

A HISTORY OF THE ARIZONA STATE PUBLIC HEALTH LABORATORY

The Early Years (1903 to 1932)

Organized Public Health in Arizona began on March 19, 1903 when the Arizona Board of Health was created by the 22nd Territorial Assembly. Operations began on April 22, 1903 with the first Board Meeting, with the Governor as the president of the Board, the attorney general as vice-president, and a practicing physician of the territory chosen to be the secretary.

In 1907, the Board appointed practicing physicians as Health Officers in every county and incorporated town of the territory. Investigations of typhoid, smallpox and scarlet fever epidemics occupied a great deal of the territorial Health Officer's time, not to mention the ever recurring intestinal disease so commonly regarded as inevitable stomach and bowel trouble. These physicians who served as county Health Officers only had the ineffectual weapon of quarantine to fight epidemics. Quarantine regulations were of no avail without enforcement, so it was necessary to post quarantine guards (the equivalent of military police) in afflicted areas. The quarantine system was not only heartily disliked in some quarters, but also proved to be very expensive for a struggling young territory to maintain.

The battle against disease, however, raged ceaselessly on. Tracing epidemics to their sources taxed the endeavors of the hardiest horse-and-buggy doctors. Investigations of water and milk supplies suspected of being contaminated frequently reached dead ends. The evidence of the doctor's senses could not be backed up by scientific confirmation. In the early 1900's there were no laboratories available to supply the tests which are performed routinely in our State today.

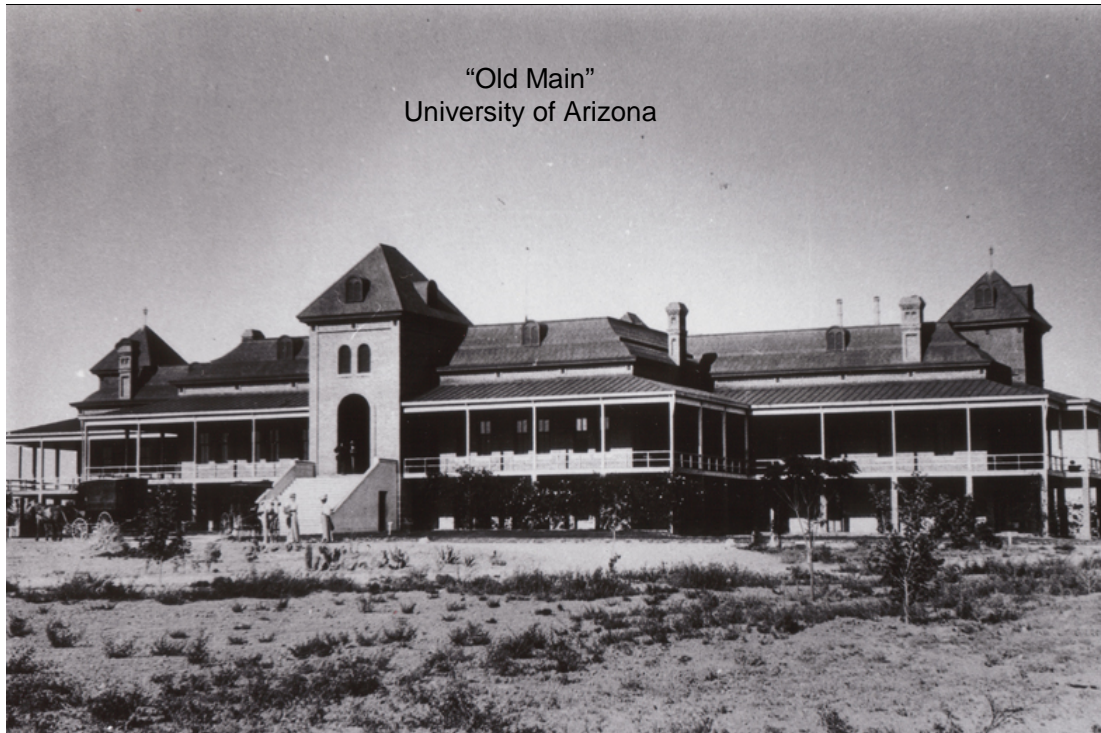
In 1907 when Dr. W. Warner Watkins opened a private practice in Phoenix, his interest in Arizona's tuberculosis problem led him to take on the post of resident physician for St. Luke's Home, as the hospital was called then. At St. Luke's in 1911, Dr. Watkins and C.A. "Bugs" Boynton opened Arizona's first laboratory called the Pathological Laboratory which began testing pathological material from tuberculosis patients, including laboratory services to all Arizona. Their primary work, however, was medical diagnosis rather than public health investigations.

To fill this Public Health Laboratory void, the first State Legislature in the first special session on May 23, 1912 established a laboratory to be known as "The Pure Food and Drug Laboratory" which operated under Section 9 of the Pure Food and Drug Law. This Act read, "To prevent the manufacture, sale or transportation of adulterated, mislabeled, or misbranded foods and liquors and regulating the traffic therein – Providing penalties for the violations of the provision of this act – Establishing a STATE LABORATORY for the analysis of foods, potable water, liquors and drugs and making an appropriation for the maintenance of such laboratory."

This name and function for the laboratory was also in reaction to the Federal Pure Food and Drug Act of 1906, which had established federal criminal offenses for adulteration and mislabeling of ingredients in food and drugs. The federal statute was Congress's response to the "literary emergency" generated by Upton Sinclair's *The*

Jungle, a turn-of-the-century book portraying a world in which all medicines were deleterious, all milk tainted, and all sausages once human.

While this new Laboratory was a Division of the State Health Department, it was located at the University of Arizona in Tucson, on the second floor of the Old Main Building, so the agency would have the guidance of the Scientific Department at the University.



Site of State Laboratory from 1912 to 1938

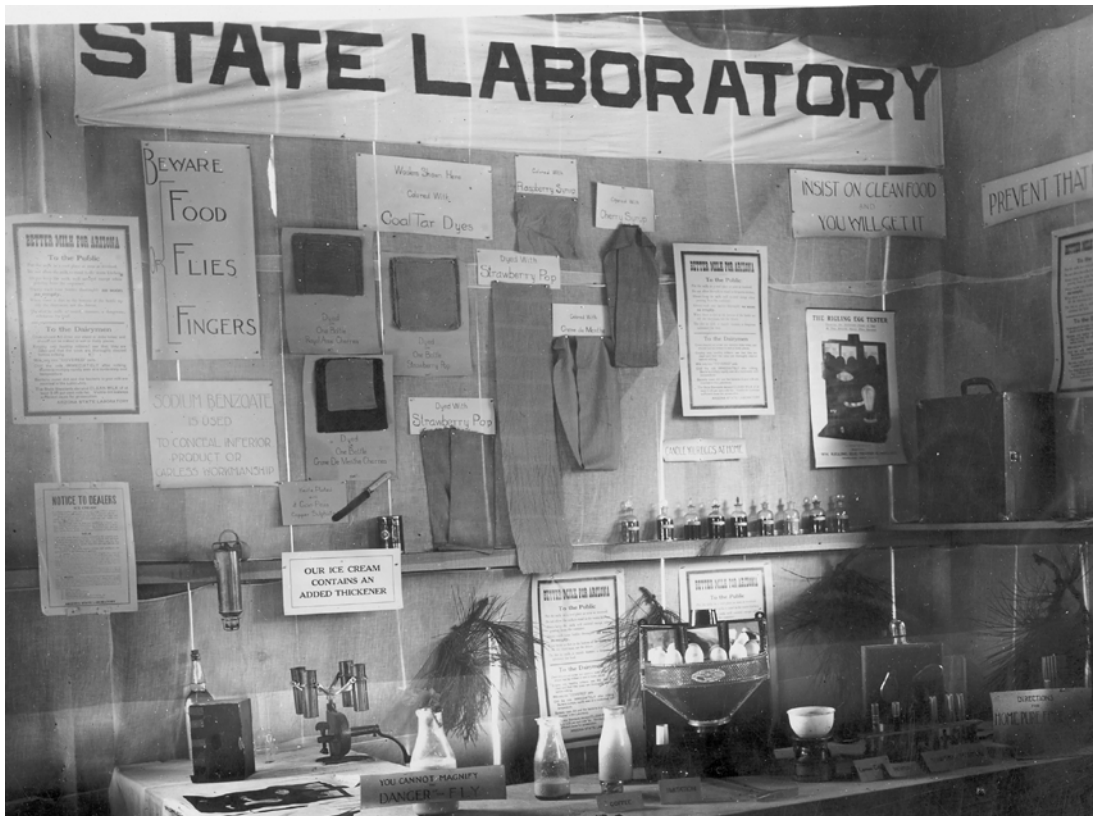
The Board of Regents at the University of Arizona together with the State Superintendent of Health were designated to appoint the laboratory director. According to the Act by the Legislature, the director “shall be a skilled pharmaceutical chemist or bacteriologist and analyst of foods, water supplies, and drugs.” The first director was Dr. Charles A. Meserve a Ph.D. in Chemistry. Dr. Meserve received his B.S. degree from MIT and his Ph.D. from the University of Erlangen, in Bavaria, Germany in 1899. Dr. Meserve had become Millikin University’s first chemistry professor and football coach in 1903 where he stayed until 1907. Dr. Meserve was working for the US Food and Drug Inspection Laboratory in Pittsburgh, PA when he was offered the job as Laboratory Director and State Chemist. Dr. Meserve, in addition to these lab duties, also became a Professor of Bacteriology and Food Chemistry from 1912-1917 for the University of Arizona. Dr. Meserve was appointed the first director at a salary of \$1800 per year and was authorized to establish the laboratory with a total budget of \$2700. In the beginning, there were three employees: a Director, an assistant and a part-time janitor.

The earliest work of the laboratory was aimed to control adulterations of foods, specifically to remove canned peas colored with copper sulfate from the shelves of grocery stores and absinthe, a type of green liqueur flavored with wormwood, in the saloons.

In 1913, the laboratory's role was expanded and given permission to also make routine urine and sputum examinations for the physicians of the state. With the testing of clinical samples, the laboratory began to be known simply as the State Laboratory and marked its entrance into the field of public health laboratory work.

Also in 1913, Dr. R. N. Looney of Prescott, Arizona, the part-time Superintendent of Public Health, brought forward some information to the State Board of Health. His family who were away that summer forgot to leave a stop order for milk delivery. When he returned, the doctor found his back porch loaded with milk. None of it had turned sour. The frank dairyman who was a good citizen said, "Sure my milk keeps fine, I use THIS. THIS was a solution of formaldehyde." That started the analysis of milk and other products for preservatives by the State Laboratory.

At this same time, the high infant mortality rate was disturbing physicians who had been active in securing the passage of the Law establishing the new State Laboratory. The physicians requested an investigation of milk supplies as a means of reducing the incidence of infant illness and death (Arizona had the second highest infant mortality rate in the nation at this time). The State Laboratory launched into a full program for bacteriological testing of milk and milk products. Also the State Laboratory produced exhibits each year at various state fairs to help create public interest in improving the quality of dairy products.



Early State Laboratory Exhibit on Milk and Food at Northern Arizona Fair

In July 1915, an article in *The Bulletin*, Vol. 1v, No. 3 was titled “Milk shall it be Food or Poison”. The article and the added incentive of a new contest introduced by the lab Director challenged the Dairy Industry to produce the cleanest possible milk. Each year the dairy with the highest score or lowest bacterial count, won a silver cup; the next three received ribbons.

One would hardly believe the stories told by the Dairy Industry and their reaction to the program. Of all the examinations and monthly publications of results, they did not believe any dairy could produce milk with less than 1,000 bacterial counts per cubic centimeter (c.c.). A few years later, these same industry individuals, after the implementation of sanitation and pasteurization in the dairies, would become angry when their bacterial counts were found to be over 10 counts per c.c. The seriousness of the findings of this investigation and the concerned interest of the dairymen resulted in the organization of an association of dairymen.

The quality of water was also implicated in the purity of milk and further involved in tracing outbreaks of typhoid fever. Improving the sanitary quality of milk and water supplies necessitated examination of sources of the supplies and the methods of handling enroute to the consumer. Miss Jane H. Rider who was a bacteriologist with the lab at this time said, “When people built their adobe houses, they dug the material out of the ground and left the hole. They let this fill with water to water their cattle. Then cows, on hot days, would stand in the ‘dobe hole’. Then milking time came, but the hossies [utters] were not washed off before they were milked, and the dirt and stagnant water got in the buckets.” Results of endless samples of milk and cream tested by the State Laboratory led to sanitary quality standards for water that was used in the dairies.

Another project that the new State Laboratory took on in the first few years was the microbial examination of candy sold in open wide-mouthed bottles and barrels, known as bulk, and a “scoop” was used to sell to the customer by scooping up the food and dropping it into a paper bag to weigh. A review of store practices could not produce any evidence these scoops were ever washed. The laboratory began making routine bacteriological examinations on these candies, however, there were no guide lines for such examinations, so, portions were weighed and dissolved in sterile water and broth for plating and Lactose Broth for *E. coli*. The plate counts turned up all kinds of fungus. Most of these were discarded as contamination. A later laboratory director stated, “It was amazing the laboratory staff were not infected since we have learned of the danger and number of fungus observed. It was either ‘Lady Luck’ watching over the staff or immunity or the methods used did not grow the pathogenic types.”



State Laboratory Exhibit at 1914 State Fair – “Insanitary Grocery”



State Laboratory Exhibit at 1914 State Fair – “Sanitary Grocery”

About the same time the candy investigation was started, one of the biggest outbreaks of dysentery was being traced to the lettuce shipped from another state and sold in Arizona. The laboratory was swamped with boxes of lettuce. Again, there were no guidelines or methods for the bacteriological examinations to work with or special medias for isolating these organisms. Only the outer leaves were used for isolating these organisms because it was learned the fields were being irrigated with raw human sewage. Many different methods were used to try to isolate the pathogens.

In 1916, Dr. Meserve, being a member of the Army reserves, requested military leave to serve in the army during the trouble on the Mexican Border, afterwards resigning to remain in the army. Miss Jane H. Rider, B.S. Civil Engineering, who was Dr. Meserve's assistant, took over as Acting Director. Miss Rider had graduated from the University of Arizona in 1911 and was Arizona's first female engineer. After graduation, she worked in the State Laboratory as a bacteriologist. In 1917, Miss Rider was appointed full Director. Miss Rider's duties remained the same as those of Dr. Meserve, except that with the appointment of a dairy commissioner, the laboratory was relieved of the inspection of dairies.



Miss Rider in a 1910 Photo

In the spring of 1918, Miss Rider also took a leave of absence to serve as a civilian in the Medical Division of the Army and was sent to Camp Doniphan, OK, and later served overseas for the American Red Cross in Great Britain. During her absence, Howard Estill, a professor of chemistry was placed in charge. He also belonged to the reserves and was called for duty. Likewise, his assistant who was carrying on the work in the state soon found he was called for duty. His assistant then took up the duties. In July 1919, the Acting Laboratory Director wired Miss Rider to return as soon as possible because he was very ill. He died a short time afterwards. Miss Rider returned and resumed her Director duties soon after.

In 1920, Miss Rider was commissioned as a Collaboration Sanitary Engineer by the federal Public Health Service at \$1.00 per year salary. Even though the budget for the Laboratory had grown to \$5,906, funds were short so the Public Health Service paid for all her travel to inspect, collect and examine interstate water supplies shipped in by the Southern Pacific and Santa Fe Railroads. Miss Rider when asked to describe her work stated that she, "juggled test tubes in the laboratory and made field investigations of milk and water supplies all over the map of Arizona, traveling by train, stage, automobile and

horseback.” She said, “Water, then as now, was on everyone’s mind. I spent a lot of time in the field with railroad representatives and mining men looking for pure water sources.”

Safe water, as we know, is a very necessary component to any community. While the population was still small and scattered in Arizona, there were different groups springing up to sell water; drilling wells and furnishing water from these supplies to the larger locations. Back in these early days, the bacteriological examinations took about a week to get results, compared to the one day methods of today.

The laboratory workers had to write all their own reports, letters, make the media, etc. Medium in those days were not in the dehydrated form they are today. The agar was shredded and had to be dissolved in water over a fire. In spite of careful watching, many times it would burn making it necessary to start over. Broths were made from raw meat, by soaking over night, filtering through a cheese cloth until all the liquid was obtained. There were other methods that were just as labor intensive – none of the autoclaves or sterilizers available at the time were automatically controlled. They all had to be watched from the time they were started until they finished. Even the still for the distilled water would flood at times when the worker would be organizing other work.



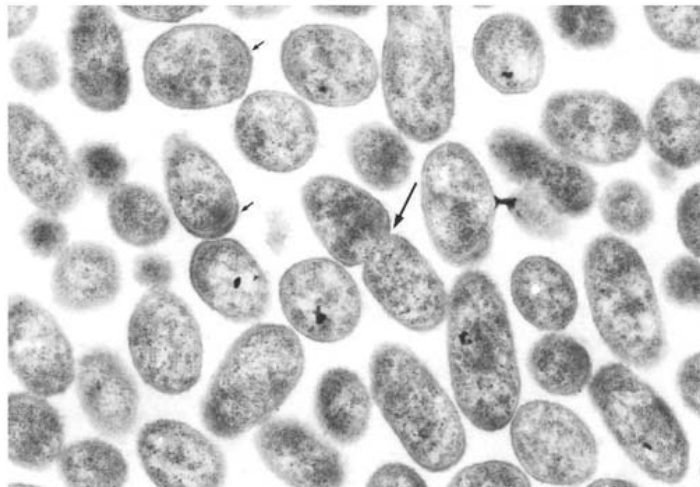
Photo circa 1918, taken in the State Laboratory in Old Main

Shortly after Miss Rider was commissioned by the Public Health Service, the first of a series of dramatic episodes involving field work was an outbreak of botulism at Florence in 1920, with five deaths and two other members of the family with non-fatal infections. The epidemiology worked out by field investigators was concurred by Dr. J.C. Geiger of the U.S. Health Service. This was the first experience searching a dump for cans that held the causative agent, commercially canned beets.

After Miss Rider received her Commission, much of her time was spent in the field leaving one worker (her assistant) and the janitor in the lab. The laboratory would on occasions also have a typist come to write reports at 35 cents an hour. These typists or secretaries were from the university pool of students needing work. One of the more

frequent typists was Lorna Lockwood, who later became a Judge of the Arizona Supreme Court (1961-1975).

In the fall of 1922, the United States Public Health Service (USPHS) was called to investigate an outbreak of Malta Fever (now known as Brucellosis) in Phoenix. The thirty four cases with two deaths was the first outbreak in an American municipality ever recorded. Samples of blood collected by Dr. Lake, USPHS and examined by the Hygienic Laboratory in Washington D.C. proved to be a virulent type, of *Brucella melitensis*. The State Laboratory collaborated on further investigations by Dr. Lake and local physicians. The herd of goats implicated in the outbreak originated in Navajo County, so it was necessary to set up a field laboratory at the Winslow High School to try to determine the incidence of Malta Fever in goats of that area. This was complicated by tribal customs of the Navajos. Antigens from the infamous 125 Strain of *B. melitensis* were prepared at the State Laboratory and used for all work done in the laboratory and the field laboratory. The investigation was more important than may be indicated. In 1912, Dr. Looney and Dr. Yount had treated goat herders in Yavapai County in the Wagoner area that had a recurring fever (Undulant). Blood samples they collected were identified by the army laboratories as being similar to the samples submitted by the army Surgeon in West Texas. A recurrence of this intermittent fever at Wagoner was referred to the State Laboratory in 1915, but it was not able to recover the organisms until Dr. Lake's investigation in 1922. Subsequently, blood samples from the goat herds in various parts of the state gave positive agglutinations.



Brucella melitensis

A decade later, Drs. J.C. Gieger and Karl F. Meyer's of the Hooper Foundation for Medical Research became interested in these 1922 studies. Another scientist in the meantime had established the relationship between the *B. abortus* and *B. melitensis* and made it important to try to determine the extent of the infection in sections of the state where it was known to exist. Welfare measures during the depression years moved thousands of goats from the Navajo reservation to the Torvea Packing Co. yards in Phoenix. Two workers from the laboratory "bled" approximately 200-250 goats three days a week. Dr. Karl Meyer collaborated in these studies. The importance of these results was evidence that the serum was only positive during the period of lactation.

In the fall of 1924, the inspection of automobile and tourist camps begun. These inspections were made by the Director of the State Laboratory and by 1927 there was a very noticeable improvement. This led to more adequate sewage and garbage disposal and better protection for their wells and springs. State regulations governed the sanitation. When they met the regulations, they were given signs that read, "APPROVED TOURIST CAMP ARIZONA BOARD OF HEALTH." In the History of Hannagan Meadows, there is a written account of the Second Annual Arizona Picnic which "took place June 18 and 19, 1927, and was the last one. In 1928, the State Board of Health strongly protested the unsanitary conditions left behind by several thousand partying people, as witnessed by Jane H. Rider of that Department after the 1927 event."



Jane H. Rider

In about 1926, Dr. McGrady, the chairman of the committee for *Standard Methods* for water examinations for the American Water Works, was tasked to revise the standards of water examination. Arizona State Laboratory was asked to assist his committee. A series of 100 samples of water from different areas of the State were tested for gas production with different media. A similar series were made in about fifteen other states and Canada. When the results were tabulated, it was found the Arizona results agreed with those of the other committee members. The 2% Brilliant Green broth now being used in laboratories for completing (confirming) microbial contamination was the one recommended by the committee.

In the Biennial Report of the State Board of Health to the Governor for the years 1925 and 1926, it states, "One of the marked shortcomings in our work has been apparent in the lack of facilities of the state laboratory, which condition is entirely due to lack of funds. The state laboratory is one of the most valuable adjuncts of the State Health Department and, while most excellent work has been done and a vast accomplishments made many more examinations could have been performed had the personnel been increased. I have repeatedly urged this need to the legislature but failed to sufficiently impress upon them the importance of this move. Other state laboratories throughout the country have grown in volume of work and importance in the control of public health matters and I feel that the State of Arizona is decidedly in need of greater laboratory facilities which can serve the public well in time of outbreaks of disease. Had it become

necessary to meet a serious situation our laboratory facilities would have been utterly inadequate. I respectfully urge the enlargement of the facilities of the State Laboratory.”

In Jane H. Rider’s 1927-1928 Biennial Report, she stated, “During the biennium of 1927-1928 we have stressed the necessity of improving the sanitary conditions of the communities of the State. Our personnel and funds are so limited we have tried to confine our efforts to work that affects the health of a large number of people. We have continued to inspect public water supplies, tourist camps, sewage treatment and disposal plants, assisted the State Dairy Commissioner in having the Standard Milk Ordinance adopted, and have carried on an investigation of the incidence of undulant fever in Arizona as well as the routine laboratory duties.”

Perhaps the biggest survey made on water supplies by the State and the U.S. Public Health Service was the *E. coli* index of the irrigation ditches. These samples were collected by Miss Rider and a Public Health Engineer. It was a long and interesting project and perhaps the most confusing part was the number of dilutions that had to be made for the plating and *E. coli* index. These results were published by the Public Health Service. In a speech before the American Public Health Association on October 28, 1930 Fort Worth, Texas, Miss Rider presented her results and talked about the sanitary features of irrigation.



The Arizona State Building – 1688 W. Adams Street

With the fast population increase in Arizona, the demands for work at the State Laboratory dramatically increased. In 1930, the State Board of Health obtained enough space in the new Arizona State Building in Phoenix for its operations and for the establishment of a Phoenix branch laboratory in Room 100. Because there were no funds to set up the new laboratory, a cooperative unit was established with the City of Phoenix and Maricopa County, thru its health unit, and the State Dairy Commissioner, all contributing toward the expenses. In October of 1930, Miss Marion E. Stroud,

bacteriologist at the original laboratory in Tucson was placed in charge of this branch with her assignments in Phoenix to be similar to those performed at the main laboratory in Tucson. In 1931, the Legislator approved appropriations of \$1800.00 per year to support the new Phoenix Branch Laboratory (the lab by 1953 occupied 1350 square feet of this building).



Marion E. Stroud