MATHEMATICS

Columbia Professor Solves 2,000 Year Old Math Problem

THE GREEKS of two thousand years ago started this mathematical discussion, but Prof. Edward Kasner of Columbia University finished it when he offered the solution to the National Academy of Sciences.

It concerns what the Greeks called "horn angles," the kind of angle that two curves make when they touch a point.

The conventional measure—and the Greeks had this measure—is zero degrees. Because angles of this kind are used in making maps of the Mercator projection sort, familiar in all school geographies, because they are useful in giving a real plotting to those illusive imaginary quantities of mathematics like the square root of minus one, and because they are useful in solving problems in heat and aerodynamical engineering, differentiating between these angles is of practical importance.

Here is how Dr. Kasner makes what might be called a "mathescopic" measure of the "horn angles," undifferentiated since the days when mathematics was big news in the intellectual centers of old Athens. This new procedure will be written in modern mathematical books:

"Measure the curvatures of the two curved lines and measure the rates of variation of the curvatures. Then divide the difference in the rates of curvature by the square of the difference of the two curvatures."

This sounds and is technical, but it is the solution of a two-thousand-year-old problem which will have practical application in geography and engineering.

The beauty of this measure is that it remains unchanged through transformations that distort distances but preserve the angles, such as occurs when the surface of the earth's sphere is deformed to make a flat-surface Mercator projection for our familiar maps.

The myriads of possible horn angles, all labeled zero degrees heretofore, can each have another label varying from minus infinity through zero to plus infinity, and each takes it own place in mathematics.

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PHYSIOLOGY

Bones Continue to Change After Adulthood is Reached

THAT bone formation is an ever-changing process in the body and not a happening occurring only during youth is suggested by experiments just reported by two Danish scientists (*Nature,* Nov. 9).

Using phosphorus made artificially radioactive so that its atoms could be "traced," Prof. George Von Hevesy of the Institute of Theoretical Physics and Dr. O. Chiewitz of the Finsen Hospital, Copenhagen, have studied the absorption of phosphorus atoms in bone formation.

Using experimental rats, the scientists found that the phosphorus atoms fed in the food take about two months before they come out of the body. They report:

"The experiments suggest strongly that the formation of bones is a dynamic process continually taking up phosphorus atoms which wholly or partly replace others."

It was found that 30 per cent. of the phosphorus atoms deposited in the skeleton of an adult rat were removed in the course of twenty days, and that the front teeth absorbed ten times as much phosphorus as the average for the whole skeleton. The molar teeth, by contrast, absorbed less than the average.

The technique employed in the experiments was to add radioactive phosphorus to one milligram of ordinary inactive phosphorus to such an extent that the Geiger counter, used in detecting the radioactive element, registered 1,000 clicks a minute.

Thus, if any product obtained later by subsequent biological or chemical reactions gave only one click a minute, the scientists knew only one thousandth of a milligram of the inactive phosphorus was present.

The ability of radioactive phosphorus atoms to act as tracers through the animal body is comparable with research on heavy water whose "heavy" isotopic atoms can similarly be used for tracing biological happenings.

Last January Prof. Hevesy reported that after a person drinks a glass of water nearly one half of it is still in the body after nine days. He used the heavy hydrogen atoms in heavy water to detect the process of elimination. His present report on phosphorus absorption is similar research with a different chemical element.

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PHYSIOLOGY

Unique Case of Inverted Stomach Is Described

CAUSES of upside-down stomach, the rare condition which came to be generally known when little Alyce Jane McHenry travelled half way across the country to have an operation for it, were described by Dr. D. A. Rhinehart of Little Rock, Ark., at the meeting of the Southern Medical Association.

The condition is most often due to a defect in the left side of the diaphragm, Dr. Rhinehart said. The diaphragm may be missing or ruptured at birth or may become ruptured some time after birth, with the result that the stomach gets up into the chest cavity and turns upside down. Paralysis of the side of the diaphragm is another condition that may be found with upside-down stomach.

A unique case of inverted or upside-down stomach in a patient who had a normal, intact diaphragm was described by Dr. Rhinehart. This patient was a widow 65 years of age who came to the doctor for relief of severe cutting pains in the right upper quadrant of the abdomen. For 20 years she had had mild generalized discomfort and uneasy sensations in her abdomen. When Dr. Rhinehart examined her he found she had gallstones and an inverted stomach. But her diaphragm, though thicker than normal, was intact and at the normal level. Dr. Rhinehart explained that her stomach must have turned upside down during its development, before she was born, another part of the digestive tract rearranging itself to permit this unusual position of the stomach.

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Ambulances are now being equipped with air-conditioning units.