

ticles and light rays behave otherwise just as they do in standard Einstein theory.

A final advance of the new Rosen theory is that it gives tensor characteristics to quantities which, in Einstein, are only pseudo-tensors. A tensor, in

mathematics, is a quantity which behaves like a collection of what scientists call vectors. A vector is a quantity which possesses both magnitude and direction. Velocity is a common vector. Tensors, in contrast to vectors, require more than three components for their designation.

*Science News Letter, February 10, 1940*

were also suffering from another condition. Nicotinic acid cured their pellagra, but left the shiny, reddened lips, cracked mouth corners and fatty deposits around the nose untouched. This condition, they found, could be cured by the vitamin, riboflavin. It could even be induced by putting patients on a diet lacking only this vitamin. Before this, no one had known that human beings needed riboflavin in their systems.

Soon Dr. Sydenstricker discovered another sign of riboflavin deficiency or lack: inflammation of the tongue, with a magenta-red color instead of the normal pink, or the scarlet of pellagra.

Next it was noticed that patients coming to the hospital with riboflavin deficiency (ariboflavinosis is its technical name) also had eye trouble which the doctors recognized as typical keratitis. Neither nicotinic acid nor any other vitamin cured this condition. Eye doctors had tried for years, unsuccessfully, to find a cure. But when the patients were given riboflavin for their sore mouths and tongues, their eyes also improved. Further trials—stopping the riboflavin and watching the eye trouble return, and the crucial trial of the vitamin in patients with syphilitic keratitis—convinced Dr. Kruse and his associates that riboflavin was the cure for this eye disorder.

#### Slit-Lamp Aided

Exact diagnosis and study of the eye disorder was made possible by examination with a slit-lamp, donated by the Milbank Memorial Fund. A pencil-point beam of light from the slit-lamp is directed across the eyes and the doctor looks into them through a microscope. This enables him to see the blood vessels and opaque spots in the cornea in keratitis. When the condition has been cured, tiny lines seen at this examination show where the blood vessels were. In the early stages of the disease this examination also shows them just beginning to appear.

*Science News Letter, February 10, 1940*

#### PHYSIOLOGY

### Surface of Lung Is Equal To Land 31 Feet Square

THE entire surface of a normal lung is equivalent in area to a strip of land occupied by a house 31 feet square, W. H. Lehmborg, American Optical Company scientist, has figured. In 24 hours of normal respiration approximately 600,000 cubic inches of air are breathed, the equivalent of air contained in a room 7 by 7 by 7 feet.

*Science News Letter, February 10, 1940*

## Vitamin Treatment Cures Blinding Eye Disease

### Keratitis, Disorder of the Cornea Hitherto Hopeless, Is Also Prevented by Riboflavin, Part of Vitamin B

THOUSANDS now blind or threatened by blindness due to an eye disease, keratitis, will have a chance to regain or preserve their sight because of the discovery that riboflavin, one of the vitamins formerly lumped together under the label B, will both prevent and cure the disease.

This latest vitamin therapy discovery, made at the University of Georgia, is announced through the U. S. Public Health Service. (*Public Health Reports*, Jan. 26)

Lack of riboflavin vitamin in the diet is proved to be the cause of the eye disease. In the first clinical trials, eleven patients were cured of the disease by doses of riboflavin, with improvement beginning within a few days.

Pathetic little babies born with syphilis, formerly thought to be a cause of the eye disease, can now have their eyes cured.

Discovery of the cause and cure of keratitis, which has long baffled ophthalmologists, was made by Drs. H. D. Kruse, of the Milbank Memorial Fund, New York, V. P. Sydenstricker, of the University of Georgia Medical School, W. H. Sebrell, of the U. S. Public Health Service, and H. M. Cleckley, of the University of Georgia Medical School. They also have found a way of detecting its earliest stages.

#### More Blood Vessels

Keratitis is a disorder of the cornea of the eye. The cornea is a delicate tissue in front of the eye whose main function is the transmission of light. Ordinarily it has almost no blood vessels in it. In keratitis, however, more blood vessels grow into the cornea, and later white opaque spots appear. If these occur in the line of vision, eyesight is blurred.

If the condition grows worse, blindness results. Itching, burning, and pain when light falls on the afflicted eye are among the symptoms of keratitis.

In the 11 patients, including two with syphilis, keratitis was cured by doses of riboflavin alone, Dr. Kruse and associates report. Improvement began within a few days. When the riboflavin treatment was stopped, the eye disorder returned. It was again promptly cured by more doses of the vitamin. Those whose vision had been badly impaired were able to see normally.

The two patients with syphilis, one congenital and one acquired, had been getting anti-syphilis treatment for months without any improvement of the eye trouble. The vitamin treatment alone, without simultaneous treatment of the syphilitic infection, brought about "remarkable improvement" of the eye condition.

#### May Not Be Diet

While lack of riboflavin is now seen to be the cause of keratitis, the lack may be due to many factors besides poor diet, the doctors explained. Chief dietary sources of the vitamin are liver, milk, eggs and vegetables. Patients may fail to get enough of the vitamin either because they do not eat enough of these foods or because they cannot absorb the vitamin from the foods. Impaired digestion may interfere with the vitamin absorption. Infection, such as syphilis, may also make it impossible for the body to get enough of the vitamin from food.

Clue to the discovery of the vitamin cure came from an earlier discovery of Dr. Sebrell and Dr. R. E. Butler, U. S. Public Health Service. They found that many patients believed to be suffering from pellagra, Dixie's hard-times disease,