action similar to that of digitalis, powerfully stimulating the heart, and in more than the smallest doses producing serious consequence. Bufagin gets its name from *Bufo,* which is the zoological title of a large and widely distributed genus of toads. Two other groups of poisonous principles are known as bufotoxins and bufotenines.

The three researchers do not believe that the toad makes any practical use of its powerful chemical armament. They stated:

"The toad may be handled, irritated, or stimulated by electricity, but it will not squirt the poison. It is not likely the toad uses its poison for defensive purposes. It is more probable that the secretion is a form of useless product much like strychnine and brucine in the plant Nux vomica. The stimulation of the glandular nerves does not result in an increase of epinephrine output into the vein, so that this hormone does not seem to circulate in the blood and play the same role as in higher mammals."

*Science News Letter, December 31, 1932*

SEISMOLOGY

## United States Feels Year's Most Severe Quake

THE MOST SEVERE earthquake within the United States in a year that was felt in California and Nevada late Tuesday night, Dec. 20, was centered near Mono Lake in the high Sierras not far from the California-Nevada state line. This determination was made by the U. S. Coast and Geodetic Survey using seismological reports gathered telegraphically by Science Service.

The exact epicenter was computed as 38 degrees north latitude and 118.8 degrees west longitude. The time was 10:10 p.m., Pacific Standard Time.

Not since the Texas earthquake of Aug. 16, 1931, which centered around Valentine, Texas, has so severe a shock been felt in this country. It was also reminiscent of the Montana quake of 1925.

An earthquake disturbed the bottom of the sea of the coast of Guatemala early on the morning of Monday, Dec. 19, the U. S. Coast and Geodetic Survey determined from data gathered by Science Service from five American observatories. The exact time of origin was 1:28.5 a. m., Eastern Standard Time. The epicenter was located approximately in 12.5 degrees north latitude, 93 degrees west longitude.

*Science News Letter, December 31, 1932*

BACTERIOLOGY

# Scientists Discover How Tuberculosis Germs Multiply

### TB Bacteria Are Found to Go Through Several Stages Instead of Following Accepted Method of Splitting in Half

THE EXACT WAY in which a single tuberculosis germ multiplies into three or more new germs has been observed by Prof. Morton C. Kahn of Cornell Medical College, New York City. He described the process before the meeting of the American Association for the Advancement of Science.

Bacteria or germs have a life cycle something like the egg, the pupa and the butterfly. Professor Kahn was the first to work out that cycle for the tubercle bacillus.

The question of how disease-producing bacteria reproduce, or multiply into more bacteria, is one of the most important problems confronting present-day bacteriologists, he said. Some believe that the organisms multiply by simply splitting themselves in half. This is probably the method of a wide variety, but he found it was not the method of the tuberculosis germ.

The rod-shaped tuberculosis germ cleaved into three or more oval bodies which became further reduced in size to extremely fine granules. From these tiny granules very small and delicate rod-shaped types developed. These rods finally elongated and thickened until they became the same size and shape as the tubercle bacillus from which they started. These new, rod-shaped tuberculosis germs were able to produce typical tuberculosis in guinea pigs.

#### One Germ Per Drop

In his investigation, Professor Kahn used a length of sterile glass tubing drawn to an inside diameter of about 1/10,000 of an inch. This he filled with culture fluid containing living tubercle bacilli. Tiny drops, about 1/1,000 of an inch in diameter, were then isolated under the microscope. With proper methods, these drops will contain only one tubercle bacillus or germ. The whole thing was then sealed up airtight and Professor Kahn could watch the same tubercle bacillus under the microscope day after day.

Contrary to the claims of some investigators, Professor Kahn did not find that the tubercle bacillus, even in the form of the almost sub-visible granules, could pass through fine-pored filters. He did find that some of the fine young granules and rods formed from the original tubercle bacillus lost the family characteristic of retaining certain aniline stains even after exposure to acid. This discovery is significant because this characteristic of "acid-fastness" is ordinarily used to determine, for diagnosis, whether or not specimens of sputum contain any tuberculosis germs.

#### Smooth to Rough

A single tuberculosis germ, he found further, can carry certain other important family characteristics. One of these is the ability of colonies of tens of thousands of individual tuberculosis germs to change from a type that is smooth, moist and glistening in appearance to a type that is dry, rough and irregular. With this ability to change from one type to another according to appearance goes the ability to have diminished or enhanced power of producing disease. These important characteristics of colonies, Professor Kahn found, belong to individual members of the colonies also.

*Science News Letter, December 31, 1932*

## *From* ATLANTIC CITY

**News of discoveries reported to the great Christmas meeting of the American Association for the Advancement of Science and affiliated societies in Atlantic City is contained in this issue. Activities of the scientists during the second half of the week will be covered in SCIENCE NEWS LETTER for January 7.**