang's orderly. In spite of strict orders to the contrary.., Colonel Huang's orderly had rushed on to the drop zone while grain was being free dropped and had been hit squarely on the head. The impact had broken his neck.[62]

The organized chaos of drop zones and re-supply affected mule behavior. According to Paul Yardley,

> The story went that when General Wingate first took a group of mules into the jungle the mules got to braying when the drops happened because they figured out food

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[60] Cureton Interview.

[61] Burnside Interview.

[62] Hunter, *Galahad*, 95.

> was coming. He ordered the mules to get their (vocal) chords cut. I don't know if that's true, but my mule couldn't bray.[63]

Mules were occasionally debrayed in order to avoid giving away LRPG positions during covert operations. Veterinarians perfected a surgical procedure in which the mule's vocal cords were cut. The process required about ten days of recuperation, and the animal made a loud rasping sound instead of the noisy bray associated with *Equus asinus*. The debraying of mules seemed to be more common with the British, though American troops reported that many mules were devocalized. The exact number of debrayed Army mules is unknown. Colonel Hunter never recalled any mules braying, not from any surgery, but rather "we managed to keep our mules too tired to bray." Buck Cureton recalled a case where a loaded mule fell off a cliff. The veterinarian climbed down and examined the mule, which had suffered no broken bones. The mule was unloaded, pulled up to the trail, and then:

> The mule ran over to a clearing and started braying. I guess he was scared to death. A big mule standing next to the one making the racket kicked him in the head, and that calmed him down.

Still other troops, such as Fred Randle, distinctly recalled their mules making an "awful hissing noise," and "unable to make a noise like all of the mules I'd been around." Randle poignantly noted that when his mule died falling off a cliff, "he couldn't even bray."[64]

One of the hazards of LRPG operations was an inability to evacuate casualties. Men and mules performed medical evacuation in Italy, where wounded men were transported to the jeep or truck head, and then usually driven by medical personnel to an aid station. No such luxuries were afforded in Burma, because troops operated in roadless areas miles behind enemy lines.

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[63] Yardley Interview.

[64] Essin, 176; Hunter, 7; Cureton Interview; Fred Randle Interview, and also Fred Randle, *Hell on Land, Disaster at Sea: The Story of Merrill's Marauders and the Sinking of the Rhona*, (Paducah, KY: Turner Publishing Company, 2002) 105.

Occasionally, stretcher-bearers carried wounded to base camps, but distances were usually too great. Likewise, the combat group could not spare any hands to transport the wounded. Early in the North Burma campaign, officers ordered wounded Marauders to remain with Kachins or other sympathetic natives in the hope that they would be rescued later. Some abandoned casualties survived, but the Japanese captured some. Caring for American wounded sparked a revolution in Army medical evacuation over the jungles and mountains of Burma.[65]

Forward observers with artillery units performed aerial reconnaissance from small liaison planes. These tiny planes occasionally landed in the most challenging places for direct communication with infantry units. According to Hank Kinder, "The L-4 would land on sandbars or anywhere they could take off again." Long range penetration groups discovered the planes had the capacity to carry one passenger, allowing for the air evacuation of wounded. The occasional landing of observation aircraft became routine as casualties increased. Medical corpsmen treated the wounded in the field and then saw to them being flown back to evacuation hospitals or larger rear area bases.[66]

Air evacuation of wounded required great effort. According to Hank Kinder,

> We found a paddy field where we made a runway for our planes. We had to make a larger runway, so we had to blast out trees and then smooth out the ground. This was at Walawbum. The field was not a quarter of a mile from the fighting. One L-4 came in for a landing, nosedived, and broke the prop. The next pilot arrived with a new prop, and then when taking out a wounded soldier, they crashed and broke another prop. We had to

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[65] *Merrill's Marauders*, 26. One wounded soldier required two to four litter bearers to carry them through the jungle trails. LRPGs received no regular replacements, so the loss of two to four men (even temporarily) increased the burden on the troops remaining with the group.

[66] Kinder Interview and letter; see also U.S. Army, *Merrill's Marauders*, 26. The L-4 Piper Cub had a 65 horsepower motor, a 35-foot wingspan, and was constructed of wood and canvas. It generally carried a pilot and one observer or casualty. The larger Stinson L-5 had a 190 horsepower motor, a 34-foot wingspan and was constructed of steel tubing and doped cotton fabric. The L-5 required slightly longer runways, but could carry two casualties. Both aircraft were used extensively for forward observation, liaison with front-line troops, and medical evacuation. The majority of *Galahad* casualties that flew from the combat zone were air evacuated by the 71st Liaison Squadron operating out of Ledo.

> move out then and they left a few men to guard the field while they removed the wounded.

Air evacuation was obviously not always successful, but the practice evolved and was integrated into Army tactics, dramatically reducing casualties and increasing combat troop morale.[67]

Galahad commenced in early February 1944 with the objective of capturing Myitkyina. American troops cleared the Japanese from Walawbum, Shaduzup, and Nhpum Ga. The Marauder's Second Battalion suffered heavy casualties after Nhpum Ga, of which there were no Marauder replacements and the battalion required complete reorganization. The Marauder's First and Third Battalions remained intact but General Stilwell ordered the reinforcement of their depleted ranks with Kachins and Chinese troops from the 30th and 50th Divisions. On April 27 the force was ordered by General Merrill to move on Myitkyina.[68]

Reaching Myitkyina before the monsoon season was doubtful so to save time, General Stilwell ordered *Galahad* to turn east, cross the Kumon Range, and move on Myitkyina some 65 miles away. Traversing the Kumon Range was backbreaking, as the force climbed from around 1,300 feet to over 6,000 feet in about one mile. Troops struggling up the mountainside frequently grabbed a passing mule by the tail for assistance, which was against regulations and simply unadvisable. "My mule was a kicker," noted Hank Kinder, "nobody hung on his tail." Nevertheless, exhausted men attempted to find any help while struggling over the mountains.[69]

The monsoons started early, making efforts at crossing the Kumon Range all the more difficult. Flights were grounded and the Marauders missed air drops due to foul weather. Even

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[67] Kinder Letter. Troops used air-dropped saws, axes, and TNT to clear timber and build improvised airstrips. Quartermaster troops fashioned an airstrip in the inhospitable terrain near Walawbum where Americans had sustained heavy casualties.

[68] *Merrill's Marauders*, 95-97. General Merrill suffered a heart attack on March 29 and was evacuated to Ledo. He returned in time to confirm final plans with General Stilwell for the attack on Myitkyina. Colonel Hunter commanded Galahad in Merrill's absence.

[69] Randle, *Hell on Land*, 104; Kinder Interview.

with clear skies, the steep terrain complicated air drops. Many containers rolled down the mountain or over the cliff. Mud and terrain caused the generally sure-footed mules to slip, and the toll on pack animals grew heavy. Pack troops unloaded the mules, and then they pushed and pulled their animals while the cargo was hand-carried by the troops. The Marauders frequently carved steps into the hillside to give men and mules better footing.

Climbing up the Kumon Range sapped the strength from *Galahad*, and going downhill was just as treacherous. Casualties mounted from sliding or falling off of the nearly invisible, muddy trails. Mules often survived a fall off of cliffs, and a tedious rescue process ensued. Muleskinners climbed down to the bottom and unloaded the mule. All hands available then led, drug, or hoisted the mule back to the trail. Many mules died from the fall. Fred Randle noted:

> We were climbing up a steep slope, pouring rain, and slipping in the mud. Jude and another mule began to sliding and went over, into the jungle down below. He couldn't even bray, just off the cliff and out of sight.[70]

Randle's mule was too far down to check for injuries or recover the supplies. The true worth of pack animals were felt when each one died. Pack masters redistributed supply loads, but eventually the loads could not be shared and pack troops abandoned every item that was not absolutely essential. The ability to transport supplies diminished with each mule loss, and as with losses of men, there were no replacements. *Galahad* faced a crisis not from the Japanese military as much as the erosion of transportation capabilities.

Struggling over the Kumon Range during the monsoon produced new necessities, which were met with typical American creativity. According to Hank Kinder:

> We left Nhpum Ga and headed over to Myitkyina when monsoons started. Mud was everywhere and you couldn't get any traction. I remembered from working on Granddad's farm and from some Amish, in the winter we'd put cork (cleats) on the

[70] Randle,105 and Interview.

> mules' shoes so they wouldn't slip on the ice. I thought it would work here (Burma) with the mud, so I decided one night to make corks for my mule's shoes. On the farm you could bend the end of the shoe down and there was a hole in the end of the shoe. We would screw in a metal cork, looked like a Christmas tree, into the hole, pointed down so it would grab into the ice. Well, there were no holes in these shoes, but you could bend the end down, there wasn't much temper so they were easy to bend. You could make a cork or cleat with just about ½ inch or less of an overhang; just bend the ends down even 5/8 of an inch and it gave traction. They weren't sharp like the Christmas trees; they were blunt, but worked alright. My buddy, the blacksmith, asked what I was doing and after I told him he said, "You can't do that, you don't have permission." I told him they'll never notice. Well, the next morning the vet captain was at the top of a steep hill and asked, "How is that mule doing with those cleats, private?" I told him, "He's fine, sir!" We laid over two days and put cork on the shoes, and re-shoed about 200 mules. My buddy the blacksmith swore he'd get even with me. I always thought I should get a rating for that idea because within a few weeks all battalions had put corks on their mules' shoes. They just got around a lot better after putting on those corks.[71]

Rain was constant and, as one Marauder recalled, it was "like being under a fire hose at times." It was also unbearably hot, and troops discarded accouterments when the operation began. Now, heavy rains water logged the remaining articles, such as bedrolls or extra clothes, and these were left on the trail. Officers and pack masters discarded some supplies under orders, but troops often lightened their loads against Army regulations. A typical GI in CBI reduced their load to a personal weapon, ammunition, food, and two ponchos—one for lying on the wet ground and one for cover. Mule packers had a slight advantage when bivouacking in rainy weather. As Hank Kinder observed, "Most guys that packed mules put their head under the saddle to keep your head dry, but those saddles smelled so bad it was hard to take."[72]

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[71] Kinder Interview and letter. Troops accumulated points and eventually those with a certain number of points were rotated home. A rating would have earned Kinder more points, and allowed him to return home a little sooner at the end of the war.

[72] Kinder Interview. A comparison of Chinese and American supply usage is found in Romanus and Sunderland, *Stilwell's Command Problems,* p. 106. The Chinese troops protected their possessions and seemed to acquiring more equipment, while "American units could be trailed by what they discarded." One of the first items GIs "lost" in CBI were helmets, followed by woolen bedrolls or blankets, both of which collected moisture and added weight.

After scaling the Kumon Range, Galahad began their descent toward Myitkyina in early May 1944. American and Chinese troops cleared the Japanese from Ritpong on May 9 after five days of brisk fighting. On May 11, Galahad split up into H Force (Colonel Charles N. Hunter) and K Force (Colonel Henry L. Kinnison), with H Force moving on toward Myitkyina and K Force moving toward Tingkrukawng. K Force would divert the Japanese at Tingkrukawng from H Force closing on Myitkyina. The American combat teams and their Chinese counterparts battled the Japanese at Tingkrukawng for two days. The weather was some of the hottest yet experienced and terrain was so rugged that Colonel Kinnison ordered the mules and heavy weapons temporarily abandoned during the last assault on Tingkrukawng. K Force was stopped and retreated late in the day on May 13, but the diversion succeeded as H Force moved undetected toward Myitkyina.[73]

Finally, on May 17, the disease-ridden, malnourished, physically exhausted Marauders and Chinese troops captured the Japanese airfield at Myitkyina. Generals Stilwell proclaimed victory, but this proved premature since Japanese forces remained in the town of Myitkyina. Chinese efforts to take the town were repulsed by the Japanese, who launched a counter attack against the airbase. A desperate struggle for the airfield followed, but the Americans and Chinese held. In early June, supplies and some 2,600 American replacements arrived via the airfield. The replacements joined the few remaining Marauder veterans to form New Galahad. A two-month siege ensued, with the American-Chinese forces occupying the airfield and the

[73] Romanus and Sunderland, *Stilwell's Command Problems*, 223-225; see also *Merrill's Marauders*, 101-105. Colonel Kinnison died from scrub typhus shortly after the engagement at Tingkrukawng.

Japanese controlling the town. Finally, members of New Galahad and a large force from the Chinese 50th Division expelled the Japanese from Myitkyina on August 3, 1944.[74]

Replacements for *Galahad* arrived shortly after the Marauders and Chinese captured Myitkyina airfield. Initially called New Galahad, the replacements eventually formed the Mars Task Force. The Mars Task Force was much better prepared and equipped for a long range penetration operation than their *Galahad* predecessors. The approximately 7,000 men and 3,000 mules were obviously a larger force, and operated with the added benefit of applying lessons learned during Operation *Galahad*. Mars Task Force also integrated some of the surviving members of *Galahad* into the new operation.

Hank Kinder, a Marauder, was hospitalized after the battle for Myitkyina. He was informed that a new group was about to embark on a mission to China. As Kinder recalled, "I was always interested in China from looking at pictures in my school books." Kinder asked the doctor for a release from the hospital. The doctor questioned Kinder's sense, "You've spent the last six months sleeping on wet ground. Why do you want to give up clean sheets and good chow?" Kinder replied, "I've always wanted to go to China, and they can use me with the mules." Hank Kinder received his discharge card, and was one of a few hundred Marauders that accompanied the Mars men for part two of the North Burma campaign.[75]

The goal of Mars Task Force was to push eastward to the Burma Road. American troops left Myitkyina on December 16, 1944 headed to Bhamo. The Ledo Road (at times merely a trail)

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[74] Romanus and Sunderland, *Stilwell's Command Problems,* 242*,* 252-254; see also *Merrill's Marauders*, 102-105, 108-110, 110-113. The capture of Myitkyina illustrates triumph and tragedy. *Galahad* conducted an epic mission, and the movement of men and material over the North Burma countryside was a feat in and of itself. However, *Galahad* forces were spent when they arrived at Myitkyina and unable to complete their final mission. Colonel Hunter blamed Generals Stilwell and Merrill for not relieving the *Galahad* troops sooner. One of the more controversial decisions occurred when Stilwell ordered several hundred wounded, convalescing troops back to battle in a desperate effort to hold the airfield.

[75] Ibid.

led to Tonkwa, where the Mars Task Force was to rally. The road march was hot, dry, and dusty. As a Mars man noted, "No climbing was required during this first stage, nothing but a dogged plodding through the dust and heat."[76] On December 31, 1944 Mars moved out of Tonkwa and immediately encountered treacherous terrain. According to John Randolph, "Our first day's march into the mountains took us from the road at a 456-foot level to a mountaintop 4,600 feet high. March schedules changed many times during the day." Typical march routine was fifty minutes of walking followed by a 10-minute break, but Mars men quickly adjusted to a "ten and ten" march schedule. A few days off of the road found the Mars Task Force nearing the Schweli River and terrain so exhausting that only one or two minutes of moving were followed by a five minute rest.[77]

Ascending mountains was fraught with difficulty. The popular image of the war in Burma features steaming jungles. Yet, as a unit history noted, "Elevations as great as 8,000 feet were surmounted. On three successive days of fair weather, water froze in canteens and helmets." Clouds also formed as troops ascended the mountains and elevation increased. Visibility was obscured, further complicating tricky air drops. On more than one occasion air drops were impossible due to stormy weather and negative visibility.[78]

On January 6, 1945 the Mars Task Force descended on the Schweli River. Bundles of bamboo pontoons and decking were used to cross the 400 foot wide river. The Task Force was prepared to cross when the "Christmas monsoons" began. Three days of torrential rain turned the fine red clay into a slippery sea of mud, making it difficult for men and mules to keep their

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[76] Don L. Thrapp, "The Mules from Mars," *The Quartermaster Review* May-June 1946, p. 5, found at http://www.qmmuseum.lee.army.mil/WWII/mules_of_mars.htm.

[77] John Randolph, *Marsmen in Burma*, (Houston, TX: Gulf Publishing Company, 1946), 108; *5332nd Brigade Narrative History*, p. 2.

[78] Ibid.

footing, and flooding the Schweli River. The bamboo bridge was unstable and required repairs. All mules were unloaded, led individually over the bridge, and repacked by muleskinners once across, which was time-consuming and exhausting.[79]

Standard operating procedure required the Task Force to move out early in the morning. Men and mules moved before the heat of the day, rested in the early afternoon, and then resuming the march until early evening. Mules needed time for grazing, watering, and grooming. Routine schedules were impossible to keep, however, and marches easily lasted into the dark, which came quite early due to dense jungle foliage. According to John Randolph:

> I've seen the end of march serials pull into bivouac areas after dark, a good twelve hours of ups and downs behind them, having had a half hour halt for a cold lunch of C or K rations. The mules had carried their loads the entire time, perhaps without water since early morning and without promise of anything green that evening.

It was usually too late to build fires for a hot meal or bathe in nearby streams. According to Randolph, the only consolation for the pack troops was, "We were too tired to care, and we did not need a bath or a hot meal to make us sleep."[80]

The typical pack troop's day did not end after reaching camp, rather, they tended to the mules and then cared for themselves.[81] Likewise, pack troops attached to long range penetration groups were frequently in harm's way, fighting and engaging the enemy. Each packer qualified with a weapon during training and often went to great risk delivering supplies to frontline troops, though there really was no front or rear echelon on most LRPG operations. All pack troops

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[79] Romanus, 189. Each of the six Quartermaster Pack Troops had over 300 mules that were all unpacked, led, and repacked. Pack troops carried the gear and packs across the river, where the animals were repacked. The two field artillery battalions had around 300 mules each, and the troops carried all of their disassembled artillery pieces and ammunition across.

[80] Randolph, 111. Most often fires were not permitted for security reasons. Bivouac preference was near running water, but often camps were not within easy distance to water.

[81] U.S. Army Field Manual 25-7 *Pack Transportation*, pp. 139-152, specifically section on setting up bivouac and pickets.

participating in Galahad and the Mars Task Force received the combat infantry badge following the campaign. As Hank Kinder recalled:

> We set up a roadblock in what we called a wagon wheel. The outer wheel or rim was guys on guard duty around the perimeter, then machine guns and mortars a little further in, and last you had the hub or inner circle. Here was the officers, radios, medics, packers, and mules. We'd place ammo dumps around the hub, and we'd run ammo up to the machine guns or rim. I took a case of machine gun ammo one time, rounds going right over my head as I got close to the rim, so I laid down, dragging my rifle in one hand and pulling the ammo crate by the rope handles, but I wasn't making no time, so I pulled the rope out, and eventually pulled the ammo crate up to the rim. The gunner yelled, "You're just in time, we're damn near out!" Daylight came and I was about to eat my breakfast. Fire broke out again…and all hell broke loose, and I carried ammo 'til about four that afternoon. I ate breakfast, lunch, and dinner all at once.[82]

Troops under constant physical and mental strain became exhausted and were often too spent to function. For example, the Mars Task Force pushed hard to reach the Burma Road and interdict Japanese supply lines. Pete Ewing accompanied one of the first American units to cut the Burma Road. Ewing recounted:

> We marched twenty seven hours continuously. Take a ten minute break, move another hour, and then a ten minute break, and that's the way we came. We got there about three in the morning, and as daylight came we went across this valley, took a hill and there was a little creek there called the Ho-say (Hosi) Valley, and this was the drop field. At daylight those C-46s just poured in, kicking out the stuff. Us muleskinners had to go haul that stuff. We worked all day, after a twenty seven hour march. Well, we were exhausted, running up and down that mountain. Dark came and we couldn't go back down to the drop field, so I jerked the saddles off, each one of us had three mules, so I jerked the saddles off and throwed them old sweaty blankets underneath, and I crawled under there and went to sleep. That night they had a banzai attack and I didn't even know what happened. Next morning I woke up and they told me "You've gotta go down there and help I Company remove mules that got blowed up in the banzai attack. They killed twenty mules, so we went down and dragged those twenty mules over to a ditch like and buried them right there. I didn't even know it happened.[83]

Another muleskinner recounted a similar incident. According to Lloyd Hackenberg,

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[82] Kinder Interview. Muleskinners usually carried M-1 Garands or carbines. A few pack troops such as Buck Cureton carried a Thompson submachine gun.

[83] Ewing Interview.

> A lot of the time we were too tired to dig foxholes. I usually slept under the saddles. We got mortared one night and I got under the saddles, they were big and heavy and gave you pretty good protection unless you got a direct hit. Those rounds went off close but I was pretty safe.[84]

Tired men and tired mules sparked non-regulation practices. Pete Ewing recalled,

> Every morning, my mule, Pat, was raring to go, she'd even step on my heels. But by noon her head would be dropped down about normal, and as the day wore on she'd hang her head way down; and when she got into this position I let my pack lay right on top of her head, and she'd push me. And of course we all used their tails to pull us up a hill.[85]

Tail pulling was frowned upon, but common, even among officers. Buck Cureton recalled,

> A new lieutenant was ordering us to stop holding on to the mules' tails. We were crawling up a mountain a day or so later, and I saw the same lieutenant getting pulled up the mountain, holding on the tail.[86]

The Mars Task Force reached their objective, cutting the Burma Road in early February 1945. The Japanese retreated after an intense counter-attack. By the end of February the men and mules of Mars were recuperating and waiting for reassignment. The Mars mules losses were less than ten percent, so mules were plentiful for another mission. One reason for the low pack mule loss rate was mule characteristics. Horses, for their fine tradition in cavalry operations, are inferior to mule in pack operations. Hank Kinder observed, "A shell could explode right next to you and they'd never move. If we'd had horses, we'd have spent all our time trying to catch them." Mules were easier to handle. According to Pete Ewing, "Mules were so herd-bound that they weren't about to run off…we'd turn twenty five loose and picket twenty five, and they all stayed close." Mules also provided more than transportation of supplies. "We used them like watchdogs," recalled Ewing. "When they were grazing they'd …make some noise, but the

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[84] Lloyd Hackenberg Phone Interview, December 10, 2010, and Letter.

[85] Ewing Interview.

[86] Cureton Interview.

moment they got still, you better get ready because you got company." Lloyd Hackenberg recalled,

> Mule's ears were like radar. One time, the big red mule that was visiting us started turning in circles and snorting, and the advisor said "That mule's heard something" and told us if the mule hits the ground, then we do the same thing and keep an eye on it until it acts normal. The mule hit the ground about the time we heard an artillery piece sound off in the distance. The mule raised its head up and those big ears started turning like a radar antenna, and then it flattened out with its head laying on the ground. We all hit the ground and an artillery shell hit about twenty five or thirty yards away. Dynamite (Hackenberg's mule) raised its head and began turning those ears and laid that head back down, and another shell hit a little closer than the first one. The Japs threw one more shell and quit a while, and Dynamite got up and began grazing again. None of us got hit that day.[87]

Another reason for lower pack mule casualties was a greater appreciation by the troops for the vital service that animals provided. True, mule stubbornness did little to ingratiate the beasts with many GIs. Nonetheless, great pains were often taken by muleskinners and regular troops to protect the animals and their cargo. A Mars man noted that after a 36-hour forced march "the mules got so tired they was tryin' to sit down." A number of mules slipped and "we had one, our number two mule, he fell over, he must've rolled a quarter of a mile." The troops stoically moved through the darkness, down the mountain, and "we had to unload the gun, the tube off of it. Unload the saddle, carry them up, and lead the mule back up."[88] Another Mars man recalled a similar incident,

> We had two of 'em to fall down over the side of the mountain. Oh God, I don't know how far it was down there. We was up above the clouds and they rolled over the side and went to the bottom…. They just rolled over that cliff and we went down there and unpacked 'em and brought 'em back up the hill.[89]

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[87]Hackenberg Interview.

[88] Randy Colvin quoted in Bradley, 412. The tube (barrel) alone weighed 221 pounds.

[89] Jim Sims, quoted in Bradley, 412.

Exhausted troops diligently recovered lost pack animals because without the mules, the last link in the supply chain was broken.

The Mars Task Force spent March and April 1945 in bivouac near Myitkyina. Most of the Mars men assumed non-combat duties as Japanese resistance subsided. According to Buck Cureton, "We gave our mules to the Chinese, and I started driving trucks. I was in a truck at the junction of the Burma and Ledo Roads when I heard the war ended."[90] Pete Ewing shared a similar experience. According to Ewing,

> The Chinese wouldn't let us fight as infantry on Chinese soil. I thought that was the greatest idea in the world! So, they made us into a trucking company. In my company there was only six of us out of two hundred men who knew how to drive a 6-by truck, so as soon as they found out you knew how, you were made an instructor. These guys that lived in the big cities or always rode a streetcar or taxi or whatever didn't drive, they didn't know how to drive, didn't even know how to shift gears. And so we trained them guys, and took off on a convoy seven hundred miles into China, down an old gravel road [the Old Burma Road] with one lane and twenty-one switch backs in one spot.[91]

Because of improved terrain and the semblance of a road, the Army (and GIs) rapidly transitioned to motorized and mechanized transportation of supplies.

In late April 1945, orders circulated that all mules in Burma and India would transfer to China. The Mars mules included nearly 3,000 mules, and around 4,000 Chinese Army in India (CAI) mules. The six Quartermaster Pack Troops attached to the Mars Task Force assisted with the mule transfer to China. A total of approximately 4,000 men participated in the final phase of the campaign.[92]

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[90] Cureton Interview. Before his truck assignment, Cureton had been a Mars Task Force rifle squad member, which included five men and one mule.

[91] Ewing Interview.

[92] Memo: Assignment of 6 Pack Troops, 23 April 1945, File # HD: 319. 1-2, Evacuation of CAI Animals, Box 13, RG: 112, NARA.

The logistical planning and quantity of supplies required to move the pack animal transport were staggering. To travel the relatively short distance of 85 miles from Lashio to Wanting, China, the Army estimated, would consume some 400 tons of grain and forage and 128 tons of "subsistence, etc. for personnel." The nearly 600-mile journey from Wanting to Kunming, China, would consume 3,000 tons of grain and forage for the mules and 800 tons of supplies for the men. In the end, around half of the mules flew to China, while the other half were road-marched.[93]

The movement of 900 Mars artillery mules from Burma to China was well documented by Captain John A. Rand, the field artillery officer in charge of the last operation. Rand divided the 900 mules into three 300-mule serials that travelled a day apart. The mules were only partially shod and hurriedly prepared when the first serial of fully-loaded mules departed Myitkyina, Burma on 26 May 1945 in the pouring rain. The serials crossed the flooding Irrawaddy River on improvised ferries. Army engineers took six flat-bottomed boats equipped with outboard motors, lashed the boats together, attached some decking, and carefully moved ten to twelve mules at a time across the swollen river. No mules were lost during the river crossing.[94]

Hardship was common even though combat operations were virtually over in this theater. Pouring rain and slippery ground created poor footing for men and mules. The rain and dampness was inescapable, and it was often too wet to build a fire to cook or boil water. Portable forges brought by AVS troops to produce mule shoes were useless in the wet conditions, and farriers seldom caught up with the demand for new shoes. Weather dried considerably when the serials entered China on 2 June 1945 at an elevation of some 12,000 feet.

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[93] Memo: Disposition of Animals Now in Burma, 17 April 1945, File # HD: 319. 1-2, Evacuation of CAI Animals, Box 13, RG: 112, NARA.

[94] John A. Rand, "Nine Hundred Mules," *The New Yorker* 30 (24 November 1954) 154-156..

Fresh water and good grazing were sparse on the leeward side of the Himalayas, and advance parties of AVS personnel often found the best grass in unkempt graveyards. No combat was experienced, but excessive work and inadequate feeding caused rapid deterioration in the mules' condition. The rate of march decreased and the first serial arrived on the outskirts of Kunming, China, sixty-four days after departing Myitkyina. The two other serials stopped at various intervals on the road to Kunming. Only 27 mules were lost by "death or humane destruction" during the march from Burma to China.[95]

Unfortunately, the greatest number of mule casualties occurred after their arrival in China. The Army planned from the beginning to declare the mules surplus and give them to the Chinese Nationalist forces. Returning the Army mules to America was not an option, at least not one given serious consideration, because of cost. An American characteristic has been to spare no expense during the conflict, but cost-saving measures often govern decisions as conflicts wane. Captain Rand summed up Army investment and cost considerations of mules in China at war's end:

> Our nine hundred mules may have been one of the most precious herds in history, for each represented an outlay by the United States of perhaps three thousand dollars, for purchase, transport, training, feeding, and care, but, looking at them another way,…they were worth nothing at all, for they had been classified in Burma as expendable and it was only by chance that they hadn't been expended.[96]

The most efficient, expeditious decision was to leave the mules with America's Chinese ally. However, China was in chaos, teetering on the brink of civil war as the war with Japan ended. The United States was growing disenchanted with the Chinese Nationalists, and typically impatient Americans wanted their Army of citizen-soldiers to return home as soon as possible.

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[95] Captain John A. Rand, Report on Animal Movement, 26 October 1945, File # 454 Animals, Box 13, RG: 112, NARA. Dysentery increased significantly due to a lack of fires and boiling water in the torrential rains.

[96] Rand, 154.

The welfare of several thousand Army mules was not a priority, and the venerable mules paid dearly.

The movement of mules to China slowed in late July 1945 following a communication and transportation breakdown between the Chinese and American armies. In early August, a disease struck some of the mules within the serials, and all delivery of Army mules to the Chinese halted. According to Captain Rand,

> Surra, a communicable blood disease, broke out in the mules. Veterinarian personnel collaborated in a program of testing and isolation and it was hoped that a new drug, being developed in the United States, could be procured. At this point the war ended and the problem became one of disposition of the animals to Chinese SOS (Services of Supply). The decision was made about 1 September to destroy all positive animals and this was accomplished immediately. Those 1st serial animals showing a negative test were distributed to Chinese Pack Artillery Battalions…. About 6 September, on the advice of competent Veterinary Officers, the Commanding General…decided the remaining animals of the 2nd and 3rd serials should be destroyed. This was a wise decision. It undoubtedly prevented the spread of the disease, and consequently all sorts of complications with China.

In a little known yet controversial decision, around one thousand of the mules were unceremoniously shot. Their carcasses were then pushed into ravines, where engineers and grief-stricken muleskinners dynamited the hillside to bury the dead.[97]

Approximately 2,000 mules were destroyed at the end of the CBI campaign, though the exact number is unknown. Likewise, the reason behind the decision is debatable. The Army argument that it wanted to prevent the spread of disease was plausible. Surra, however, is a vector-borne disease, which means it is spread by infected insects (e.g. flies or mosquitoes) biting an uninfected mule. It is not air-borne, thus it is far less communicable than the Army feared. Also, many of the native animals appeared to have immunity to the disease. Surra was

[97] Rand, Report on Animal Movement. According to eyewitnesses, the dust had not settled from the blasts when Chinese peasants began frantically digging up the carcasses for the meat.

not imported to China by American mules, so the argument that American mules were shot to prevent an outbreak among Chinese animals is not particularly credible.[98]

A more humane reason was to spare the animals suffering, though the argument is paradoxical. The image of a GI about to apply the *coup d' grace* to his mule with a sidearm is hardly humane. Yet, as Captain Rand concluded, "It is my belief that compassionate veterinarians and affectionate mulemen believed the better fate for their mules was a bullet than to face a future of cruelty, disease, and starvation…." Americans, such as Loyd Hackenberg, were suspicious of leaving their animals in the hands of the Chinese. According to Hackenberg, "This Chinaman tried to take Dynamite, and I drew down on him. I found out they was going to eat him, and I wasn't going to have it." After discussing the animal's fate with his commanding officer, Hackenberg tearfully shot his mule. Captain Rand observed, "Our mules were not made for Chinese life. Forcing them to fit into it, we believed, might be worse than a humane death."[99]

A more dispassionate explanation for the "great mule shoot" was that it simply saved time and effort. The war ended, and the Army no longer needed the service of several thousand mules. American hopes that China would be a strong ally proved false, and Army decisions to leave any surplus material with the Jiang Jieshi government were re-evaluated. It was simply cheaper to dispose of the mules than leave them in China or return them to the United States. The sad ending of Army mules in CBI is indicative of other cultural traits, including chronic impatience and a penchant for wastefulness. Americans spare no expense during a crisis, but once the crisis has passed, they revert to doing things quickly and on the cheap. The disposal of mules in CBI at the end of World War II does not represent Army adaptability or the importance

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[98] Bradley, 428; see also Essin, 186-188.

[99] Rand, Nine Hundred Mules, 164; Hackenberg Phone Interview, December 10, 2010; Rand, 164.

of logistics, transportation, and supply. However, the humble end for several thousand mules in China during 1945 illustrates the underlying theme of this work, which is the influence of historical traditions on how America waged World War II.

Several thousand Army mules survived the war in CBI, and their liquidation and disposal soon followed the war's end. Parameters for the sale of surplus animals were established, including orders that "no horse will be sold for more the $52.81" and "no mule will be sold for more than $250.00." All sales "must be in cash, paid in Indian rupees prior to delivery...," and the "Government has no responsibility for transportation." [100] The Foreign Liquidation Commission processed some 3,000 horses and mules at the Shillong Remount Depot in Assam, India. The animals were prepared for dispersal and moved via train in two large shipments from northern India to Calcutta. The Foreign Liquidation Commission ordered the first group to East Europe, and the second shipment sailed for China and the Philippines.[101]

The United Nations Relief and Rehabilitation Association (UNRRA) worked to transfer Army surplus mules to needy countries, though UNRAA efforts in China were not as successful as those in Europe. UNRRA requested a shipment of 2,200 animals from India to Shanghai and arranged the use of two liberty ships for transportation, but finding enough Army personnel to handle the animals was a problem. According to an UNRRA memo, "each shipload of 300 animals required approximately thirty EM (enlisted men) animal handlers." Unfortunately, only seventy-four enlisted men remained in the various Remount Troops still in theater, and these men were rapidly accumulating enough points to go home. Likewise, the movement of animals via train from Shillong to Calcutta took a minimum of four weeks, further complicating the

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[100] Memo: Surplus Animals, Army-Navy Liquidation Commissioner, New Delhi, India, 12 October 1945, File # 454 Animals, Box 13, RG: 112, NARA.

[101] Edward A. Rock, Sr. "Mules—Where? When? How?" *Ex-CBI Roundup*, July 1984, 18. Most of the animals travelling to East Europe finished their odyssey as draft animals in Poland, Romania, and Yugoslavia.

UNRRA timetable for trains, ships, men, and mules. A flurry of memos, radio messages, and promises that handlers "would be sent home immediately after reaching their destination," helped overcome the logistical barriers and deliver UNRRA mules to China.[102]

The Army kept meticulous records on animal transfer, use, and disposal during the CBI campaign. Records are less precise during the immediate postwar period. Several thousand mules became part of the Chinese Nationalist Army, thus accomplishing an original U.S. Army goal. In an ironic twist, however, many of these Army mules were discovered by American troops when they deployed to South Korea some six to eight years later. The Army had no contingencies for pack animal use in Korea and, in typical GI fashion, troops quickly adapted and requisitioned local animals for transportation purposes. Many animals were captured by GIs from North Korean and Chinese forces and impressed into service by the Americans. The Americans were surprised to discover that several animals had previously served in the U.S. Army. Operating in the mountainous area between Seoul and the Imjin River, the First Cavalry redeployed a captured mule already bearing Preston Brand 08K0. In all likelihood, the mule had been in Captain Rand's first serial that survived the trek from Myitkyina to Kunming in 1945.[103]

The campaign in CBI was stereotypically American. GIs endured hardships and the Army spent untold resources to accomplish a mission. The American effort even impressed the Japanese, who refused to believe the Americans had marched overland into China. According to Pete Ewing,

> When we got to the Burma Road we took a couple of prisoners and the first question they asked was how did you parachute all them mules to the ground without

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[102] Memo: Animals for UNRRA, Office of Theater Quartermaster, 27 October 1945; see also Memo from Office of Theater Quartermaster to Deputy Field Commissioner, Office of the Foreign Liquidation Commissioner, New Delhi, 13 December 1945, File # 454 Animals Pack, Box 5568, RG: 338, NARA.

[103] Waller, *Horses and Mules in National Defense*, 31; Essin, 195.

> breaking their backs? They thought that land was impenetrable, that it couldn't be done by infantry. They thought we was paratroopers. [104]

The troops who fought and trekked nearly one thousand miles over the most treacherous terrain on earth quickly adjusted to non-combat duties and displayed a GI preoccupation with getting home. In the rush to return home, any surplus, including several thousand Army mules, was unceremoniously abandoned as the Army rapidly adjusted to postwar conditions. The abandonment of several thousand Army mules in CBI was a gross waste but hardly surprising and transcended a simple *c'est la guerre* attitude by the Army. The mule's demise followed an Army protocol consistent with America's historical traditions.

[104] Ewing Interview.

Figure 8-1. Merrill's Marauders and mules cross one of the countless streams in North Burma. (U.S. Army Signal Corps, NARA).

Figure 8-2. Marauders and mules crossing the Irrawaddy River by pontoon ferry. (U.S. Army Signal Corps, NARA).

Figure 8-3. Loading mules onto C-47 planes for flight over the Himalaya "Hump." (U.S. Army Veterinary Service in World War II).

Figure 8-4. Mars Task Force and mules nearing the Burma Road, January 1945. (U.S. Army Signal Corps, NARA).

Conclusion: Constants, Regressive Adaptability, and the American Way of War

Flushed with victory, a stampede for demobilization swept the country in the late summer and autumn of 1945. Like Cincinnatus, the American tradition of citizen-soldiers fueled one of the most rapid, widespread demobilization efforts in history. As one veteran recounted,

> You know that famous picture of the guy kissing the girl? Well it wasn't like that for a lot of us. We were glad it was over, but there wasn't much celebration. It was over and that was that. I was discharged from the Army in September of '45, and I was back by October driving a bread-truck.

This telling statement reflects two components to the American way of war. First, it reflects the dependence on citizen-soldiers instead of standing, professional armies. Second, it demonstrates a certain level of impatience with war or the peace process that follows. Approximately 5,000,000 men deployed overseas between1942 and 1945, and were slated to return over fourteen months (roughly 360,000 men each month). Every ocean-worthy vessel, from aircraft carriers, battleships, and cargo ships, to the *Queen Mary*, transported returning service personnel. The unplanned repatriation of several million Americans was another logistical headache, but the problem of moving millions of men was resolved.[1]

Transporting and disposing of surplus material, however, was another matter. One problem was the manpower shortage in the Service of Supply. Soldiers accumulated credit, quantified as "points," for length and nature of service. Combat troops, suffering higher casualty rates, often earned fewer points for time served compared to service troops. So, service troops were often discharged earlier, yet these were the personnel with expertise in handling and managing surplus supplies.

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[1] Huston, *Sinews of War*, 561; Raymond Nahlen Interview, June 25, 2003. The iconic photo to which Raymond Nahlen referred was taken by Alfred Eisenstaedt in Times Square for *Life* magazine on August 14, 1945.

Another problem was deciding what was surplus, which could be liquidated, and what was necessary for the reduced, peacetime military. The method of disposal for items declared surplus spawned additional headaches. Selling items at nominal costs could depress local markets, or black marketers could acquire them and make huge profits at the expense of the locals. Likewise, sharp criticism incurred if material was destroyed or left to ruin.[2]

Surplus Army animal disposal methods varied *post bellum*. Early in the war, the Army implemented the Civil Affairs and Military Government (CA/MG) division of the War Department's Special Staff. The Army Veterinary Service worked with the CA/MG in recently liberated areas, helping locals by providing rudimentary veterinary care to native livestock populations. One of their post-war missions was the supervision of surplus animal disposition to organizations such as the United Nations Relief and Rehabilitation Administration (UNRRA) and various Marshall Plan rebuilding efforts. The AVS set prices, instituted transportation and transfer protocols, and taught basic veterinary medicine to the new owners of Army surplus animals. Animals in Europe and the MTO were sold at nominal fees by the Army and eventually by the State Department's Office of the Foreign Liquidation Commission, or given away through various charitable organizations helping war refugees. Animals serving in China were not as fortunate, since most were shot by Army troops or died shortly after being impressed into the Chinese Nationalist Army.[3]

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[2] Ibid., 562, 564.

[3] Miller, *AVS in WWII*, 441-442. Some programs within the Marshall Plan included giving Army mules to war refugees in France, Germany, Italy, Poland, and Yugoslavia. The Surplus Property Act of 1944 governed property disposal until 1949. The disposal of surplus material became a source of contention between the War Department and State Department. Supervision of surplus disposal ultimately came under the Office of the Foreign Liquidation Commission: see Huston, 564-567.

Army interest in animal power waned immediately after V-E and V-J Day. Animals were declared surplus, their disposition prompt and definitive as the Army made no serious contingencies for animal power. Some 2,500 surplus Army mules were transferred by the State Department from Italy to Greece when civil war erupted in 1946. The State Department negotiated the transfer of an additional 10,000 mules from the USDA to Greece from 1947-1949. Shiploads of surplus war material, including several thousand mules, were also sent to Turkey in 1949 as a cost effective implementation of Truman Doctrine promises "to support free peoples…resisting attempted subjugation…by outside pressures." The Army, however, made no efforts to keep a large contingent of pack animals, which proved problematic when direct American military intervention later occurred in areas where terrain necessitated animal transportation. [4]

The deployment of pack troops to the inhospitable terrain of Korea, though logical, never occurred during America's three-year involvement in the "police action." Belief in the superiority of motor transportation and faith in advancing technology, particularly the helicopter, rendered pack units obsolete. Thus, trained pack units were unavailable for deployment to the frozen hills of Korea. The U.S. military was aware of the unique problems associated with fighting in the frigid mountains of the Korean peninsula. The U.S. Marine Corps opened the Mountain Warfare Battalion in 1951 to prepare replacements bound for Korea. Yet, the art of pack transportation was not part of the Mountain Warfare curriculum.

The Army's failure to deploy trained pack units did not stop the use of animal transportation by GIs in Korea. As a former Cavalry officer noted:

> In March 1951, north of Kumyanjung Ni, the famous Wolfhound Regiment had 33 mules with one machine gun unit. There were many others in use in the same sector.

[4] Ibid., see also Essin, *Shavetails and Bell Sharps*, 194.

> Troops were reluctant to give information as to where captured animals were located, or in what numbers, for fear they would be denied their use and they would be moved to another area. On the drive north from Seoul late in May, the 1st Cavalry Division moved the animals they had acquired earlier by trucks. (The QMC 6x6 truck is readily adaptable for this purpose and required no major change.) In the mountainous sector north of Seoul to the Imjin River, captured animals were used to pack in barbed wire, steel stakes, mines, etc.[5]

The problem was not new. Poor infrastructure and inhospitable terrain blocked supply lines, and the Table of Organization/Equipment (TO/E) provided no remedies. Troops resolved the crisis by adapting supply transportation, which was hardly a novel concept. The answers found in scorched Tunisian wastes or parched Sicilian hills were rediscovered by GIs on frozen Korean mountainsides. The U.S. military did not adjust by reducing the amount of supply and firepower utilized; and in this regard American forces employed characteristic ways of war, including excessive supply consumption and unfathomable quantities of firepower. However, U.S. troops in Korea also applied another American characteristic by incorporating local, native stock into the transportation chain to ensure the delivery of supplies.

The Army discontinued pack animal units and programs four years after the cease fire in Korea. The inauguration of the Special Forces and Special Warfare Center during the early 60s saw training for unconventional warfare earnestly pursued by the Army. Army preparations and prosecution of war in Vietnam demonstrated creativity, particularly in the application of advancing technology. The reliance on advancing technology by American forces permeated the battlefield. For example, combat transportation, fire support, and supply transport was moved almost exclusively by the ubiquitous helicopter. Contingencies for animal power by the Army in

[5] Colonel R.E. Ireland quoted in Waller, 31.

Vietnam were never seriously considered because no breaks in the supply chain ever occurred where animal power was needed.[6]

Preparations for a showdown between NATO and Warsaw Pact members governed U.S. military strategy for two decades after Vietnam. The Defense Department and various think-tanks projected a short-lived conflict in which advanced technology and mass army maneuvers through the Fulda Gap and across the North German Plain would determine the outcome. Eclipsed in these plans were considerations of animal power by the Army. The period was reminiscent of the Army's "shifting gears" during the late 1930s, when the Army converted to motorization and mechanization. Contemporary wisdom held that technology had advanced to a point where alternative methods of transportation were a waste of time and resources. Military planners limited the question of animal transportation to scant studies analyzing unconventional wars on the periphery, such as the remote jungles of Latin America or the inhospitable Hindu Kush of Afghanistan.

The Soviet Union invaded Afghanistan in 1979. Over the next nine years Russian and loyal Afghan forces waged a grueling campaign to return Afghanistan into the Soviet Union's orbit. Resistance to the Soviet and pro-Soviet Afghan government by the *mujahideen*, though fragmented, was widespread. Support for the rebels grew from small amounts of humanitarian aid to sizable amounts of money and military hardware. The *mujahideen* received large quantities of small arms, an untold number of technologically-advanced anti-aircraft Stinger missiles, and approximately 700 American mules upon which to haul the supplies. *Mujahideen* resistance rose while Russian resolve fell. The toll of a protracted campaign forced Soviet

[6] Essin, 196. American military advisors to South Vietnam in 1959 used local animals for pack transportation, but these operations never advanced beyond experiments. With the exception of canine units, U.S. forces in Vietnam were dependent on mechanized and motorized technology throughout the conflict.

withdrawal in 1989. Afghanistan lapsed into civil war until the *Taliban* quelled the fighting through brutally repressive measures in 1996. *Taliban*-supported allies, such as *al-Queda,* struck various Western targets during the late 1990s and early twenty-first century, including the spectacular attacks against the World Trade Centers and Pentagon on September 11, 2001.[7]

The United States formally launched the War on Terror by deploying troops to Afghanistan in October 2001. Arguably the most technologically advanced military ever to take the field, American forces deployed to one of the most inhospitable regions on earth and quickly realized the value of adaptability. The opening phases of Operation *Enduring Freedom* involved Special Forces riding horses and packing gear on mules and donkeys. Animal power was not in the TO/E. Only a few of these elite operatives possessed some knowledge of riding, and even fewer were familiar with pack transportation. Just like the Army of 1942, the Special Forces sent to Afghanistan in 2001 had almost no formal training in animal packing because most military planners were confident that technology had rendered animal power obsolete. Yet, similar to GIs in World War II or Korea, American Special Forces demonstrated a seamless application of adaptability. Cadres of experienced riders procured native stock, coached the novices, and then packed and rode to war in twenty-first century Afghanistan.[8]

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[7] Lester Grau, Editor, *The Bear Went Over the Mountain: Soviet Combat Tactics in Afghanistan*. (Washington, D.C.: National Defense University Press, 1996). www.dtic.mil/cgibin/GetTRDoc?AD=ADA316729 (accessed August 21, 2012); see also C.J. Dick, *Mujahideen Tactics in the Soviet-Afghan War*, (Royal Military Academy, Sandhurst, England: Conflict Studies Research Centre, 2002). http://cgsc.cdmhost.com/cdm/singleitem/collection/p4013coll11/id/559/rec/12 (accessed August 20, 2012); and Bradley, 434. Hub Reese, a Tennessee broker, with cooperation by the U.S. State Department, assembled and flew over 700 mules to Islamabad, Pakistan to assist Afghan rebels. See Associated Press, "U.S. Aids Afghans with Mules." http://www.apnewsarchive.com/1987/U-S-Aids-Afghans-With-Mules/id-d5ba7f12bc005b580c0bfd4040a8836d (accessed September 1, 2012).

[8] James Hargett, U.S. Army Special Forces Medical Sergeant, Interview and email correspondence, June 30, 2012; see also Doug Stanton, *Horse Soldiers: The Extraordinary Story of a Band of U.S. Soldiers Who Rode to Victory in Afghanistan*. (New York: Scribner, 2009).

Special Forces infiltrated the rugged Afghan mountains and within a few weeks demonstrated a devastating martial presence. The Americans incorporated a unique blend of high technology and antiquity. Typical missions occurred under the cover of darkness, with one or two Special Forces soldiers perched atop a desolate mountain-top scanning the countryside with night vision equipment. Special Forces troops acquired and confirmed targets with the command post via satellite phone. The troops typed coordinates into a lap-top computer. A laser range-finder provided additional information, and the troops marked or "painted" the target with the laser. A few minutes later, two 1,000-pound precision-guided bombs launched from a jet aircraft some 30,000 feet above hit the target. The Special Forces soldier carefully placed the lap-top, laser, and satellite phone in a saddle bag, packed it on a horse, mule, or donkey, and rode back to the base of operations.[9]

The Special Forces soldier personified the most technologically advanced military in the twenty-first century. The fact that he was on horseback seems astonishing, yet this soldier was not an aberration. He represents two distinctly American characteristics displayed in war. First, Americans frequently spare no expense and employ whatever means necessary to accomplish a mission. Second, Americans, often deemed over reliant on advanced technology, have often "advanced" backward, adapting and applying antiquated means to achieve an end.

Americans arriving in Afghanistan were the best-equipped warriors in military history. However, they quickly learned that Humvees and helicopters did not guarantee mission success. The remarkably dynamic society in which the American soldier trained and outfitted left him momentarily in a quandary. He was firmly gripped by what Lewis Mumford called the "atrophy

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[9] Ibid., see also Donatella Lorch, "Green Berets Up Close," *News Week* 14 January 2002. http://www.groups.sfahq.com/5th/02_01_14_green_berets_up_close.htm (accessed August 20, 2012); Anthony Davis, "Special Forces 'Painting' Afghan Targets for U.S. Strikes," *Janes Defence Weekly* 22 October 2001. http://www.strangecosmos.com/content/item/22284.html (accessed August 22, 2012).

of human capacities," a victim of that alluring panacea called technology. Then, demonstrating a certain nature of adaptability, the American soldier bought a horse from the locals, learned about war in primitive places, and applied skills long forgotten. Triumph in Afghanistan in the political-military sense is still undecided, but a tactical victory through American ingenuity and technological retrogression in the mountains of Afghanistan is indisputable.[10]

Army adjustments to the unplanned use of animal power in Afghanistan were rapid. According to James Hargett,

> The first teams to utilize horses did so without any formal training but had experienced riders to coach the others. Shortly after, the use of these animals became doctrine and, at least in SF (Special Forces), riders courses began as did training in the care of these animals. I only recently left active duty but am aware of at least one Special Forces mobility training course involving horses. A lot of focus is on large animal vet care in the medical course. I can't think of any conventional forces who have used animals, but they are common in the smaller unconventional units.[11]

Quick modifications were impressive, particularly by an institution inclined to caution.

Numerous field manuals on pack animal care and use were dusted off or re-published after U.S. troops deployed to Afghanistan in October 2001. Published in 2000, the *United States Army Field Manual 31-27, Pack Animals in Support of Army Special Operations Forces* became the standard for special operations units. The Army also produced another field manual called *Special Forces Use of Pack Animals, FM 3-05.213* in 2004. Most recently, the Advanced Skills

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[10] Lewis Mumford, *Technics and Civilization* (Chicago: University of Chicago Press, Reprint Edition, 2010), quoted in David F. Noble, *America by Design: Science, Technology and the Rise of Corporate Capitalism*, (Oxford and New York: Oxford University Press, 1977), xvii; for an excellent narrative on the impact of technology in American society see Carroll Purcell, *The Machine in America: A Social History of Technology*, (Baltimore: Johns Hopkins University Press, 1995).

[11] Hargett Interview, June 30, 2012.

Branch of the John F. Kennedy Special Warfare Center introduced a six-part CD-ROM video to accompany *FM 3-05.213* on procedures for working with pack animals.[12]

Courses in pack transportation were quickly incorporated into training throughout the U.S. military. During World War II, pack troop selection was random and training lengthy. Contemporary programs are abbreviated and concentrated, focusing on small groups engaged in unconventional warfare. Army Special Forces offer a one to four-week course simply titled "Special Operations Animal Packing Course" at Fort Bragg, North Carolina. Likewise, the United States Marine Corps Mountain Training Center at Bridgeport, California started courses in pack training shortly after fighting began in Afghanistan. Small unit pack training continues at Bridgeport, which is located in the eastern Sierra Nevada Mountains and most closely replicates Afghan terrain and conditions (See Appendix C-1). Troops steeped with advanced technology training quickly learn the benefits of animal power and, like veterans of World War II, rapidly learned the behavioral characteristics of their animal charges so they can better perform the mission at hand.

U.S. troops deployed to Afghanistan have not been accompanied by American-bred mules. U.S. forces depend primarily on native horses and donkeys for two reasons. First, it is more cost-effective to use local stock, particularly since there is an adequate number available. Afghanistan, in this regard, is similar to the Mediterranean (and unlike CBI) in World War II. Second, native animals are already conditioned to the environment, providing immediate service. Afghan donkeys are smaller and cannot carry the same load as American mules, but their numbers are plentiful and their performance quite satisfactory.

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[12] FM 31-27 *Pack Animals in Support of Army Special Operations Force.* http://publicintelligence.net/fm-31-27-pack-animals-in-support-of-special-operations-forces/ (accessed August 24, 2012); *FM 3-05.213 Special Forces Use of Pack Animals*. http://www.scribd.com/doc/12776241/fm305 (accessed August 24, 2012). Both Field Manuals are available in PDF.

The integration of advanced technology, such as computers and laser-guided munitions, with something as basic as a native donkey remains challenging in Afghanistan. An obstacle for the U.S. military is resisting the promise of technological panaceas and instead finding a balance between old and new technologies. In recent years, Lockheed-Martin attempted to build robotic pack animals. The Multifunction Utility/Logistics and Equipment, or MULE, was a computerized, six-wheeled, one-ton vehicle capable of carrying 1,000 pounds, remotely controlled by a soldier. The MULE would move burdensome amounts of supplies and be most useful for bringing gear "that last few hundred meters, to where the fighting was going on." The Army was interested, but MULE failed nearly all field tests. One is reminded that "war cannot be refined." The sweat and toil of war can be reduced by technology, but circumstances will always arise where mission success depends on the performance of men and beasts of burden.[13]

Adaptability permeates American military history. Indeed, this dissertation asserts that adaptability has been as much of an American way of war as advancing technology, mass supply, or superior firepower. The Army's technological regression to animal power in World War II is one example of adaptability in America's military heritage. The use of animal power in remote, peripheral campaigns did not in and of itself win the war, no more so than hedge-row cutting tanks, floating dry-docks, or sea trains. Collectively, however, the particular nature of American ability at all levels, including strategic and tactical, domestic and foreign, was as vital to Allied success as mountains of material.

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[13] "Son of MULE Fails in Afghanistan," November, 28, 2011, http://www.strategypage.com/htmw/htinf/articles/20111128.aspx (accessed August 23, 2012); see also Lester Grau and Lt. Col. Hernan Vazquez, "Ground Combat at High Altitude," *Military Review*, January-February 2002. http://fmso.leavenworth.army.mil/documents/groundcombat/groundcombat.htm (accessed August 20, 2012) for unique problems associated with high altitude fighting including physical conditioning, inefficiency of vehicle motors and helicopter engines, and pros and cons of pack animals.

The methods of waging war, and particularly the technology applied, change, but even the methods of war are often dictated by constants, such as geography. For example, motorization and mechanization revolutionized war up to a point, but only changed the face of battle so far. In the face of immutable realities such as inhospitable terrain, victory went to the side that more rapidly adjusted. Like superiority in firepower and material, adaptability is an American characteristic during war. This dissertation examines the U.S. Army's adoption of animal power, a millennial-old technology, in a conflict best known for machines and motors.

There are many reasons the Army failed to recognize a need for animal power prior to the crises of World War II, Korea, or Afghanistan, and these reasons have helped determine an American way of war. The first reason was arrogance. Making no transportation contingencies in areas with no roads and inhospitable terrain was hubris born of an absolute faith in advanced technology. As Adna Chaffee proclaimed, "In any important war involving armies and fought in terrain where important wars are fought, mechanized cavalry is a vastly more powerful, mobile, and decisive force than…horse cavalry."[14] Technological advances render weapons obsolete, such as when smokeless powder and the machine gun replaced the muzzle-loading, black-powder musket. However, some elements are constant, such as climate and geography, and only reckless arrogance suggests otherwise. The notion that unalterable elements are conquered is folly, and so is the removal of these factors from the calculus of war.

Another reason the Army failed to see a need for animal power before World War II was an ignorance of history. Similar to mistakes in Korea and Afghanistan could have been ameliorated, if not avoided altogether, had assessments of the past been made with greater

[14] Brig. General Adna Chaffee, "Some Observations and Recommendations Pertinant to Any Future Expansion and Development of Mechanized Cavalry which May Be Contemplated by the War Department," Memo to Adjutant General, September 15, 1939, File 322.02, Mechanized Cavalry, Box 7, RG 177, NARA

objectivity. Leopold von Ranke urged historians to "tell how it really was." The von Ranke model is untrendy, but historians, particularly military historians who might advise military planners and policy makers, must be more dispassionate. Brutally painful honesty in historical assessments can provide good counsel for decision makers under wartime pressures.

Livy noted at the end of the first century BCE, "Nowhere do events correspond less to men's expectations than in war." This sobering assessment of war holds true in a couple of ways. The first is emotional. Livy's remark is a sad reminder that wholesale destruction and killing so common in war is something for which no one can adequately prepare. But emotional unpreparedness is linked to rational unpreparedness. If Livy is correct, then war will always have certain unpredictable elements. After all of the war-gaming, simulations, and data are processed, militaries must make rapid adjustments to these unforeseen twists.[15]

An American proclivity for adaptation proved one of the greatest contributions to Allied success in World War II. Mountains of resources helped, but material alone did not win World War II. Enemies were defeated because America adapted faster than her foes, overcoming the fog and friction of war during the immediate crisis. Examining the Army's archaic use of animal power in a highly mechanized, motorized war, creates an awareness of an American way of war not limited to vast supply or mass firepower. The U.S. military would do well to embrace and cultivate America's adaptive nature in preparation for future conflicts.

According to Williamson Murray:

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[15] Livy, History of Rome, XXX, quoted in Gerald Linderman, *Embattled Courage: The Experience of Combat in the American Civil War*, (New York: Free Press, 1987); see also Willaimson Murray, *Military Adaptation in War: With Fear of Change*. (New York: Cambridge University Press, 2011). For contemporary efforts promoting adaptability within military ranks see Al Grasso and William L. LaPlante, *Report of the Defense Science Board 2010 Summer Study on Enhancing Adaptability of U.S Military Forces*, (Washington, D.C.: Defense Science Board). January 2011 and at http://www.acq.osd.mil/dsb/reports/EnhancingAdaptabilityOfUSMilitaryForcesB.pdf (accessed August 20, 2012); U.S. Army, *The Army Capstone Concept/Operational Adaptability*. www.tradoc.**army**.mil/tpubs/pams/tp525-3-0.pdf (accessed August 26, 2012).

> In a period of accelerating strategic and technological change, it is all the more essential that soldiers confront the future with a firm understanding of war's continuities, and that scholars furnish them the best historical analysis…in which to ground that understanding.[16]

The U.S. Army's use of mules in World War II is a story of such continuities and the adaptability borne of historical analysis that overcame them.

[16] Williamson Murray and Richard Hart Sinnreich, Editors, *The Past as Prologue: the Importance of History to the Military Profession,* (New York: Cambridge University Press, 2006), 1-11.

Figure C-1. While not quite using the "jawbone of an ass," U.S. Marines in the 21st century still employ the venerable mule. (Image available at http://www.militaryphotos.net, accessed November 1, 2012).

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