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Publication Date: June 1981 Author: MAJ William J. Kelch

Research Committee: LTC James, Heil, LTC James Cantrell, COL David Huxsoll, and COL Allen Jones

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Graduate Degree Programs

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MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

Name of candidate: William J. Kelch

Title of thesis: Military Working Dogs and Canine Ehrlichiosis (Tropical Canine Pancytopenia) in the Vietnam War

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Director, Graduate Degree Programs

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

MILITARY WORKING DOGS AND CANINE EHRLICHIOSIS

(TROPICAL CANINE PANCYTOPENIA)

IN THE VIETNAM WAR

by Major William J. Kelch, USA, 102 pages

The United States employed large numbers of military working dogs as sentries, scouts, trackers, and mine detectors in Vietnam. In mid-1968 an epizootic occurred which threatened the working dog program and led to 250 canine deaths. Military veterinarians launched an extensive effort to control this disease and to determine its cause. This study, using primary and secondary written sources, describes the epizootic, the identification and control of the disease, and its implications for the future use of military working dogs.

Canine ehrlichiosis, a highly fatal tickborne rickettsiosis caused by Ehrlichia canis, was identified as the cause of the epizootic. Clinical and experimental experience proved that canine ehrlichiosis can be successfully treated with tetracycline; this treatment and serologic testing to detect infected animals brought the epizootic under control, although ehrlichiosis still remains a problem among military working dogs. This study concluded that the future control of canine ehrlichiosis and related diseases requires: serologic screening of prospective and active duty military dogs, rigorous tick control, evaluation of the disease threat in areas where military dogs are employed, disease education of personnel who deal with military dogs, and additional veterinary research.

ACKNOWLEDGMENT

Many individuals assisted me in completing this thesis. Colonel Leeland B. Carter, a retired veterinary officer, Colonel Thomas J. Keefe, Chief, Veterinary Laboratory Service, Brooke Army Medical Center, Colonel Sidney R. Jones, Chairman, Department of Veterinary Pathology, Armed Forces Institute of Pathology, and Miss Patty F. Vidrine, Air Force Medical Service Center provided valuable information without which I could not have completed this study. My thanks to them.

Miss Rosemary C. Marlowe, Mrs. Patricia N. Wells, and Mrs. Mary M. Crow of the Combined Arms Research Library led me through the maze of library materials. Without them I would still be lost somewhere in the "stacks."

Ms. Marilyn A. Harre in the Graduate Degree Programs office cheerfully responded to an interminable stream of inane questions. I appreciate her tolerence.

My thanks also to McMan Associates for their skillful manipulation of words. They made the mechanics of thesis writing much more bearable.

My sincere thanks are extended to the members of my graduate committee. Lieutenant Colonel James E. Cantrell and Colonel Allen W. Jones helped throughout with their substantive critiques and editorial skills. Double thanks to Colonel David L. Huxsoll, the world's acknowledged authority on canine ehrlichiosis, for both providing valuable information about the disease and for critiquing and proofreading the thesis. Finally, special thanks to Lieutenant Colonel James R. Heil, whose buoyant attitude and perceptive comments kept the project afloat and, hopefully, steaming in the right direction.

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Chapter I

INTRODUCTION

Man domesticated the dog in prehistory. He used the dog to keep him company, to guard his cave, to alert him to intruders, and to help him fight his wars. No one knows exactly when dogs were first used in war, but Assyrian, Babylonian, Egyptian, Greek, and Roman armies all employed dogs.

Assyrian soldiers used trained mastiffs as early as 2300 B.C. (24). Babylonians and Egyptians utilized dogs in war as did Alexander the Great (126), while the Greeks and Romans employed large mastiffs for guard duty and attack (101). Plutarch and Pliny both mention war dogs in their writing, and Aeneas speaks of dogs carrying messages in their collars (117). The Romans used dogs to bite Goths (19), and their mastiffs, which were equipped with armored collars, forced enemy foot soldiers to lower their shields to protect their legs, thus exposing their upper bodies (11). Their garrisons were warned of approaching enemy troops by keen-smelling canine sentinels posted on the watch towers, and they were themselves confronted with fighting dogs when they invaded Britain (126).

Soldier dogs were also used during the Middle Ages and early modern history. Dogs were equipped with coats of mail with protruding spikes or small scythes to disrupt enemy calvary (126), and armored dogs accompanied knights during the crusades (153). Henry VIII of England gave Charles V of Spain a gift of 400 war dogs fitted with iron collars (117,126). Charles was reportedly so pleased when his

dogs defeated the French dogs at Valencia that he held up their performance as an example to his soldiers (117,126). Elizabeth I presented 100 warrior dogs to the Earl of Essex when he set out to subdue the Irish (126). Balboa was accompanied by combat dogs when he crossed Panama in the early sixteenth century. His favorite dog was Leoncito (Little Lion) who warned of many Indian ambushes (11). Also in the New World, Christopher Columbus used bloodhounds to track American Indians (117,126), and the Indians themselves used dogs as sentries and beasts of burden (139).

Attila the Hun, Philip of Spain, Frederick the Great, and Napoleon all used dogs as sentries (126). Frederick reportedly said, "The more I see of men, the more I like dogs (118)." Napoleon's favorite warrior dog, Moustache, was a particularly interesting animal.

Moustache, a cross-bred poodle, was born in Calais in 1799 and raised by a grocer in Caen. Moustache, apparently bored with his pleasant but humdrum life in Caen, voluntarily joined the French Grenadiers as they marched through town. Moustache attached himself to the band and marched away with Napoleon's soldiers. Near Alexandria, Moustache detected a surprise attack by the Austrians, gave the alarm, and the Austrians were forced to retreat. As a result, Moustache was given the full rations of a grenadier, a collar with the name of the regiment, and the barber was ordered to comb and shave him weekly. Shortly after this incident, Moustache was wounded by a bayonet in the left shoulder, and, before he completely recovered, the Battle of Marengo took place. During this battle Moustache remained with the regimental flag; he was able to recognize

it among the dozens of others. At Austerlitz Moustache again followed the regimental flag. The ensign carrying the flag was wounded and fell, but Moustache, limping and bleeding, retrieved the flag and carried it back to camp. Moustache, despite his exploits, was later struck by an ungrateful lout with the flat side of a saber. Deeply disturbed, Moustache deserted his regiment and attached himself to some dragoons who were bound for Spain. He was killed in action by a cannonball at the Battle of Badajos on 11 March 1811, and was buried on the scene with his collar and a medal he had won earlier. The grave was topped with a simple stone inscribed, "Here Lies the Brave Moustache." The grave was later desecrated by the Spaniards by order of the Inquisition (118).

Dogs played a minor role in early nineteenth century American military history. In 1839, Brigadier General Zachary Taylor, "Old Rough and Ready," decided to use bloodhounds to seek out recalcitrant Seminole Indians in the Florida Territory. The Seminoles steadfastly refused relocation in Arkansas and offered resistance to American military forces. General Taylor's proposal to use dogs against the Seminoles in Florida met opposition in Congress. Gentlemen simply did not sic dogs on other people, not even savage Indians; such atrocious, barbarous conduct could not be permitted. After much debate and delay, the Congress in the spring of 1840 finally acceded to the use of the dogs, but only after firm assurance that the dogs would be used only to track Indians, not to attack them. General Taylor, sensitive to the controversy, ordered that the dogs be leashed and muzzled when employed so that no one would be injured. When sixteen controversial

canines marched to war to the sound of fifes and drums, they showed no interest whatever in Indians. Despite several weeks of training in tracking Seminoles, the dogs remained uninterested in Red Men. So Zachary Taylor's political problems were solved by the dogs themselves. Not to be outdone by the Army, the Navy and Marines also employed bloodhounds to hunt Seminoles. While the bloodhounds enjoyed riding through the Florida swamps in canoes, they found no Indians. Thus, the bloodhound projects ceased (18).

Dogs were employed by several armies in the late nineteenth and early twentieth centuries. They were used during the American Civil War (117,126). They were utilized by the British to haul supplies (19) and light equipment (11) during the Crimean War, and the Germans used them as watchdogs (11) and to locate wounded soldiers during the Franco-Prussian War (11,19). Dogs also carried flasks of brandy to wounded Russian soldiers during the Russo-Japanese War (126), and World War I saw the first large scale use of military dogs.

At the beginning of World War I, Germany, Italy, Belgium, France, and England all had war dog services. The French dog service was abolished by Marshal Joseph-Jacques-Cesaire Joffre after the Battle of the Marne, and the English dog service ceased to exist after the Battle of Aisne when the one British military dog, an Airedale, was killed. Both the French and English reestablished dog services in 1915 (87).

The Germans had 6,000 trained dogs in service when they advanced into France in 1914 with another 4,000 dogs in reserve (87). They eventually enlisted 30,000 dogs and the French 20,000 during World War I (19). Canine casualty estimates vary considerably for World War I: 5,000 French dogs (70); 7,000 dogs for all armies (9); 16,000 German dogs (87). In any case, canine casualties were numerous. At the end of the war, France disposed of 15,000 surplus dogs (70). The Americans did not have dogs of their own, although the American Expeditionary Force used a few dogs provided by the French and the Belgians (21). Nevertheless, American soldiers frequently made pets of dogs found on the battlefield.

Rin-Tin-Tin may be just a run-of-the-mill movie and television star to some, but he actually was a World War I veteran. Rin-Tin-Tin was born in a German trench at Metz. He was abandoned by his mother when the Germans retired and was subsequently adopted by an American lieutenant. The lieutenant raised Rin-Tin-Tin in Europe during the war, took him to America when the war ended, and eventually made him a movie star (8).

Dogs were used extensively in World War II. The United States Marine Corps trained more than 1,000 dogs during this war (11), and Marine war dog platoons served in Guam, Pelelieu, Iwo Jima, Okinawa, and Saipan (19). A ninety pound Marine shepherd named King was credited with pointing 132 Japanese snipers (11).

The United States Army had no war dogs at the beginning of World War II, but established a dog program shortly after the war began. With the assistance of a group of dog breeders and fanciers called

Dogs for Defense, the Army recruited about 20,000 dogs into the "K-9 Corps" (49). These dogs saw combat service in Europe, North Africa, and the Pacific (9) where they were employed as mine detectors, guards, messengers, scouts, sentries, and sled dogs (89).

Approximately half the dogs recruited by the Army were retained for training by the Army (70). About thirty breeds of both sexes entered military service, but by the fall of 1944 the breeds preferred included the German Shepherd, Belgian Sheep Dog, Doberman-Pinscher, Farm Collie, Siberian Husky, Malemute, Eskimo Dog, and various crosses of these breeds. They were trained at seven training centers: Front Royal, Virginia; Fort Robinson, Nebraska; Camp Rimini, Montana; San Carlos, California; Gulfport, Mississippi; Beltsville, Maryland; and Fort Belvoir, Virginia (27). Of those trained, 9,000 were trained as sentry dogs; 6,000 of these were used by the Army and 3,000 by the Coast Guard to patrol sparsely inhabited beaches in the United States (70). Army dogs were employed worldwide as mine detectors, guards, messengers, scouts, sentries, and sled dogs (89).

The exact number of Army war dogs trained during World War II is as follows (27):

Type and Number of Dogs Trained

Type of Dog	Trained for Army	Trained for Coast Guard	Total
Sentry	6,121	3,174	9,295
Scout	571	0	571
Sled and Pack	268	0	268
Messenger	151	0	151
Mine Detection	140	0	140

One famous collie-husky war dog named Chips was volunteered for service by his master after Chips bit the garbage man. Chips served with the 3rd Infantry Division in Algeria, Morocco, Tunisia, Sicily, Italy, and France. Chips "singlehandedly" attacked an Italian machinegun position and forced the surrender of its crew. He was credited with the capture of several other prisoners and was once wounded by a pistol shot. Chips was awarded the Silver Star and the Purple Heart; although the awards were subsequently revoked because animals were prohibited by regulation from receiving decorations, Chips was the subject of two speeches in Congress and widespread acclaim. Chips reportedly bit General Eisenhower on the hand during the Roosevelt-Churchill conference in Casablanca in January 1943 (50,101). Dogs such as Chips were romanticized heroes of the war, even inspiring fictional accounts of canine war heroics (149).

Other nations used dogs during World War II. The Russians trained dogs to eat under tanks; then, when the German tanks attacked, the hungry dogs were sent under the German tanks with mines strapped

to their backs (11). This was a risky practice since the dogs did not distinguish between German and Russian tanks. The total number of dogs used by the Russians is not available, but estimates are in the tens of thousands (70). The Japanese used dogs in Hong Kong to locate hiding Chinese who were then shot by Japanese snipers who accompanied the dogs (11). The Germans used about 200,000 dogs during World War II (6). One British dog was decorated by Field Marshal Bernard Law Montgomery for his work in Normandy during D-day (67). Another British dog named Judy, a pedigree pointer, served as mascot on several British naval vessels in the Pacific. She was captured by the Japanese in March 1942, became an officially registered prisoner-of-war, and, when released at war's end, was awarded the Dickin Medal for courage, endurance, and lifesaving (135). Altogether, more than 250,000 dogs were used by the Allies and the Axis during World War II (54).

American dogs saw service in the Korean War on a limited, but useful, basis. The Air Force used sentry dogs to guard airstrips and supplies (49), and Army patrols used scout dogs (19,24,147). Scout dogs may have reduced casualties by as much as sixty percent (147), and enabled infantry to move farther and faster with less risk of ambush (9,147). A scout dog named York reportedly led 148 combat patrols without the loss of a single man to enemy fire (21). The 26th Infantry Scout Dog Platoon, which was trained at Fort Riley, Kansas (27), participated in more than 500 patrols and received the Meritorious Unit Citation and the Korean Presidential Unit Citation (24).

The uses of dogs in war seem to be limited only by man's ingenuity. Dogs can attack the enemy or guard against his approach. They can be used as dray animals: pulling sleds (89), pulling wagons (87), and carrying supplies on their backs (70). A good team of dogs on good roads can reportedly pull a half ton (87). They can serve the military police by detecting drugs and explosives (31,53,94), assisting in crowd control (35), and escorting funds (108). Dogs can carry messages and pull telephone wire between locations (9). They can assist as medics: locating the wounded, especially at night; pulling stretchers; carrying first aid forward; and leading blind soldiers (87). Dogs have been used to steal army rations and documents (67). They improve morale and esprit de corps by serving as mascots (112), and have even protected their masters from venomous snakes (68,145). They can protect from infiltrators, even those completely submerged in streams and breathing through hollow reeds (124). Dogs can detect booby traps (113), tripwires (113), and tunnels (25,113), and can be parachuted into an area of operations (26,28,106). They can scout the enemy and track the enemy (64). Clearly, the dog has many roles in war.

Chapter II

USE OF MILITARY WORKING DOGS DURING THE VIETNAM WAR

General

Dogs were used in many capacities during the Vietnam War. The French introduced twenty dogs in Indo-China as early as 1948. These dogs were trained and maintained by the French Army Veterinary Service and served in three different roles. First, man-dog teams were used to support the infantry in reconnaissance, searches of villages and other areas, and in establishing ambushes, a role corresponding roughly to the present day scout dog. Second, the French employed dogs as mine-detectors just as the United States Army did later in the war. And, last, the French dogs were used to guard installations such as air bases, ammunition supply points, general supply depots, and gasoline depots. This role corresponds to the present employment of dogs as sentry dogs and patrol dogs. The French dogs did not adapt well to the climate in Indo-China, but generally received good ratings as scouts and excellent ratings as sentries. Their performance in mine detection was poor (72).

The United States used military working dogs in many different roles throughout the Vietnam War. They served as sentry, patrol, scout, tracker, mine and tunnel detection, and contraband detection dogs. They served with the Air Force, Army, Navy, and Marine Corps.

The Republic of Vietnam Armed Forces also used sentry, scout, and patrol dogs during the Vietnam War.

Dog Procurement

In 1964 the responsibility for procurement of military working dogs was transferred from the Army Quartermaster Corps to the Air Force Air Training Command at Lackland Air Force Base, San Antonio, Texas (85). The Commander of Lackland Air Force Base was directed to procure dogs for the military services. The Air Force thus assumed responsibility for the recruitment, examination, and acceptance of animals into the military working dog program. Dogs were obtained by donation and by purchase from their owners; they were generally of German Shepherd type, one to three years old, male or female (if spayed), any color except white, at least sixty pounds, and not less than twenty-three inches tall at the shoulders (21). These specifications were relaxed during emergency procurements or when dogs of different breed, size, or color were required for special purposes.

Two methods were used to procure dogs: an advertising and publicity program and mobile dog procurement teams. The Air Force conducted an advertising and publicity program through the United States Air Force Recruiting Service. The Air Force's number one recruiter was a dog named Nemo, a Vietnam War hero who was severely wounded, losing an eye during a Viet Cong attack on Tan Son Nhut Air Base on 4 December 1966. Nemo was retired from the sentry dog program after receiving these wounds. He then traveled the country as a canine recruiter (46).

Dog owners were told that the military services needed dogs, and were advised to query the Military Working Dog Center at Lackland Air Force Base if they were interested in selling or donating a dog.

Based on this query, if the dog met the required specifications, documents were forwarded to the owner which included a contract for the sale or donation of the dog to the United States government and a veterinary examination form. The owner then was required to have the dog examined by a military or civilian veterinarian. These documents were forwarded to the Military Working Dog Center, and, if the dog was still qualified for service, a shipping crate was forwarded to the owner. The dog was transported to Lackland Air Force Base at government expense for final evaluation. The dog was examined for medical soundness and tested for behavioral characteristics. About forty percent of the dogs were rejected, principally for hip dysplasia, heartworm disease, and gun-shyness. These rejections occurred after initial examination or after arrival at Lackland. Hip dysplasia and heartworm disease were usually detected before shipment of the dog to Lackland, while gun-shyness and other behavioral problems were generally detected at Lackland. Dogs rejected at Lackland were returned to the owner, or were given away to individuals or medical research institutions if the owner did not want the dog. If the dog was accepted for military service, it became the property of the United States government in accordance with the procurement contract (85).

The Air Force also used mobile dog procurement teams. These teams usually consisted of nine to fourteen members, including veterinarians, veterinary technicians, dog behavioral specialists, and dog handlers. These mobile teams travelled around the country and purchased dogs "on-the-spot." The teams established testing stations,

at military installations if possible, and did the required testing, medical examination, and administration at this one site. The team's arrival in an area was preceded by an intense advertising and publicity campaign (85).

In addition to dog procurement in the continental United States, the Air Force also operated a dog procurement activity at Wiesbaden, Germany for dogs destined for European duty (85).

After entering military service, the dogs were shipped to various training centers and trained in their specialty.

Sentry Dogs

A sentry dog is "a German Shepherd trained to assist in providing tactical or non-tactical security in and about fixed installations; a powerful psychological deterrence against intruders and attack; a highly aggressive animal able to work either on- or off-leash, controlled at all times by a skillful handler; part of a physical security element (85)." Sentry dogs are rather fearsome creatures that are systematically trained to love one human master and to hate all others . They are used exclusively in a perimeter defense role, almost exclusively at night. The dog's keen senses of hearing and smell enable it to detect intruders at long distances with near perfection. The dog alerts his handler to the intruder's presence and general location, and will attack and hold the intruder on command. In Vietnam sentry dogs were generally employed to alert only and not attack, while the handler communicated the presence of the intruder to back-up security personnel.

The first Air Force sentry dog teams were initially assembled at Lackland Air Force Base and deployed on temporary duty to Tan Son Nhut, Bien Hoa, and Da Nang arriving in July 1965 as part of Project Top Dog 145. The quality performance of these dogs led to the permanent assignment of sentry dogs to United States Air Force air base defense forces. All dogs were procured through Lackland Air Force Base; most were also trained at Lackland, although dogs were also trained at the Pacific Air Force Sentry Dog Training Center at Showa, Japan and at Kadena Air Base, Okinawa. The number of Air Force sentry dogs peaked at 476 in January 1967 and were located at the following sites (44):

Bien Hoa	46
Binh Thuy	25
Cam Ranh Bay	62
Da Nang	48
Nha Trang	23
Phan Rang	66
Phu Cat	66
Pleiku	28
Tan Son Nhut	66
Tuy Hoa	46

The number of dogs gradually declined until the end of the United States involvement in the war.

Air Force sentry dogs were generally employed in two overlapping shifts per night, serving both to detect enemy intruders and to provide a psychological deterrent to intrusion. Viet Cong sappers

(engineers employed to destroy and penetrate fixed defenses) were well aware of the prowess of the sentry dogs. They attempted to avoid the dogs by lying motionless when approached by a dog and by trying to conceal their scent with garlic-like herbs (44). However, these efforts were largely fruitless. Between July 1965 and 4 December 1966, no known penetrations occurred in areas patrolled by sentry dogs. On 4 December 1966, however, a penetration occurred at Tan Son Nhut Air Base which resulted in the first Air Force sentry dog deaths in Vietnam. Three dogs were killed, and Nemo, who was mentioned previously, was wounded. The last Air Force sentry dog battle death occurred on 29 January 1969 at Phan Rang.

Air Force sentry dogs encountered some problems in Vietnam. They were very susceptible to heat, suffered sometimes from gastrointestinal upsets, were frequently victims of snakebite, broke legs and paws when jumping down from vehicles, and, early in the war, had to live in their shipping crates. Nevertheless, sentry dogs were generally recognized as the most effective means of air base perimeter defense (44).

Numerous incidents occurred at air bases in Vietnam that illustrate the method of employment and utility of sentry dogs in air base defense. In February 1966 Viet Cong attempted to infiltrate Pleiku Air Base on three occasions. They were intercepted by sentry dog teams and driven off with small arms fire. Also in February 1966, Viet Cong were driven away from Bien Hoa Air Base by Airman Second Class Ronald Rutherford and his dog Hans. In April 1966, Airman

Second Class Rick Young and his dog Cowboy helped other sentry dog teams apprehend twenty-five people on the perimeter at Tan Son Nhut Air Base (29).

The Army first introduced sentry dogs in Vietnam in September 1965. The dogs were originally organized into several military police detachments and deployed at widely scattered locations. They were later reorganized to form the 212th Military Police Company (Sentry Dog) in January 1966. The 981st Military Police Company (Sentry Dog) was activated at Fort Carson, Colorado in February 1967 and deployed to Vietnam in November 1967 (41). The 595th Military Police Company (Sentry Dog) was activated in Vietnam in January 1970. These three companies were part of the 18th Military Police Brigade. In July 1970 the three companies served in the following areas (132):

212th Military Police Company (Sentry Dog)

Location	Number of Posts	Sentry Dog Teams
Long Binh	18	46
Tay Ninh	6	15
Long Than	10	26
Saigon	1	3
Vinh Long	6	16
Soc Trang	3	8
Total	44	114

981st Military Police Company (Sentry Dog)

Location	Number of Posts	Sentry Dog Teams
Phan Rang	3	8
Cam Ranh Bay	9	23
Phu Tai	14	25
An Khe	8	21
Pleiku	20	47
Ban Me Thuot	5	13
Nha Trang	6	16
An Son	6	17
Qui Nhon	2	5
Total	73	175

595th Military Police Company (Sentry Dog)

Location	Number of Posts	Sentry Dog Teams
Da Nang	12	30

These 319 sentry dogs were posted near general storage yards, airfields, ammunition supply points, petroleum product storage areas, food storage areas, docks, and a convalescent center. Dogs and their handlers were trained at the United States Army Pacific Sentry Dog School in Okinawa (85).

Army sentry dogs generally performed well in Vietnam. They were effective against intruders, and, as with Air Force sentry dogs, served as a psychological deterrent to intrusion. Their use as an economy of force measure was emphasized in physical security programs because they could be used in lieu of men for perimeter security, thus

freeing men for other tasks (85). They encountered some of the same problems as Air Force sentry dogs: heat, spoiled food, and, sometimes, poor housing. One problem encountered with the employment of Army sentry dogs was their use in areas where strong odors, loud noises, and other distractions lessened their effectiveness (41). Strong petroleum odors in petroleum storage areas and continual noise in dockyards limited the effectiveness of sentry dogs.

Although the performance of Army sentry dogs in Vietnam was generally applauded, there is at least one dissenting voice. Colonel W. H. Brandenburg, who was the United States Army Vietnam Provost Marshal and Commander, 18th Military Police Brigade from 30 August 1968 through 22 December 1969, wrote:

> Sentry Dogs:
>
> a. The Brigade has two sentry dog companies with a third one in process of activation. Dogs are stationed at ammunition supply points, air fields, tank farms, outposts and other similar areas. Th efficiency of sentry dogs is difficult to determine. Sappers have successfully attacked installations guarded by dogs, e.g., Qui Nhon Ammunition Depot, and they have been detected by dogs at others, e.g., Tay Ninh, Ban Me Thout. Although doctrine prohibits the use of dogs as deterrents, it is possible that dogs do deter attacks. Dogs are deployed in a number of locations that have never been attacked. While cause and effect cannot be established, the possibility is not unreasonable. Nevertheless, dogs are expensive.
>
> b. Veterinary care must be available. Training must be continuous. Care and grooming are extremely important, especially in the Vietnam climate. With all this attention, dogs can work only six hours out of 24. Thus his handler remains on post only six hours also, whereas the average security guard and military policeman works a 12 hour shift.
>
> c. A number of dog posts in RVN were established simply to humor senior commanders. It is a fact that good dog posts are difficult to find in RVN. Continuous

> activity at most key installations and activities creates a cacophony of sights and sounds which virtually negate a sentry dog's effectiveness (122).

Colonel Brandenburg's view is a minority opinion, but it should be noted that his comment about sentry dogs represents about one-sixth of his entire debriefing report, which, in turn, represents his feelings after a sixteen month tour in Vietnam. His comments also suggest that he is more intimately familiar with sentry dog operations than might be expected from the United States Army Vietnam Provost Marshal. Thus, his comments should not be casually disregarded.

Colonel Paul M. Timmerberg, United States Army Vietnam Provost Marshal and Commander, 18th Military Police Brigade from 15 June 1971 to 30 May 1972 had a more favorable opinion of Army sentry dogs. He said in his debriefing report:

> The employment of sentry dogs in physical security functions was highly successful and represents one of the most outstanding achievements of the military police in Vietnam. They were programmed into country during the initial phases and have been retained to the present. They have been efficient, economical, and effective in protecting property against theft and providing security against attack. They have also produced substantial savings in manpower (123).

The United States Marine Corps introducted sentry dogs to Vietnam in April 1966 (111). These dogs, as well as a unit of Navy sentry dogs, were stationed at Da Nang (98). During the Vietnam War, the Army, Air Force, Navy, and Marines all had sentry dogs located at Da Nang.

The Republic of Vietnam Armed Forces also employed sentry dogs. In 1963, for example, they had seven operational sentry dog platoons which were located at Da Nang, Pleiku, Go Vap, Thanh Tuy Ha, Saigon,

Bien Hoa, and Tan Son Nhut (73). Later in the war, during the Vietnamization period, many dogs were transferred from the United States Armed Forces to the Republic of Vietnam Armed Forces.

Sentry dogs, regardless of which service they worked for, had one serious deficiency. They were incorrigibly vicious. They attacked anything and everything except their own handler, and sometimes they even forgot to follow that rule. They attacked kennel cleaners, veterinarians, other sentry dogs, small children, and anyone else who crossed their path. They attacked steel pipes, brick walls, and concrete abutments if these inanimate objects found themselves between the sentry dog and its prey. Only one handler could control the beast, and sometimes even he had trouble doing it. When the handler was on leave or sick, some real problems arose, and retraining a sentry dog to accept a new handler was difficult, sometimes impossible. This one serious deficiency of the sentry dog led to the development of the patrol dog, a more docile creature.

Patrol Dogs

To overcome the problem presented by the temperament of sentry dogs, the Air Force began experimenting with the use of patrol dogs in 1968 (125). Four patrol dog teams were trained for the Air Force by the Metropolitan Police Department, Washington, D.C. and used on a trial basis at Andrews Air Force Base, Maryland. The initial trial was successful; so, after additional field evaluation, the first patrol dog class began at Lackland Air Force Base in August 1969 (52).

The temperament of the patrol dog is more agreeable than that of the sentry dog. The patrol dog is not a raging, snarling beast, although on command it will become extremely aggressive and will attack. It can be used in a perimeter defense role just as the sentry dog, but the patrol dog is taught tolerance of other people, animals, and things. It can be used in situations totally unsuited for the sentry dog such as controlling crowds, escorting money, searching for lost property, and tracking. A patrol dog can be worked unmuzzled and off-leash. In short, the patrol dog is a multipurpose dog, while the sentry dog is extremely specialized.

The patrol dog saw little service in Vietnam, although during this period patrol dogs were extensively employed elsewhere in the world. While Air Base Defense in the Republic of Vietnam 1961-1973 (44) does not mention patrol dogs, some Air Force sentry dogs in Vietnam were retrained as patrol dogs before being given to the Vietnamese as part of the Vietnamization program (132). The Army also made limited use of patrol dogs during the war (103,107).

Scout Dogs

A scout dog is "a German Shepherd trained to work silently either on- or off-leash, day or night, and to alert to airborne scent, to 'signal' the handler when it has picked up the presence of nearby dangerous objects or personnel, and to support maneuvering infantry elements in a wide range of tactical tasks (85)." The United States Army recognized the value of the scout dog early in the Vietnam War. As early as 1962, the Army recognized the scout dog's ability to alert

on strange personnel at ranges from twenty-five to 1,000 yards, to give patrol personnel a sense of security and confidence, to provide a psychological advantage over the enemy, and to aid in perimeter security in heavy jungle and at night (139). In addition, the Republic of Vietnam Armed Forces had five active scout dog platoons in 1963 (73).

The Army's scout dog program, which had been active during both World War II and the Korean War, was reactivated in 1965 with the establishment of the Infantry Scout Dog Training Center at Fort Benning, Georgia. From Fort Benning, dogs were airlifted directly to Vietnam (98). The dogs were organized into Infantry Platoons (Scout Dog) which consisted of three or four squads. Each platoon contained twenty-seven to thirty-six dogs, and varied in size during the war as changes were made in the Tables of Organization and Equipment under which the platoons were organized. In 1968 there were twenty Army scout dog platoons in Vietnam assigned to the following units (85):

Unit	Infantry Scout Dog Platoons
1st Infantry Divsion	35th, 41st
1st Cavalry Division (Airmobile)	25th, 34th
4th Infantry Division	33d, 40th, 50th
9th Infantry Division	43d, 45th
25th Infantry Division	38th, 44th, 46th
101st Airborne Division	42d, 47th, 58th
Americal Division	48th, 57th
173d Airborne Brigade	59th, 39th
199th Light Infantry Brigade	49th

A scout dog training detachment which maintained a pool of replacement dogs was located at Bien Hoa Air Base (98,148). The United States Marine Corps employed two scout dog platoons in the Da Nang area (74).

Dogs were generally employed as the lead elements in small infantry maneuver units, i.e., they were employed as the "point." They were also employed as flank and rear screens, in support of outposts and ambushes, as members of reconnaissance teams, and in searching hamlets (104). Scout dogs were also trained to detect trip wires, booby traps, and mines. They were usually employed with one man-scout dog team per maneuver unit, but occasionally two teams were employed with one unit. This allowed one dog to rest while the other worked. Since the dogs relied heavily on their sense of smell, the wind direction was a major determinant in choosing the proper method of dog employment (7). Some specific examples of scout dog employment illustrate how these dogs performed (20):

> On 9 August 1966, PFC Barejko and Scout Dog Vikki 2X84 of the 38th Scout Dog Platoon were on a search and destroy mission near Bao Cap when Scout Dog Vikki alerted on a booby trap from a distance of three meters. Results: One booby trap destroyed.
>
> On 14 January 1967, SP4 Peters and Scout Dog Prince 5A07 of the 39th Scout Dog Platoon were on a search and destroy operation in the Iron Triangle when Prince alerted on a tunnel at 30 meters. Results: 100 pounds of rice, four radio sets, 2,400 blasting caps, 160 pounds of explosives, 40 antitank mines and medical supplies were captured.
>
> On 28 February 1967, SP4 Quada and Scout Dog King 22X4 of the 48th Scout Dog Platoon were on a search and destroy mission near XT164978 when King alerted on enemy personnel at 125 meters. Result: documents, food, hospital supplies captured and 12 VC KIA.

> On 9 April 1967, SP4 McClellan and Scout Dog Achates 06X2 of the 44th Scout Dog Platoon were on a search and destroy operation when Achates alerted two different times at 200 meters and 300 meters. Results: the enemy detonated three claymores and three VC's were killed.

The performance of military scout dogs was generally regarded as excellent. The enemy feared and respected the scout dog, and reportedly had orders to aim for the dog first and the handler second (6). Notwithstanding this generally favorable evaluation, scout dogs did have their limitations. The dogs were very susceptible to heat and fatigue. After a period on patrol, the dogs became hot, tired, and failed to concentrate on their work. Unlike a human soldier, a scout dog could not be ordered to perform. The dog's cooperation had to be voluntary. The dogs also required a great deal of water, much more than a man. This sometimes created problems, particularly during the dry season. By far the most frequently voiced criticism of scout dogs was that they instilled a false sense of security and overconfidence in the men on patrol. Scout dogs were supposed to instill confidence, and they did, but the confidence sometimes overwhelmed the men's good judgement, making them careless. They began to feel invincible which, of course, they were not. The scout dogs were very good at detecting enemy personnel and booby traps, but they were not perfect; thus the men could ill-afford to lower their own defenses.

Tracker Dogs

A tracker dog is "a highly trained Labrador Retriever able to work silently on a 25-foot leash following (day or night) a 'ground'

scent over terrain not holding a visual sign; to 'signal' the handler when it is nearing the subject being tracked; to be an integral part of a reconnaissance element for tracking enemy movement (85)."

One of the major problems of American combat units in Vietnam was maintaining contact with the enemy. The Viet Cong had a disturbing habit of disappearing into the jungle where they could not be found. This problem was recognized by the Americans shortly after they became involved in the war. They tried to solve the problem by tracking the Viet Cong with bloodhounds (they apparently had not heard of Zachary Taylor's exploits), but the bloodhounds made so much noise thrashing about in the jungle that they were a hazard to the personnel on patrol.

The Americans knew that the British had had some success using Labrador Retrievers to track down Indonesian and Chinese communist guerrillas in Borneo, so in May 1966 they decided to begin a tracker dog program. A team of officers was sent to visit the Headquarters, British Far East Land Forces in Singapore and the British Jungle Warfare School in Johore Bahru, Malaysia. The Americans received valuable advice and information, and a joint British-American military agreement was reached which called for the use of British dogs from Malaysia and the training of American handlers at the British Jungle Warfare School. Since Britain was a signatory of the 1954 Geneva Convention which partitioned Vietnam, and Malaysia was neutral regarding the Vietnam War, the military agreement required diplomatic sanction. Agreement was reached in September 1966, and in October 1966 fourteen United States Army combat tracker teams began training in Malaysia. These combat tracker teams were subsequently deployed in

Vietnam (85). The tracker dog training mission was later transferred to Fort Gordon, Georgia (45) where some dogs were also procured locally (152).

Tracker dogs were generally employed as part of combat tracker teams which were composed of human visual trackers and canine scent trackers. The composition of these teams varied during the war as experience was gained. A six-unit team composed of four human visual trackers, one dog handler, and one dog was most commonly used (64). The handler and dog could be employed alone, but best results were obtained when the entire team was used together (104). The tracker teams could perform the following missions (85):

1. Follow a retreating enemy and re-establish contact.
2. Follow local enemy to villages or homes.
3. Follow and recover US personnel captured by the enemy.
4. Follow and recover US Army patrols or individuals who were lost or separated from their units.
5. Back-track captured enemy personnel to determine where they had been and where they hid any supplies or equipment they may have had.

In 1968 there were seven United States Army combat tracker platoons and three combat tracker detachments operating in Vietnam. Each platoon consisted of four combat tracker teams and each detachment included two combat tracker teams. This represented a reorganization of the original fourteen combat tracker teams which came from Malaysia. These combat tracker units were assigned as follows (85):

Supported Unit	Combat Tracker Unit
1st Infantry Division	61st Infantry Platoon
1st Cavalry Division (Airmobile)	62d Infantry Platoon
4th Infantry Division	64th Infantry Platoon
9th Infantry Division	65th Infantry Platoon
25th Infantry Division	66th Infantry Platoon
101st Airborne Division	557th Infantry Platoon
Americal Division	63d Infantry Platoon
173d Airborne Brigade	75th Infantry Detachment
199th Light Infantry Brigade	76th Infantry Detachment
United States Army Vietnam Special Troops	77th Infantry Detachment

In early 1969 the Royal Australian Army maintained eight tracker dogs at Nui Dat near Vung Tau (74).

Combat tracker teams were generally very effective in Vietnam. Their limitations included difficulty in tracking in heavy jungle at night, in tracking after a heavy rainfall, and in following a track more than twenty-four hours old (85). Some specific examples of combat tracker team operations will serve to illustrate their use (20):

> On 3 May 1967, when a friendly ambush was hit by a large enemy force, Combat Tracker Team No 1 was called by the 1st Bn, 27th Inf. The track was 3 1/2 hours old and made by 50 to 60 men. Visual trackers found a track which the tracker dog followed for 4,000 meters through populated areas. The VC were tracked to a boat landing where they apparently left in a sampan. Then the dog tracked two men, apparently boat guards, about 700 meters to a village where the track was lost.
>
> On 19 June 1967, Combat Tracker Team No 8 was called by "A" 1/7th Cav, 1st Cav Div to investigate tracks leading from caves. The CTT came under sniper fire as they landed by helicopter. After reaching the support platoon, the

platoon came under fire. The CTT followed approximately 8 VC's leaving the area. The visual trackers tracked for a short distance when heavy rain washed out all footprints. After about 1,000 meters, the dogs picked up the smell of the VC. The CTT came under fire while moving back to the support platoon. CTT called artillery in on enemy position.

On 23 June 1967, Combat Tracker Team No 6 was called by an element of the 9th Div to follow an enemy track. The CTT was supported by two squads from the aerial rifle platoon. The track was 12 hours old made by an estimated enemy battalion. The visual trackers identified the track and the dog followed for about 500 meters to an enemy base camp. Evasive tactics included walking along a rocky stream bed. The base camp included a school, tools, clothing, ammo, and bunkers. Artillery was called in on the base camp after the team withdrew.

Mine and Tunnel Detection Dogs

A mine and tunnel dog is "a German Shepherd trained to work silently and detect (by a combination of air and ground scents) hidden mines, booby traps, tunnels, and bunkers; and to support maneuvering infantry elements on specific tasks (85)." Breeds other than the German Shepherd were also trained for mine and tunnel detection during the Vietnam War.

During the Vietnam War, mines and booby traps were a constant menace in the field. On roads and in open areas, mechanical mine detectors were generally effective, but in the jungle these devices generally were not useful. Therefore, in May 1967 the United States Army Limited Warfare Laboratory at the Aberdeen Proving Grounds, Maryland began a study to determine if military dogs could be effectively employed to detect mines, booby traps, tripwires, and tunnels (113).

The Limited Warfare Laboratory established training procedures and demonstrated the project's technical feasibility between January and July 1968. In August 1968 the 60th Infantry Platoon (Scout Dog) (Mine/Tunnel Detector Dog) began training at Fort Gordon, Georgia, and this platoon was deployed to Vietnam in April 1969. The platoon consisted of twenty-eight dog handlers and twenty-eight dogs. The dogs were trained as either mine dogs or tunnel dogs. The mine dogs were trained to work off-leash on or near roads and trails under the command, by voice or by hand and arm signals, of their handlers. They were trained to detect mines, booby traps, and trip wires, and to alert by sitting down two feet away from these objects. The tunnel dogs were trained to detect trip wires and tunnels. They worked off-leash at distances up to thirty meters from their handlers. They were controlled by hand and arm signals and they alerted by sitting down two feet from the trip wire or tunnel entrance (40).

The 60th Infantry Platoon (Scout Dog) (Mine/Tunnel Detector Dog) was based at Cu Chi and served with the 25th Infantry Division and the Americal Division. Eighty-five percent of the patrol leaders of the supported units reported that the dogs enhanced patrol security (40). This, coupled with earlier testimonials, including testimony before the House Appropriations Committee which stated that the dog was the best way to locate Viet Cong tunnels (25), insured the continuation of the mine/tunnel detector dog program. The Infantry School at Fort Benning, Georgia was directed in July 1970 to assume responsibility for the mine/tunnel detector dog program and to improve training techniques and dog effectiveness (113).

Although the dogs in the 60th Infantry Platoon (Scout Dog) (Mine/Tunnel Detector Dog) were trained exclusively to detect mines, booby traps, tripwires, and tunnels, the dogs in the infantry scout dog platoons also received limited training in these skills (136). Therefore, discovering these devices was not the exclusive province of the mine/tunnel detector dog.

The United States Marine Corps, aware of the Army's progress in the employment of mine/booby trap detector dogs, conducted its own evaluation in 1970. The Marine Corps sent eighteen handlers and fourteen dogs to Vietnam in March 1970, and another twenty handlers and fifteen dogs in May 1970. The dogs were employed in combat operations with infantry and engineer elements of the First Marine Division and with elements of the Combined Action Forces. The evaluators concluded that mine/booby trap detector dogs were effective and suitable for Marine Corps use as a supplement to other detection and neutralization procedures (42).

The performance of sentry, scout, and tracker dogs in Vietnam was judged almost universally excellent. The mine/tunnel detector dogs received good, but somewhat less enthusiastic reviews of their effectiveness. These dogs did in fact fail to discover some mines and booby traps, and those who witnessed these misses and the resulting casualties quite naturally were less than enthusiastic about the work of these dogs. Conversely, those saved by a dog from death or maiming were understandably grateful. The criticism of dog performance was largely the result of the overconfidence often found in soldiers who were accompanied by dogs. The soldier felt that the dog was a

foolproof detection system, and, when the dog failed to perform, the soldier was naturally disillusioned. The strongest supporter of the mine/tunnel detector dog program would never have suggested that the dog was a foolproof system. Two vignettes, one of success and another of failure, illustrate the employment of mine/tunnel detector dogs:

> Dog missed a Claymore, the detonating device was approximately two (2) feet off trail, the hell box was approximately seven (7) feet off trail. Incident resulted in three (3) KIA and three (3) WIA Marines. Dog and handler were not injured, however, the dog was so frightened by the explosion that he ran away which resulted in the dog MIA (42).

> If dogs think of such things, Romper would have been thinking that her fur coat was much too hot for the 100 degree heat of the Boi Loi Woods. But Romper was thinking of other things as she padded silently under a tall bush. As the slight breeze shifted, she paused, then changed direction and moved slowly forward, testing the breeze carefully with her very pointed nose. After circling an innocuous-looking bush, she glanced back at her handler and carefully sat two feet from the mortar round a 17-year-old boy had spent 30 minutes camouflaging (113).

It is easy to see why opinions varied about the effectiveness of these dogs.

Contraband Detection Dogs

German Shepherd dogs were used in Vietnam to detect by smell contraband items, principally marijuana (105). Because the detection program was designed to stem the flow of illegal drugs to the United States, the use of dogs centered on the major airports from which servicemen departed Vietnam. Other areas could, of course, also be searched. The dogs, if properly rested to maintain their interest in their work, were a nearly foolproof detection system because packaging marijuana in a way which escaped detection by the dogs was virtually

impossible. Although these "marijuana sniffers" were a familiar sight in airports, the total number of dogs used for this purpose was very small.

Other Dogs

In 1967, the Army initiated a program at the Edgewood Arsenal, Maryland to develope an improved military dog. The program was designed to breed a superior military German Shepherd, one with improved behavioral and physical characteristics. The elimination of hip dysplasia was a paramount goal. An improved German Shepherd was bred, but none of the dogs were used in Vietnam. The program ended in 1976.

Although not military dogs per se, a large number of canines, certainly hundreds, perhaps thousands, were kept as pets by American servicemen. These servicemen, far away from home and lonely, often chose man's best friend as a companion. The presence of these pet dogs complicated animal disease control measures.

Chapter III

DISCOVERY AND CHARACTERIZATION OF CANINE EHRLICHIOSIS IN VIETNAM

General Comments

Many medical problems affected military working dogs in Vietnam, but canine ehrlichiosis most seriously jeopardized the operational efficiency of military units dependent on dogs. This chapter is a description of the discovery and characterization of canine ehrlichiosis in Vietnam. Its intent is to describe in detail the disease as it appeared in Vietnam, the establishment of its etiology, and the present knowledge of the disease.

First, the veterinary care for military working dogs in Vietnam is described. Next is a brief description of the first cases of canine ehrlichiosis in Vietnam. Since the disease was not immediately recognized as canine ehrlichiosis, these first cases prompted the military veterinary research community to begin studies to determine the etiology of the disease. This research effort and the clinical effort of veterinarians in Vietnam to control and treat the disease occurred simultaneously. The research effort which led to a definitive diagnosis is described in "Definitive Diagnosis;" the clinical effort in Vietnam is described in "The Epizootic in Vietnam."

The information presented in "First Cases in Vietnam," "Definitive Diagnosis," and "The Epizootic in Vietnam" is sketchy and sometimes incomplete when compared to our present knowledge of canine ehrlichiosis. This is a deliberate attempt to describe how events really occurred, not how they occurred in light of present knowledge.

The people involved in these events dealt with sketchy and incomplete information, so an effort has been made to re-create that atmosphere.

Today's knowledge of canine ehrlichiosis is discussed in "Description of the Disease."

Veterinary Care for Military Working Dogs

Since the epizootic of canine ehrlichiosis in Vietnam began in 1968, it is worthwhile to examine the veterinary units which provided medical care to military working dogs in Vietnam at that time. Because canine ehrlichiosis eventually became almost exclusively an Army problem, Army veterinary units will be emphasized.

In 1968 the Army had approximately fifty veterinarians in Vietnam assigned to twelve different veterinary units. These units were part of the 44th Medical Brigade and provided a variety of veterinary services including subsistence inspection, preventive medicine, zoonosis control, sanitary inspection of commercial food processing establishments, civic action projects, and medical care of military animals. Veterinarians also provided veterinary laboratory services at the 9th United States Army Medical Laboratory, Vietnam.

Most of the veterinary units provided limited medical care for military working dogs on an area basis. In the First Corps Tactical Zone[a] in the north, service was provided by the 175th Veterinary

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[a]The Corps Tactical Zones were numbered from one to four, beginning with one in the northernmost provinces, and ending with four in the southernmost; the Second Corps Tactical Zone was further subdivided into North and South.

Detachment (Team JB, TOE 8-500G)[b] and the 504th Medical Detachment (Team IE, TOE 8-500G), both of which were located at Da Nang. In the Second Corps Tactical Zone North, the 459th Veterinary Detachment (Team IE, TOE 8-500G) was located at An Khe and the 760th Medical Detachment (Team JB-RS, TOE 18-500D) was located at Qui Nhon. In the Second Corps Tactical Zone South, the 176th Veterinary Detachment (Team JB, TOE 8-500G) and the 764th Medical Detachment (Team IE, TOE 8-500G) were both located at Cam Rahn Bay. The heaviest concentration of veterinary units was in the Third Corps Tactical Zone surrounding Saigon. The 522d Medical Detachment (Team AF, TOE 8-500G) was the headquarters element for all Army veterinary units in Vietnam and was located at Long Binh. The 245th Medical Detachment (Team JB-RS, TOE 8-500D) was also located at Long Binh. The 4th Medical Detachment (Team JB, TOE 8-500D) and the 936th Medical Detachment (Team ID, TOE 8-500D) were located in Saigon; the 75th Medical Detachment (Team JA, TOE 8-500D) was at Vung Tau. The Fourth Corps Tactical Zone had only one veterinary unit, the 359th Veterinary Detachment (Team IE, TOE 8-500G) at Dong Tam.

Complete hospital facilities were provided by the 936th Medical Detachment at Tan Son Nhut Air Base in Saigon and by the 764th Medical Detachment at Cam Ranh Bay. The 936th Medical Detachment small animal hospital eventually served as the central evacuation hospital for canine ehrlichiosis patients.

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[b]Veterinary units were initially designated "Medical Detachments," and later designated "Veterinary Detachments." The following designations are as of 31 December 1968 and include some units which had been re-designated and some which had not.

At the end of 1968, these veterinary units were supporting 1,099 military dogs including Army scout, sentry, and tracker dogs, Marine scout and sentry dogs, Navy sentry dogs, and Australian tracker dogs. Upon request, support was also provided to dogs from the United States Air Force and from the Army of the Republic of Vietnam (5).

After canine ehrlichiosis became a serious problem in Vietnam, other veterinary personnel were utilized, principally those from the Walter Reed Army Institute of Research in Washington, D.C. These veterinarians provided some assistance in Vietnam itself, but most of their work was done in their Washington, D.C. laboratory, first to determine the cause of the disease, then to refine understanding of the disease process.

First Cases in Vietnam

In mid-September 1968 several military working dogs were presented for treatment manifesting clinical signs of unilateral or bilateral epistaxis, severe leucopenia, and a progressive anemia. The animal's condition gradually deteriorated as the anemia progressed, and death resulted. The disease was apparently identical to a disease reported in 1967 in tracker dogs imported from the British Jungle Warfare School in Malaysia. The first five deaths in 1968 were reported by the Chief, Department of Veterinary Medicine, 9th United States Army Medical Laboratory, Vietnam on 12 October 1968.

The initial cases in 1968 occurred in dogs from the 212th Military Police Company (Sentry Dog) at Long Binh, the 48th Infantry Platoon (Scout Dog) at Chu Lai, the 936th Medical Detachment at Tan

Son Nhut Air Base (a blood donor dog and two dogs being held before euthanasia), and from several units in the Pleiku area. It was observed very early that all affected dogs were either kenneled at Long Binh or Saigon, or had been exposed to other affected dogs in the Long Binh or Saigon area (77,116).

Retrospective studies indicated that this hemorrhagic disease had probably caused one death on 24 July 1968 and another on 23 August 1968. Deaths also occurred from September to December 1968 in Okinawa; all of these deaths were in dogs which had been shipped from Vietnam or which had been kenneled with them. The cause of this disease was unknown; it was therefore named idiopathic hemorrhagic syndrome (77,116).

As more information was gathered, the following more complete clinical picture emerged. The disease generally began with the sudden appearance of unilateral or bilateral epistaxis in a previously clinically normal dog. Some dogs died in as little as one day from exsanguination; about forty percent died in five days; about seventy percent died in seven days. Some animals recovered and became chronic cases. Other clinical signs included loss of weight, transient corneal opacity, loss of stamina, hindlimb weakness, vomiting, dehydration, lethargy, ecchymosis on the abdomen and between the toes, anemia, dermatitis, edema of the limbs and scrotum, and petechial hemorrhages on the penis (116).

Hematologic findings included a leucopenia with total white blood cell counts as low as $500/mm^3$. Packed cell volumes were consistently low, and often dropped precipitously from near-normal to

fifteen to twenty percent within twenty-four hours; this apparently was the result of hemorrhage. Hemoglobin was also low. Blood chemistry values were essentially normal, although in chronic and terminal cases, blood urea nitrogen and creatinine levels were elevated. Coagulation times were normal, but bleeding times were greatly prolonged. An elevated erythrocyte sedimentation rate was a frequent finding (116).

The gross pathologic features of idiopathic hemorrhagic syndrome included enlarged and hemorrhagic lymph nodes; petechial and ecchymotic hemorrhages of the parietal pleura, urinary bladder, and gastrointestinal tract; petechial hemorrhages in the prostate, testicles, kidneys, epicardium, and endocardium. Dark feces were often found in the colon, and dogs with clinical epistaxis usually had a large blood clot in the nasal cavity. The spleen and bone marrow were considered normal, while the liver was normal in size with an increased prominence in the lobular pattern. Subcutaneous edema and hemorrhage were often seen in the limbs, particularly over the joints (116).

Histologically, a plasma cell infiltration was found around blood vessels in virtually any organ, but particularly in the lymph nodes, kidneys, and meninges. Central lobular degeneration and/or necrosis was commonly found in the liver, and a decreased cell population was found in the bone marrow, particularly myeloid cells. Megakaryocytes were reduced in number or almost absent. The histologic changes were consistent with an autoimmune disease (116).

In January 1969 a review of the medical records of military working dogs revealed that clinically apparent disease was often preceded by a one to four day febrile episode which occurred about two months before the onset of acute illness. After this febrile episode, the dogs usually returned to a clinically normal state until the subsequent acute episode (116).

It was recognized early in the epizootic that idiopathic hemorrhagic syndrome seemed to occur more frequently in dogs housed in heavily tick-infested kennels. This suggested a possible tick vector (77).

By 18 March 1969 there were seventy-five canine deaths in Vietnam attributed to idiopathic hemorrhagic syndrome with at least an additional fourteen deaths in Okinawa. All dogs were screened hematologically, and an additional 210 dogs were classified as suspects, based on a total white blood cell count less than $7,000/mm^3$ and/or a packed cell volume less than forty percent. It was noted that suspects frequently later became clinical cases which then succumbed to the disease (116).

In early 1969 the cause of idiopathic hemorrhagic syndrome was unknown. The differential diagnosis included: chemical poisons; bacterial toxins; ionizing radiation; and bacterial, rickettsial, viral, and hemoprotozoan infections. Hematologic, blood chemistry, and epidemiologic studies effectively eliminated chemical poisons and bacterial toxins from consideration, and, since no source of radiant energy capable of producing this disease could be found, ionizing radiation was also elminated as a possible cause. Blood and tissue

cultures failed to consistently reveal any bacterial organism; the disease was therefore considered to be of viral, rickettsial, or hemoprotozoan origin (98). A viral infection transmitted by a tick vector and complicated by an autoimmune phenomenon was initially favored (33,86), but the need for further definitive study was clear.

Definitive Diagnosis

Determining the cause of idiopathic hemorrhagic syndrome was a lengthy, difficult task, and further refinement of the exact pathogenesis of the disease continues to the present. The research efforts which eventually resulted in a definitive diagnosis were largely conducted by the Walter Reed Army Institute of Research in conjunction with the Army veterinarians located in Vietnam.

Transmission studies were immediately initiated using tissues and whole blood from dogs with typical signs of idiopathic hemorrhagic syndrome. Beagles and other laboratory animals were inoculated with tissue suspensions and whole blood. By April 1969 a disease apparently the same as idiopathic hemorrhagic syndrome had been produced in the laboratory by the inoculation of fresh whole blood from affected dogs. Babesia organisms were identified in infected beagles. Two viruses were isolated from mice inoculated with material from affected dogs. Other laboratory studies included the following: bacterial cultures; attempts to grow an agent in various tissue culture systems; examination of engorged ticks for viral agents; examination of plasma specimens for clotting factors; serologic examination of sera from affected dogs for antibodies to numerous

rickettsial and viral agents; and detailed serum electrophoresis of sera from affected dogs. The completion of these initial studies suggested very tentatively that idiopathic hemorrhagic syndrome was produced by an infectious agent, probably a virus. The role of the Babesia organisms required further evaluation (116).

In early 1969 the term used to describe this disease changed from idiopathic hemorrhagic syndrome to tropical canine pancytopenia. This name change occurred because tropical canine pancytopenia was the term used by the British to describe an identical disease which occurred in British military dogs in Singapore as early as 1963 (133,151), and because the Labrador Retriever tracker dogs purchased from the British and brought to Vietnam in late 1966 and early 1967 were apparently infected with tropical canine pancytopenia when they arrived in Vietnam (62). During this period, the disease had acquired several other names including tracker dog disease, idiopathic epistaxis, idiopathic hemorrhagic disease, and canine hemorrhagic fever (116).

Attempts to identify the cause of tropical canine pancytopenia continued in 1969. An organism tentatively identified as Ehrlichia canis was consistently isolated from naturally occurring cases, and intracytoplasmic inclusion bodies thought to be Ehrlichia canis were found in mononuclear cells of both naturally occurring cases and in experimentally infected German Shepherds and Beagles. Both German Shepherds and Beagles became febrile and developed other typical signs of tropical canine pancytopenia including anemia, leucopenia, increased erythrocyte sedimentation rate, and severe weight loss. Only the German Shepherd, however, developed epistaxis and corneal

opacity. This suggested that the German Shepherd breed was more susceptible to the naturally occurring disease. Babesia canis was still noted in the whole blood of dogs with the naturally occurring disease, but this was generally considered to be a secondary, concurrent infection. As the researchers became convinced that Ehrlichia canis was the causative agent, the research emphasis shifted to specific studies with this organism (137).

Attempts were made to cultivate Ehrlichia canis in several in vitro and in vivo systems. These included guinea pigs, mice, hamsters, embryonated eggs, alveolar macrophage cultures, leucocyte cultures, and other tissue cultures. These attempts were all unsuccessful, and the dog remained the only system for cultivating Ehrlichia canis (137).

Preservation, chemotherapy, and vector studies were also conducted. Studies demonstrated that infective whole blood and other tissues could be preserved for long periods in the frozen state. Chemotherapy studies, particularly important since the veterinarians in Vietnam were still dealing with an epizootic, suggested that tetracycline was of value in treating tropical canine pancytopenia. This evidence confirmed the clinical observation of veterinarians in Vietnam that the administration of tetracycline was useful therapy. The vector studies during 1969 concentrated on developing a "clean" strain of Rhipicephalus sanguineus, the brown dog tick, i.e., a strain of ticks which would transmit no known canine disease (137). Establishing a "clean" tick colony was extremely laborious. It required breeding ticks through multiple generations, feeding them on

dogs at each stage of their development, and thorough examination of each dog on which the ticks were fed. Also, because the etiology of the disease was unknown, all these research efforts were carried out in a strict containment facility to prevent the potential spread of the disease to humans or other animals. The need for containment seriously complicated the research effort.

Although the cause of tropical canine pancytopenia had not yet been established with certainty, D.L. Huxsoll et al. (61) speculated in late 1969 that the cause of the disease was Ehrlichia canis.

By mid-1970 veterinary researchers at the Walter Reed Army Institute of Research had concluded that Ehrlichia canis was indeed the cause of tropical canine pancytopenia (138). This definitive diagnosis was based on the consistent recovery of Ehrlichia canis from dogs naturally affected with tropical canine pancytopenia, and on the production of an indistinguishable disease in laboratory dogs experimentally infected with Ehrlichia canis. The clinical course (146) and epizootiology (62) of the disease were described in 1970. Briefly, the clinical course of the disease was described as beginning with a five to fifteen day incubation period following initial exposure, probably exposure by a tick vector. The incubation period was followed by a two to ten day febrile phase during which pyrexia, decreased stamina, weight loss, and an abnormal hemogram were noted. The febrile period was followed by a subclinical phase of five to seventeen weeks during which the dog had an abnormal hemogram, but was clinically normal. Following the subclinical phase, about forty percent of the dogs evidenced epistaxis and succumbed to the disease

either acutely in two to five days or chronically after as long as three months. The remaining sixty percent of the dogs experienced no clinical hemorrhage but eventually succumbed to the worsening pancytopenia. This latter category of chronically pancytopenic dogs was not clinically recognized during the Vietnam epizootic.

Research efforts continued at the Walter Reed Army Institute of Research. These included continued transmission studies in cell cultures, embryonating eggs, and dogs; pathologic, chemotherapeutic, electron microscopic, and Ehrlichia canis preservation studies; and continued work on a "clean" Rhipicephalus sanguineus colony (138).

Therefore, by mid-1970, tropical canine pancytopenia, formerly idiopathic hemorrhagic syndrome, was definitively diagnosed as a highly fatal infectious disease of the dog caused by the rickettsial organism, Ehrlichia canis. Ehrlichia canis had been strongly suspected as the cause of the disease in 1969 (61), but Koch's postulates were not fully satisfied until two years after the epizootic began. This requires a discussion of efforts to clinically deal with the disease in Vietnam during this two-year period.

The Epizootic in Vietnam

As research efforts were determining the etiology of tropical canine pancytopenia, the veterinarians in Vietnam had to clinically deal with an unknown disease on a day-to-day basis. Following the first death in September 1968 from acute, fatal epistaxis in a dog from the 212th Military Police Company (Sentry Dog), deaths began occurring in dogs throughout Vietnam. Since it was recognized early that the disease was probably infectious in nature, all dogs with

epistaxis were referred after September 1968 to the 936th Medical Detachment at Tan Son Nhut Air Base for treatment (98). Only dogs requiring hospitalization for tropical canine pancytopenia were referred to the 936th. All dogs requiring hospitalization for other diseases were referred to the 764th Medical Detachment at Cam Ranh Bay. This was an attempt to prevent transmission of the disease from infected to noninfected dogs (5). Thirty-five deaths occurred by the end of 1968 (99), including dogs from the 212th Military Police Company (Sentry Dog), the Sentry Dog Training Center, the Scout Dog Training Detachment, and seven of the twenty infantry scout dog platoons (98).

Treatment of the acute disease was symptomatic and largely unsuccessful. Treatment included the use of a full range of antibiotics, sulfonamides, vitamin B-complex, vitamin B-12, vitamin C, vitamin K, calcium lactate, hematinics, corticosteroids, and whole blood transfusions (32). These treatments sometimes prolonged the course of the disease, and a few dogs were returned to duty, but most dogs eventually died despite intensive treatment.

During 1969 the epizootic continued with approximately 140 additional deaths. Deaths from tropical canine pancytopenia in 1969 were as follows (98,125)[c]:

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[c]The reported "deaths from tropical canine pancytopenia" during this period differ slightly from one source to another, apparently because different individuals had slightly different standards for establishing a firm diagnosis. These differences are small.

Month	Number of Deaths
January	12
February	23
March	16
April	15
May	13
June	12
July	12
August	10
September	7
October	12
November	9
December	1

By the end of 1969, deaths from tropical canine pancytopenia had occurred in the 212th Military Police Company (Sentry Dog), the 981st Military Police Company (Sentry Dog), all twenty infantry scout dog platoons, two Air Force sentry dog units (Tan Son Nhut Air Base and Da Nang), Marine and Navy dogs at Da Nang, the Sentry Dog Training Center, and the Scout Dog Training Detachment (98). Efforts to control and treat the disease consisted of isolating affected dogs, instituting rigorous tick control measures, hematologic screening of all dogs, and symptomatic treatment.

In 1969 the high incidence and prolonged course of the disease caused mission failures among the military dog units. Hospitalized dogs were unavailable for duty, yet were still carried on their units' roles. Therefore, dog holding detachments were established at both the 936th and the 764th Medical Detachments, and, if a dog's hospitalization was expected to exceed fifteen days, the dog unit was permitted to requisition a new animal. This served both to isolate infected dogs and to enable the dog units to perform their missions (3).