

the Pacific area that usually pick up a really severe disturbance anywhere, no matter how distant, showed no trace of it.

However, Venice could be really severely damaged by even a minor local earthquake, for the city is a veritable "set-up" for seismic trouble. It stands on a group of low, sandy islands off the coast, and this kind of shifting ground is exactly where an earthquake

can play the most mischief. The constant additions to the sand and silt load on the sea bottom, brought down by the Po and the lesser rivers of the Venetian plain, are in themselves contributors to eventual earthquake disturbances. By lightening the load on the land, and increasing it on the sea bottom, they set up strains that in the end find their relief through earthquakes.

*Science News Letter, October 31, 1936*

kept in 2-inch square pine boxes covered with tightly-fitting cork stoppers. The boxes are kept in trays of slightly moistened sand and a very little of the moisture makes its way through the walls of the pine box to the space occupied by the ticks. Dr. Francis says their board bill has been cheap.

One dozen of the surviving 36 had a meal of monkey blood after three years. Another dozen were fed after four years. The last 12 got their first meal in five years just the other day.

"They were flat as a flitter," Dr. Francis said, "when we let them bite the monkey, because they had gone so long without food. But these ticks are fast feeders. Within half an hour they had gorged themselves full of monkey blood."

The monkey is now sick with relapsing fever, showing that the spirochetes of this disease were able to stay alive five years in the starved ticks' bodies. Dr. Francis thinks the ticks and the spirochetes can live indefinitely. He has put them in his will, so that if they survive him, some other scientist will be entrusted with the job of keeping them and studying their longevity.

This five-year survival of both starved ticks and the relapsing fever germs within them show that there is no hope

PUBLIC HEALTH

## Starvation Record Set as Ticks Survive for Five Years

### Twelve Texas Ticks Get Their First Meal in Half Decade Showing Surprising Longevity and Endurance

A STARVATION record has fallen as 12 Texas ticks got their first meal in five years—blood sucked from a monkey.

A record for longevity in the tick world was broken at the same time in the laboratories of Dr. Edward Francis of the U. S. Public Health Service's National Institute of Health, where the ticks dwell in little wooden boxes that look like apartment houses set on sand.

The starvation and longevity records have interest to others than just scientists, however; they are an unpleasant menace to the longevity of man.

These ticks harbor the germ of relapsing fever, a disease with symptoms something like those of malaria and with a 50 per cent mortality in some parts of the world. There have been 250 cases of this disease in Texas in the last six years, none of them fatal, however.

The ticks are not the ordinary wood ticks but belong to the species *Ornithodoros turicata* and are found only in Texas, Arizona, California and Colorado.

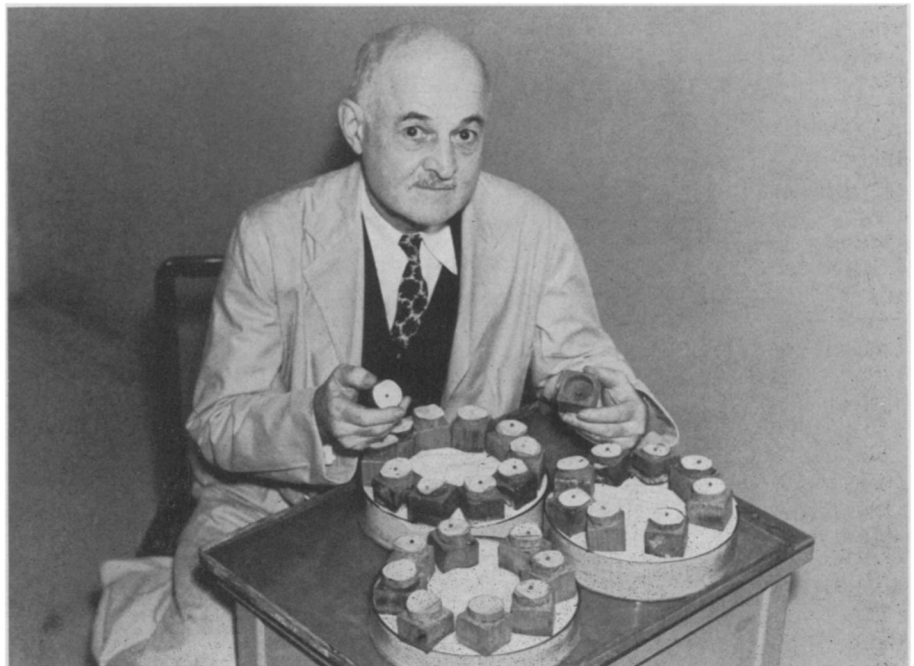
#### Ticks Live Without Food

The amazing thing about these ticks is the length of time they can go without a meal. Twelve of them have lived for the past five years without any food at all. Not only that, but these ticks on their diet of what Dr. Francis terms "thin air" have been able to nourish in their starved bodies the spiral germs that cause relapsing fever.

Five years ago 130 of the ticks arrived from the Blue Bug Cave in Texas where they made their home in the sandy dust. The cave gets its name from the ticks

which have a blue color when they are full of blood. When they arrived they were given a meal of monkey blood. The monkey they bit promptly got sick with a bout of relapsing fever.

Some of the ticks got killed by accident and Dr. Francis gave some of them away to other scientists who wanted to study them. There are 36 of them still living in his laboratory, where they are



VILLAGE OF TICKS

*In wooden pill-box-like houses built upon the sand, Dr. Francis displays the record-holding ticks. The village is surrounded with antiseptic material that will kill the inhabitants should they stray.*



#### WORLD RECORD HOLDERS

*These ticks, carriers of relapsing fever, have lived without food for five years in the laboratory of Dr. Edward Francis at the U. S. Public Health Service in Washington, D. C.*

of exterminating the ticks, Dr. Francis explained. The menace of relapsing fever will have to be fought by some other means.

Relapsing fever, which can also be spread by body lice, has been known for centuries in Europe, Asia and Africa, but has not been much of a problem in the United States. A few small epidemics were reported in this country in the last century but in these cases the disease seemed to have been brought in by immigrants. Until about six years ago there was no evidence of its occurring naturally in the United States. Then from Texas came reports of an outbreak following a camping trip made by a group of boys.

#### Lived in Caves

"The boys, of course, had to pick some outlandish place for their camp," Dr. Francis related, "so they chose some caves down there in Texas. Later, after they had returned to their homes they began, one by one, to get sick."

The symptoms were fever, chilliness, headache and other pains, followed by a rash and profuse perspiration, after which the patients seemed to recover, only to get sick again four or five days later. These relapses are what gives the disease its name. During the third relapse, the spiral-shaped germs called spirochetes were found in their blood and the disease was diagnosed as relapsing fever.

#### Seized by Fever

Some of the doctors started investigating the source of the disease and one of them, Dr. G. M. Graham of Austin, Tex., went into the cave where the boys had camped. He came out covered with ticks and six days later he had relapsing fever. Fortunately, the disease as it now occurs in Texas is not fatal. The patients recover after several relapses, even if untreated. But there is an effective medicine for it. Doses of arsphenamine, given a week apart, cured the boys after their ailment was diagnosed. It had at first been mistaken for malaria because of the similarity of the symptoms.

After Dr. Graham's investigation, some of the ticks were collected and shipped to Dr. Francis for study. They do not carry any other disease, he says, and apparently they live by sucking blood from men, possums, cattle, horses, pigs, gophers or other animals that wander into the caves where they normally live.

*Science News Letter, October 31, 1936*

The life of leather in books or furniture can be greatly lengthened, chemists have found, by using common salt in the tanning process.

The wasp's method of chewing wood into pulp to make paper for building his house is pronounced very similar to the paper-making methods of big factories.

#### GEOPHYSICS

### Earth's Electric Currents Form Gigantic Crust Eddies

**D**ISCOVERY of electrical circuits in the earth's crust that whirl around a number of points, both in the polar regions and in more temperate climes, was reported to the International Union of Geodesy and Geophysics in Edinburgh by O. H. Gish and W. J. Rooney of the Carnegie Institution of Washington's Department of Terrestrial Magnetism.

The crustal electric currents are believed to form 16 extensive eddies. Eight of these are located in the middle and low latitudes. Four in the Northern Hemisphere and four in the Southern Hemisphere form a symmetrical arrangement about the equator. The centers of these eddies are about equally spaced in longitude and lie near the tropics of Cancer and Capricorn, respectively.

Four other eddies also appear in high northerly latitudes with their centers near the arctic circle. These also are about equally spaced in longitude. A corresponding set of eddies presumably exists in high southerly latitudes, but data to establish the fact are not available.

"All these eddies follow the sun in such a way that eight of them are always on the sunlit side of the earth and eight on the dark side," the American scientists reported. "The current in the daylight eddies of middle latitudes is considerably greater than that in the corresponding night-time eddies. However, a contrast of this character is not a common feature of the circulations constructed from data obtained at high latitudes. The centers of the forenoon eddies in middle latitudes lie near the meridian for which the time of day is 9 a.m., while the afternoon eddies center on the meridian for which the time is about 3 p.m. This feature varies between stations by as much as two hours. The current circulation is clockwise in the forenoon eddy of the Northern Hemisphere and in the afternoon eddy of the Southern Hemisphere. The sense of the circulation in the other middle-latitude eddies may be ascertained by applying the rule that the sense of circulation is opposite in any two adjacent eddies of corresponding latitude. Thus circulations in the eight eddies of the middle-latitude belt are related in the same way as are the rotations in a series of interlocking gears when oriented in a manner similar to that of these eddies.

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