Oral History Number: 120-008, 009
Interviewee: Robert N. Philip
Interviewer: n/a
Date of Interview: February 1984
Project: Bitterroot Historical Society Oral History Project

Robert Philip: A tape by Robert N. Philip, February 28, 1984, titled Rocky Mountain spotted fever in the Bitterroot Valley and the development of the Rocky Mountain Laboratory.

The term Rocky Mountain spotted fever is a misnomer. Today, one seldom sees the disease Rocky Mountain spotted fever in this area of the United States. Most of the problem nowadays is in the southeastern part of the United States along the Atlantic coast. This was not always the case however. Some 80 to 100 years ago Rocky Mountain spotted fever played a very important role in the development of the Bitterroot Valley, and Western Montana actually became the cradle for. The development of our knowledge about a group of diseases referred to as rickettsial diseases. The name is derived after their martyr, Howard T. Ricketts, who was so instrumental in developing and establishing the fundamental knowledge of Rocky Mountain spotted fever in the Bitterroot Valley, and subsequently lost his life from epidemic typhus in Mexico City in 1910.

The organisms, rickettsia, are actually small bacteria that require living cells for their propagation. Because of the latter fact, in the early days, the agent causing Rocky Mountain spotted fever was considered to be a virus. The disease Rocky Mountain spotted fever is transmitted by the bite of the wood tick, which is generally distributed throughout the northern Rocky Mountain...northern Rocky Mountains from southern Canada to northern Arizona. Clinically, the disease is characterized by the development of a characteristic rash involving particularly the arms and the hands and the soles of the feet and the extremities, spreading therefrom to the trunk. These clinical manifestations actually reflect the location of the causal agent, which involves the cells lining a smaller blood vessels of the extremities in particular. In many areas of the West, the disease is fairly mild. Before the days of antibiotics, the mortality rate being in the neighborhood of five to ten percent. However, in the Bitterroot Valley in Western Montana, the disease reached a case fatality rate of 70 to 80 percent, which was responsible largely for the initiating of the attempts to learn about the disease and control it initially.

The story begins in the late 1800s. The first case to occur in this area of the world is not known definitely. It is recorded by some of the earlier, early investigators as being in 1873 in a prospector in the Bitterroot Valley, but the illness is not documented factually. However, in March of 1882, two small twin children of J.L. Latimer (?) of Grass Valley at the mouth of O'Brien Creek just outside of Missoula came down with a disease which was diagnosed as spotted fever by a Doctor Ives, who was practicing in that area at that time. This was the first case that he had encountered in his experience in the West. Although he'd seen similar illnesses in the eastern part of the country at an earlier date, which undoubtedly were what we now

know as meningococcal meningitis, thus the true identity of the 1882 cases is really not established, but they could well have been Rocky Mountain spotted fever.

In 1883, there was a another case diagnosed by Dr. Ives as spotted fever occurring in a child of William Chapin (?) who had homesteaded at the mouth of Chapin Creek near the bridge crossing just above the present town of Darby. Again, we do not know for sure whether this was Rocky Mountain spotted fever, but it could well have been. At any rate, there were not many cases back in those days, and perusing the early newspapers—the *Missoulian* and its predecessors—it was evident that illnesses compatible with what we now know to be Rocky Mountain spotted fever were infrequent prior to the mid-1890s.

Then many of the early physicians and the residents of the Bitterroot Valley began to notice a peculiar illness which they were referred to often as black measles. Later on, recognizing its uniqueness, they referred to it as spotted fever. They understood the fact that the disease occurred characteristically during the spring months of March, April, May, and June; that it occurred only among residents of the west side of the valley. They also noted its apparent association with the lumber industry—the loggers, the lumber man, and the people who had been exposed to old mill sites, or who lived along the ranks of some of the west side streams. They attributed cause to the spring runoff, snow water, or in some manner to contamination of the streams by sawdust and debris from the old mill settings.

Late in the 1890s, the number of cases of spotted fever increased dramatically and with a death rate of 75 to 80 percent. The problem became one of great concern to people residing in this area, and there was a great deal of publicity—adverse publicity—which resulted in some action being taken at the state level. In 1901, the State Board of Health was created, and the secretary of the court appointed was Dr. A.F. Longway, who along with a physician from Great Falls by the name of Earl Strain (?), visited the Bitterroot Valley to take a look firsthand at the disease problem and initiate action to identify the disease concerned and to develop some kind of measures for its control. The upshot was that in 1902 two pathologists from Minnesota—Dr. Lewis B. Wilson and Dr. William M. Chowning were commissioned to investigate the disease in the Bitterroot Valley and make recommendations for its elimination. Wilson and Chowning collected a list of cases that had occurred in the area and evaluated some of the factors—entomological factors—associated with their occurrence. There were some 102 cases that they listed, and they were struck by the fact that in many, most of these, there was an association with the bite of wood ticks. They also examined the blood, microscopically, of several cases that occurred during their time here and thought they identified a parasite involving the red blood cells, which they named Plasmodium hominis (?). They also noted that there was a great many ground squirrels present on the west side of the valley, and they thought they also identified this organism in the blood of these animals. In a very scholarly, well-written article in 1903, they expounded, they relayed their findings to the medical world and attributed the cause of Rocky Mountain spotted fever to Plasmodium hominis that was transmitted by the wood tick.

The publicity about spotted fever actually became nationwide, and the surgeon general of the Public Health Service in 1902 assigned a young medical officer by the name of J.O. Cobb to come to the Bitterroot Valley and see what he could find out about this particular disease. Cobb arrived in June of 1902 near the end of Wilson and Chowning's investigations for that year, and he was much impressed by the findings of Wilson and Chowning and reported back to the surgeon general in very complimentary terms on the thoroughness of their investigations. In 1903, the surgeon general assigned Dr. John F. Anderson, who was with the Hygienic Laboratory—the United States Public Health Service in Washington D.C.—to come to the valley and initiate additional investigations. In that spring, also, Dr. Wilson returned to the valley to collect more information on cases that occurred in that year. Anderson also was impressed by the plasmodium theory of causation and the role which the wood tick played in disease transmission. He collected information on a few additional cases of spotted fever and published, in a rather long article, the results of Wilson and Chowning listing the geographical distribution of those some hundred plus cases that they had collected.

In the meantime, residents of Western Montana for the most part were quite skeptical about the tick theory of transmission, but nevertheless, focusing on this small arthropod was a very important development in the prevention of this disease even though skeptics did not believe in the tick theory of transmission, they were careful, or more careful, than they had been previously to remove ticks when they were in areas where tick prevalence was extremely high. However, this theory of tick transmission received a severe setback in 1904 when Dr. Charles Wardell Stiles, also of the Hygienic Laboratory, Chief of the Division of Zoology, came out to the Bitterroot Valley and examined a half dozen cases that occurred in Missoula and the Bitterroot and could not identify the organism Plasmodium hominis in these cases. He also noted that in some instances there was no history of tick bite, and in a subsequent scientific publication, he decried the theory of tick transmission of this particular disease. This confusion, of course, was very unsettling to residents of this particular area, and they became even more skeptical about the capabilities of these so-called experts in arriving at a solution to their particular problem.

It was in this setting then in 1906, when Dr. Ricketts came to the area and began the first of his classical investigations. Although he was supported at least in part by the Montana Board of Health, Dr. Ricketts later stated that one of the reasons that he came here in the first place was because of the conflicting results of earlier investigators piqued his scientific curiosity. In a series of brilliant investigations between 1906 and 1909, Dr. Ricketts worked out the essential elements on disease transmission and its maintenance in nature and even established the framework for a systematic control of the disease problem to be followed by subsequent investigators. He set up his headquarters at what was then known as the Northern Pacific Hospital headed by Dr. J. J. Buckley (?) in Missoula now referred to as Missoula General Hospital. Although the present structure is not the structure that was present at the time of Dr. Ricketts' researches.

One of the first things that he wanted to do was to determine whether or not to identify the nature of the causal agent of Rocky Mountain spotted fever, and for this purpose he needed

experimental animals. He used monkeys, guinea pigs, and rabbits initially, and rabbits did not provide any successful outcome, but he was able to establish a causal organism in guinea pigs and he was able to show transmission of the disease from one animal to the next and also able to transmit the disease to monkeys. Later, he showed that ticks being fed on diseased guinea pigs would acquire infection and after a suitable period of time could transmit the disease to other animals. Still later, he also established the fact that the disease agent could be transmitted from one tick generation to the next by way of the eggs. He also showed the ticks collected in nature, in a few instances, were infected with the disease organism, and he hypothesized that there must be an animal host in nature from which uninfected ticks could acquire their infection, because of the fact that transovarial transmission in the tick population was less than 100 percent. Dr. Ricketts' findings were convincing to the majority of residents in Western Montana, and they now began to take the tick theory of transmission much more seriously than heretofore. Dr. Ricketts had been struck by the similarity in the clinical the disease between Rocky Mountain spotted fever and what was referred to then as Mexican typhus. And after he had completed his work in the Bitterroot Valley in 1909, he proceeded to Mexico City and began investigations on the peculiar disease that was occurring particularly in the jails in Mexico City. He hypothesized that the disease there may well have been transmitted by body lice, and indeed he did demonstrate that this was the case before he himself was bitten by infected louse and subsequently developed typhus and died of the disease within days before he was scheduled to come back to the Bitterroot Valley the following spring in 1910.

In the meantime, a young entomologist at the Montana Agricultural College in Bozeman [now Montana State University] was urged, became interested in Dr. Ricketts' finding as regards the role of the wood tick in the transmission of Rocky Mountain spotted fever, and determined to learn more about the life cycle of this particular tick. However, his resources were rather meager, and he enlisted interest also of the Federal Bureau of Entomology. In 1909, a young student of Dr. Cooley's [Robert A. Cooley] was hired by the bureau to obtain information on the distribution of this particular tick throughout the Rocky Mountain region, and in the spring of 1909, he traveled through Montana, Wyoming, Utah, Idaho, and Oregon and Washington and obtained much of the information that we know today on the distribution of this particular tick. Dr. Cooley had arranged with Dr. Ricketts to initiate field investigations on the tick and the occurrence of spotted fever in nature in 1910. The Bureau of Entomology was also to collaborate in this effort, and Mr. Willard King was employed to set up a laboratory for this purpose. This became known as Camp Venustus. It was established in the middle of a hot spotted fever area close to Sweeney Creek near Florence. A Federal Bureau of Biologic Survey [Bureau of Biological Survey] as well as a Bureau of Entomology was involved in this effort, and a young zoologist by the name of Clarence Birdseye—later of frozen food fame—was hired by the Bureau of Biologic Survey to determine the types of small animals which were present in the Bitterroot Valley that might be involved in the natural maintenance of Rocky Mountains spotted fear.

The principal finding of the work in that year was the establishment of the fact that the life cycle of the wood tick actually encompassed to a span of two years—two or more years—

rather than a single year as Ricketts had originally thought. This, of course, complicated any scheme for tick control which was initiated in 1911. Much of the thinking of Dr. Cooley and others was focused at that time on control of the adult tick by dipping large domestic animals in arsenical dips which would kill the adult ticks before they could assume their role in propagation of the species. It was known also that small animals, particularly Columbian ground squirrels or gophers, were important in maintaining the immature stages of the wood tick; therefore, destruction of these rodents was also a major facet of the control program.

The decade between 1911 and 1920 then was one that was primarily focused on attempts to eradicate the wood tick from the Valley floor and foothills west of the Bitterroot River. During much of this time, this was a cooperative effort between the United States Public Health Service, the Bureau of Entomology, and the State Department of Entomology—State Board of Entomology. The mechanism by which this control effort was coordinated was through a Board of Entomology established by the state of Montana in 1913. This consisted of the chairman of the Board of Health, the state veterinarian, and the state entomologist—the latter acting as secretary for the board and also the person who was directly in charge of the control operations. Through the Board of Entomology, rules and regulations regarding control activities were developed, control districts were established from Missoula south to Lost Horse, and the cooperation of west side residents of the Bitterroot Valley and as far north as O'Brien Creek was elicited with some difficulty.

The collaboration among the various agencies did not always run smoothly. For example in 1911, the secretary of the Montana State Board of Health Dr. Thomas Tuttle requested the United States Public Health Service to establish investigation of Rocky Mountain spotted fever in the Bitterroot Valley independent of Dr. Robert Cooley's operation. He felt that this disease was primarily a medical problem and that medical experts should be primarily involved in eliciting the information necessary for disease control. In 1911, the surgeon general of the Public Health Service assigned Dr. Thomas B. McClintic, also a young officer of the Hygienic Laboratory, to the Bitterroot Valley where he established his headquarters that the town of Victor. The dipping vat was built by Cooley's group at Florence and by the Public Health Service at Victor, and ranchers were encouraged to bring their livestock to the vats periodically during early spring for adult tick eradication. A system of gopher eradication was also set up in these two areas, and restrictions were placed on movement of livestock from tick-infested areas to non-tick-infested areas during the tick season from April 1 to July 15. In addition, Dr. McClintic set up a test field area in the foothills west of Victor, measuring one by eight miles, in which he began limited studies of the small mammal populations and their capacity to act as hosts for the causal agent of spotted fever.

The control operations of the two groups continued the following year, although the Bureau of Entomology temporarily withdrew in view of the poor collaboration manifest by the U.S. Public Health Service. The work that Dr. McClintic started in elucidating the mechanisms of transmission of spotted fever in nature were continued in 1912. But shortly before the season's

end, Dr. McClintic himself developed Rocky Mountain spotted fever and died of the disease within a day after his return home to Washington D.C. This of course—

[Break in audio]

It was realized, more than ever before, the urgent need to develop measures for elimination and control of Rocky Mountain spotted fever. Consequently in 1913, the Public Health Service assigned Dr. L.D. Fricks to take Dr. McClintic's place in Victor. And Dr. Fricks arrived in the spring of 1913, and returned each tick season to continue control work and in spotted fever investigations to the time that World War One broke out, at which time the Public Health Service left the area at the end of June 1917, not to return for a number of years thereafter.

During Dr. Frick's time, the collaboration improved considerably between the U.S. Public Health Service and the State Board of Entomology, and also the National Bureau of Entomology returned to the area and set up its headquarters near Florence. The control efforts were coordinated through Dr. Cooley of the Board of Entomology. Through dipping of livestock, control of the Columbian ground squirrel—elimination of the Columbia ground squirrel—the quarantine efforts of livestock, and burning of slashings along the foothills during the spring months, the number of ticks present in the control districts undoubtedly decreased in large measure. In addition, the number of cases of spotted fever dropped from some 26 in 1900 to only a half dozen in the latter part of the 1910 to 1920 decade.

In 1917, because of the war, the Bureau of Entomology also withdrew from the Bitterroot Valley, and Dr. Willard King who carried out the bureau's program very effectively, likewise, was reassigned to mosquito work in the southern states later in the armed forces. Between them the Bureau of Entomology and the United States Public Health Service funneled some 15,000 dollars a year into control efforts in the Bitterroot Valley, which left some 5,000 dollars of state moneys for control of insect-borne diseases that could be used by the Board of Entomology elsewhere. In 1916…Correction, in 1915, the Board of Entomology, under Dr. Cooley, decided to allocate some 5,000 dollars to elucidation of the fly problem and typhoid fever in the eastern part of the state. Dr. Cooley enlisted the services of a young entomologist from the University of Massachusetts by the name of Dr. R.R. Parker to conduct these studies in Miles City. Parker did an excellent job, and the following year, his services were again enlisted to study. Rocky Mountain spotted fever in the eastern part of the state.

For the first time in 1916, it was recognized that spotted fever was also a problem in some of the eastern counties although the disease did not carry the same high case fatality rate that it carried in the Bitterroot Valley. Dr. Parker carried out these studies in 1916 in the Powder River country and in 1917 in Musselshell. When the Bureau of Entomology and the United States Public Health Service withdrew from Montana in 1917, the state was thrown back on its own meager resources, and Dr. Parker was assigned to the Bitterroot Valley in 1918 to assume the control efforts which had been carried out by the other two agencies up to that time. This was

the beginning of Dr. Parker's long association with investigations and control efforts on Rocky Mountain spotted fever, which terminated only with his death in 1949.

Dr. Parker was not impressed with dipping of livestock as a means for eliminating the tick. He also noted that the problem was not just restricted to the control districts, but if a final elimination of the disease were to be achieved, there had to be some means for elimination of the reservoir of disease which obviously existed in the mountain canyons to the west of the control districts. He was convinced, however, that rodent control campaign should be accentuated in order to eliminate the immature stages of the tick. He also was convinced that further research was necessary on the ecology of the disease in nature. But he did not have the financial resources to pursue this goal to any significant degree until 1921 at which time there was a sudden increase in the number of cases that occurred in Western Montana, which involved among others two very prominent people from Missoula—One a state congressman and his wife who was president of the Montana Women's Club—which resulted again in the return of the United States Public Health Service. It was obvious that something more had to be done in attempts to control the disease than had been done heretofore.

Control of the tick, in itself, was not sufficient, and ultimately a vaccine was needed to protect the residents of this area against acquisition of the disease. Agreement was reached between the state and United States Public Health Service that more satisfactory laboratory quarters would be established, that Dr. Parker would become a special expert in the United States Public Health Service, and that a public health service officer would be assigned to the Bitterroot Valley to assume direction of the program here. The state would continue to function as the means for tick control in the area. Thus in 1921 and 1922, the abandoned schoolhouse at Canyon Creek was leased and remodeled for work with infected ticks and animals. Dr. R.R. Spencer who had spent one summer with Dr. Fricks several years earlier was assigned as a director of the laboratory. Spencer and Parker formed a team that functioned very efficiently through the end of the 1920s. Parker's interests were primarily in the ecology of the disease, and Spencer was interested primarily in the laboratory aspects.

In order to study disease ecology, however, it was first necessary to devise satisfactory laboratory techniques for study of the disease and cultivation of the disease organism. Up until that time, disease transmission in the laboratory was achieved either by inoculating infectious blood from one animal to the next or by feeding infected ticks on normal guinea pigs. The latter procedure was very laborious, and Spencer thought that, in order to determine present prevalence of infected ticks in nature, a simpler procedure had to be devised for the transmission work. He first attempted to do this by grinding up infected, but unfed, adult ticks and inoculating them into susceptible animals. He was surprised to find however that, although this procedure immunized the animal against the subsequent challenge with virulent organism, it did not in itself cause disease. Later, he found out that feeding was necessary in order to reactivate the organisms in the tick in order for disease to be transmitted. The procedure that was finally worked out was that the ticks were fed for two or three days, and then they were ground up and inoculated into susceptible animals.

In the meantime in Europe, studies were being continued on epidemic typhus, and an investigator there found that infected body lice with the typhus rickettsia that had been inactivated with phenol when ground up could be used as a basis for a vaccine against epidemic typhus. Spencer and Parker were familiar with this work and they felt that this might offer a possibility as far as developing a preventive vaccine against Rocky Mountain spotted fever. Consequently in 1924, infected ticks were ground up, the organisms were inactivated with a combination of formalin and phenol, and vaccine so prepared when inoculated into guinea pigs protect the animals after a certain period of time against challenge with Rocky Mountain spotted fever rickettsii. This was a very exciting development. Because it had become quite obvious that there was a great deal of risk working with the spotted fever organisms in the laboratory.

In 1919, a bacteriologist at the state health department acquired spotted fever in the laboratory and died. In 1922, a young technician assisting Dr. Spencer, William Gettinger [William Edwin Gettinger], also acquired the disease and subsequently died. In fact, every person who developed spotted fever prior to 1924 in the laboratory subsequently died of the disease. Thus, the need for protection of the laboratory personnel was critical. The first person to be vaccinated with the Spencer-Parker vaccine was Dr. R.R. Spencer himself. There were no side reactions, and within a short time, many of the laboratory employees had taken the vaccine. One who did not take the vaccine, however, was a field man by the name of Harry Cohen who had been Dr. Parker's assistant from the very beginning. He was a remarkable individual, who was thoroughly familiar with the techniques for collecting ticks and their animal hosts in nature. However in the fall of 1924, he too acquired a laboratory infection and died of spotted fever.

R.R. Parker carried on field trials of the vaccine in the Snake River country of Idaho. In this area, several hundred cases of spotted fever occurred every year primarily among sheepherders. Each spring the sheep were driven from the Snake River to the Sawtooth Mountain, and the cases of spotted fever developed during this spring migration. In Idaho, the disease is milder, and Parker found that vaccinated sheep men were protected in large measure by the spotted fever vaccine. Over in the ensuing years, the Spencer-Parker vaccine was also used extensively in the Bitterroot Valley. The effectiveness of the vaccine here, however, was somewhat different from that in Southern Idaho. Very little protection against the occurrence of disease in the Bitterroot Valley occurred. However, the vaccine was effective in reducing the severity of disease.

Nevertheless, even among vaccinated persons, there was occasional death. The death of Dr. Spencer's assistant who had been vaccinated—LeRoy Kerlee [Albert LeRoy Kerlee]—in 1928 was very discouraging to Spencer, and ultimately, probably an important reason for his discontinuing this work a year or so later. Nevertheless, in spite of occasional failure, there is no question but what the Spencer-Parker vaccine was effective in protecting against this dreaded disease. However, the manufacture of vaccine on a large scale required many thousands of

infected ticks, which were difficult to maintain under containment conditions that were adequate to protect laboratory personnel under the conditions that existed at that time. It was obvious that new laboratory facilities were needed. Consequently, in 1927, the state legislature appropriated some 60,000 for construction of a new facility. This new laboratory was completed in 1928, and comprises the first building of the complex of laboratories now known as the Rocky Mountain Laboratories, located on the southwest corner of Hamilton bordering Fourth Street just outside the city limits.

However by this time, it was recognized that spotted fever was not just a Montana problem; that neighboring mountain states had just as many and even more cases in some instances, which resulted in ever increasing demand for the vaccine by practicing physicians in those areas. It was increasingly evident that preparation of spotted fever vaccine was more than just a state obligation and that this responsibility should be assumed by the United States Public Health Service. Consequently, negotiations were initiated for the United States Public Health Service to assume complete jurisdiction over preparation of the vaccine and research on the disease. This was finally accomplished in 1932, by which time it was already evident that additional facilities were needed in order to satisfy the demand for vaccine.

In 1932, a check was sent to the treasurer of Montana amounting to 68, 757 dollars for the purchase of the Rocky Mountain Laboratory by the United States Public Health Service. It coincided with the reorganization of the Hygienic Laboratory and the establishment of the National Institute of Health, which was the parent organization of the present National Institute of Allergy and Infectious Diseases. This coincided also fairly closely with the discovery of Rocky Mountain spotted fever in the East, particularly in the states of North Carolina and Virginia. Thus, the demands for vaccine increased dramatically, and no sooner had the original building been purchased by the Public Health Service than it became evident from space requirements that a new addition was needed. This was completed in 1934. In the late '30s, additional buildings were added, and the complex of laboratories assumed its present appearance.

The decade of the 1930s at the Rocky Mountain Laboratory was known particularly as a period of Rocky Mountain spotted fever vaccine production. Increasing demand reached a peak in 1939 when enough vaccine was distributed to immunize some 140,000 people. This expanded production required not only an increase in facilities, but also an increase in the laboratory staff, and at its peak required some 6,000 domestic rabbits to feed the ticks and 15,000 to 20,000 guinea pigs to infect ticks and to assay the vaccine for potency. The procedure was very expensive and laborious, and it was evident by the mid-1930s to Dr. Parker that some other means for vaccine development should be devised. In 1936, Dr. Harold Cox was recruited to explore the possibilities of developing a vaccine by tissue culture methods. In this, Dr. Cox was unsuccessful, but he did develop a procedure for growing rickettsia in the yolk sacks of developing chick embryos. For this purpose, fertile chicken eggs were needed. By 1940, it was evident that the yolk sack method for preparing spotted fever and other rickettsial vaccine was superior to the Spencer-Parker method of preparing vaccine from an infected ticks. However, a

small amount of tick vaccine was continued to be prepared each year until 1950. This was to be used only, however, for persons who were allergic to egg protein.

The yolk sack method for growing rickettsia was a very important discovery. With the advent of World War Two, a vaccine against epidemic typhus was urgently needed to immunize the men in our armed forces. Historically, in every large war, epidemic typhus has been a scourge wherever there had been a breakdown in the structure of society, such as in prison and refugee camps and among destitute persons in war-torn countries. In the early 1940s, the Rocky Mountain Laboratory became the major supplier of yolk sack-grown typhus vaccine. Fertile chicken eggs were also found to be useful in cultivating yellow fever virus fr preparation of yellow fever vaccine. Along with the Rockefeller Center, the Rocky Mountain Laboratory became one of the two suppliers of yellow fever vaccine for the armed services in World War Two. Dr. Mason Hargett of the United States Public Health Service and Mr. Charles Burruss [Harry Burruss] were sent out here to supervise yellow fever vaccine production. In the preparation of vaccine, heretofore, human serum was necessary for stabilizing the virus—the vaccine strain of which is an attenuated, but living, virus. Unfortunately, the serum which was used in the preparation of yellow fever vaccine at the Rockefeller Foundation was contaminated with hepatitis virus. Consequently in 1942 and '43, many of our servicemen vaccinated with the Rockefeller vaccine developed a high frequency of jaundice when they. Arrived in North Africa. The yellow fever vaccine prepared at the Rocky Mountain Laboratory, however, did not cause any problems.

A significant development of Dr. Hargett's was the elimination of the need for stabilizing the vaccine with human serum. The large-scale preparation of vaccines during the 1940s required a large increase in the number of staff members at the laboratory. At that time, the laboratory had grown to include some 150 to 160 staff members. In the meantime, throughout the 1930s and the 1940s, between 5,000 and 10,000 people in Missoula and Ravalli counties were requesting vaccination against Rocky Mountain spotted fever each year. Rocky Mountain spotted fever continued to be a problem throughout the 1930s, but during the 1940s, a number of cases decreased, and interestingly enough, the case fatality rate from the disease dropped dramatically. The reasons for this are not entirely understood, but undoubtedly, the widespread use of spotted fever vaccine played an important role.

The death of Dr. Parker in 1949 marked the end of the spotted fever era at the Rocky Mountain Laboratory, although investigations of this disease have been continued on a lower scale up to the present time. Although Parker's interests were particularly focused on the spotted fever vaccine, there was much other field and laboratory research work that were being conducted during his long regime. Some of the lines of investigation were fortuitous. For example, shortly after development of the Spencer-Parker vaccine in the mid-1920s, a number of staff members began to acquire a disease which was subsequently identified as tularemia. It was discovered that some of the ticks in nature acquired this disease organism from feeding on infected animals, and could then transmit the disease to non-infected animals. This began a long series

of investigations of tularemia—a disease which is has been of particular interest to Dr. William Jellison.

In the early 1930s in Brazil, a disease was recognized which resembled Rocky Mountain spotted fever. This was known as Sao Paulo tick typhus. Investigators at the Rocky Mountain Laboratory, in collaboration with Brazilian scientists, established the identity of the two diseases. It was evident that spotted fever vaccine prepared in Montana would be effective against the Brazilian form of the disease. Later, spotted fever was also recognized in Columbia, South America, in Central America, and also in Mexico. Likewise, in the early 1930s, spotted fever-like illnesses were recognized in various other parts of the world. Investigation revealed that these diseases were caused by rickettsia, which were slightly different from the organism that causes Rocky Mountain spotted fever. Included among these diseases was South African tick bite fever, Kenya tick typhus, fièvre boutonneuse in the Mediterranean area, Indian tick typhus, and North Asian tick typhus, which is widespread in the Soviet Union. In northern Queensland, Australia, in the late—

[Break in audio]

This is side 3 of a tape by Robert N. Philip on Rocky Mountain spotted fever in the Rocky Mountain Laboratory.

In the mid-1930s, as many as one million infected adult ticks were needed for the preparation of spotted fever vaccine. Consequently, men in the Civilian Conservation Corps (CCC) camps were enlisted to collect ticks in nature. These were then infected in the laboratory and used to rear infected ticks in the laboratory. A lot of ticks collected from the Nine Mile CCC camp west in Missoula caused an unusual illness in guinea pigs. The organism was isolated and found to resemble rickettsia in many respects. At this point, the organism was a curiosity. Although it caused disease in guinea pigs, there was no evidence to this time that it was a source of human infection. For want of a better term, the disease in guinea pigs was referred to as Nine Mile fever. About this time, the head of the Laboratory of Infectious Diseases at the National Institute of Health in Bethesda, Maryland, paid a station visit to the Rocky Mountain Laboratory, during which he observed some of the work being conducted with spotted fever rickettsia and this Nine Mile organism. When he returned to Washington, he came down with an unusual illness, which was later recognized as being caused by the Nine Mile organism.

About this time, in Australia, a new disease was described, which was referred to as Q fever. The symptoms described were similar to those experienced by Dr. Dyer of the Laboratory of Infectious Diseases. The organism causing Dr. Dyer's illness was later shown to be very similar to that responsible for Q fever in Australia. Since that time, Q fever has been recognized as a worldwide disease of considerable significance in parts of Europe and the Middle East. It is also widely distributed in this country where it is maintained as a reservoir of infection among domestic animals.

There were other diseases that came under investigation during the 1930s and the 1940s. In 1933, there was a large outbreak of encephalitis in the city of St. Louis. Rocky Mountain Laboratory staff members were sent to investigate the possibility of insect transmission. This disease later became known as St. Louis encephalitis, and it was subsequently shown to be widespread throughout the southern part of the United States. Likewise, in the mid-1930s, bubonic plague was identified in Beaverhead County, Montana. Dr. Jellison was assigned the task of investigating this problem. Specialists knowledgeable about rickettsial diseases were needed in the armed forces at the outbreak of World War Two. A number of Rocky Mountain Laboratory scientists became members of a typhus commission. Included were Dr. Jellison, Dr. Glen Kohls, Dr. John Bell, Dr. Cornelius Philip. During the Asiatic-Pacific operations, a disease new to the Allies, but quite familiar to the Japanese, was recognized as frequently occurring among our armed forces in the area of operations. This disease referred to as scrub typhus resembles Rocky Mountain spotted fever in many respects. Indeed, it is also caused by a rickettsia that is somewhat related to that causing Rocky Mountain spotted fever. The disease is widespread throughout Southeast Asia and in the Pacific Islands, and during the war was the third-leading cause of morbidity among the American troops in that area. Members of the United States typhus commission including the environmental scientists were detailed to learn more about the disease and to establish measures for its control among the Allied troops. Much of what we now know about scrub typhus was learned during those war years, and the scrub typhus organism itself was studied for a while at the laboratory here.

The scope of the Rocky Mountain Laboratory program of research expanded greatly during the post-war years. In the late 1940s, an unusual disease was recognized in Southern California, which was referred to as Y fever. This was later identified as Q fever. The disease was well-established among some of the dairy herds in the Los Angeles area, and the disease organism was spread in dust from contaminated premises. Later in the 1950s, it was established that Q fever was widespread throughout Southern Idaho in the Snake River Valley in both sheep and cattle. Environmental investigators were instrumental in these investigations. They included Dr. John Bell, Dr. Lori Lewoto (?), Dr. Herbert Stoner, and Dr. Richard Ormsbee.

Dr. Carl Larson became director of the Rocky Mountain Laboratory on January 1, 1950, following the death of Dr. Parker. There had also been a change in administration and program emphasis at the National Microbiological Institute—the forerunner of the National Institute of Allergy and Infectious Diseases in Bethesda, Maryland. Joseph Smadel became the scientific director for the intramural program and was instrumental in drastically changing the direction of infectious disease research at the Rocky Mountain Laboratory. It was at this time that technological advances were proceeding at a remarkable rate. Foremost, among these was the development of cell culture techniques for cultivating viruses, particularly those that were responsible for many of our respiratory illnesses. They included also the arthropod-borne virus diseases.

Dr. Carl Eklund was recruited during the 1940s to set up a program on arthropod-borne virus disease research. He became much interested in the encephalitis viruses and Colorado tick

fever virus. The latter is responsible for frequent, but mild, disease caused by the bite of the wood tick. It is widely distributed among ticks of the Bitterroot Valley. About ten percent of them carry Colorado tick fever virus. During Dr. Larson's regime, programs on basic research were initiated. They included investigations on molecular biology by Dr. Edgar Rebbe (?), and host responses to infection by. Sam Salven (?). Drs. David Lackman and Robert Gerloff directed their attention to developing serologic procedures for measuring post responses to infection.

As the years have passed, basic research has become the prime part of the research program at the Rocky Mountain Laboratory. Today, very few of the activities are disease oriented. I will not attempt to go in to the recent developments and program emphasis at the laboratory, except to mention that there is still some research work going on in the field of rickettsial diseases and Rocky Mountain spotted fever. Robert Aniker (?) is analyzing the composition of the spotted fever organism using highly sophisticated laboratory techniques available to the researcher today. It's hard to realize that after nearly 100 years, there are still many facets of this disease about which we do not know the answers. Prime among these is the question of virulence. Why was spotted fever in the Bitterroot Valley so severe? It must be related in some way to the makeup—the composition—of the organism itself. If this component could be identified and isolated, perhaps a more effective spotted fever vaccine could be prepared against the disease.

In recent years there has been a search for identity by the Rocky Mountain Laboratory. In early years, the objectives were clear cut. There was indeed a mission that could be clearly identified. Times have changed. There no longer are the pressing infectious disease problems that can be clearly defined around which a cohesive research program can be directed. Most of the basic research, laboratory research, that currently being conducted is not unique to this area of the world. It can be carried on just as well elsewhere. For this reason, from time to time, questions have been raised by federal administrators about the need for continuing a large research laboratory in this rather isolated area of the country. These questions will undoubtedly continue to arise from time to time in the future. The Bitterroot Valley and the Rocky Mountain Laboratory have had a rich heritage. Historically, they have contributed greatly to our understanding of many disease problems in this country and indeed in the world. These efforts have revolved around individuals and the individual scientific interests. At least, until recent years, this has always been the philosophy promulgating research interests of the United States Public Health Service through the years.

This is all too brief an account of the history of spotted fever in the Bitterroot Valley and the development of the Rocky Mountain Laboratory. Only a few of the activities have been mentioned. There are many others equally important. For example, I did not mention the fact that Dr. Robert A. Cooley retired in 1930 from Montana State College and became a staff member of the Rocky Mountain Laboratory under Dr. Parker. Through his efforts and those of Dr. Glen Kohl—his successor—and Drs. Clifford (?) and Kearns (?) who came much later.

The largest reference collection of ticks in the world was established at. Rocky Mountain Laboratory. The collection became the center for study of ticks of agricultural and medical

importance throughout the world. Through the years, hundreds of foreign scientists have visited the laboratory to study these materials. The collection has now been transferred to the Smithsonian Institution. It is no longer possible in the Bitterroot Valley for Rocky Mountain spotted fever to become the disease problem that it was around the turn of the century. This is due in large measure to the specific control efforts by Rocky Mountain Laboratory scientists and their predecessors, but even more it is probably due to the changes in the pattern of life in this area. Intensive cultivation, more complete knowledge of the life habits of the ticks and their animal hosts have eliminated Rocky Mountain spotted fever from the Bitterroot Valley floor. Nevertheless, the disease continues to exist on the north slopes of the west side canyons where it will undoubtedly be maintained indefinitely. We will continue to have one or two cases of Rocky Mountain spotted fever every year. Now with the advent of specific antibiotics for treatment and more effective laboratory methods for diagnosis, there is no good excuse for a fatal outcome from this disease.

End of dictation.

[End of Interview]