

MATHEMATICS

Fermat's Last Theorem

► ONE OF the world's most famous unproved problems, Fermat's Last Theorem, has been proved for numbers over three times greater than ever before through use of high-speed computing machines.

Prof. H. S. Vandiver of the University of Texas, with Drs. D. H. and Emma Lehmer of the University of California, reported to the National Academy of Sciences meeting in Washington that the theorem is true for all exponents less than 2,000.

Previous desk calculator work allowed Prof. Vandiver to prove it for numbers less than 619. Then calculations became prohibitively long. The electronic calculator SWAC of the National Bureau of Standards at Los Angeles carried the job much further in only a few hours of operation.

Fermat's Last Theorem has been one of the famous mathematical puzzles since the middle of the seventeenth century, when the French mathematician wrote in the margin of an arithmetic book that he had found a truly wonderful proof which the margin was too narrow to hold.

The theorem is that it is impossible to

find three integers such that if two of them are raised to an integral power larger than two and added, the sum would be the third integer raised to the same power. The Egyptians knew that there are many solutions for the theorem when the integers are squared or raised to the power of two. The familiar right angle with its three sides in the ratio 3:4:5 is an example.

Many of Fermat's mathematical followers spent their lives trying to obtain a solution to Fermat's moment of inspiration, which mathematicians now seriously doubt actually solved the theorem rigorously. At least three large cash prizes, one in 1907 amounting to \$25,000, were offered for the solution, and amateurs who had spent their time on the trisection of an angle, the squaring of the circle and perpetual motion went to work on this problem. All the proofs offered were false.

No one has proved or disproved Fermat's Last Theorem. Prof. Vandiver has now proved it to a larger number than ever before.

Science News Letter, May 8, 1954

PHYSICS

Formation of Aurora

► THE BRILLIANT display of aurora, or northern lights, is formed when the extreme outer edge of the earth's atmosphere stops a stream of particles thrown out by the sun.

It is not the solar particles themselves that stir up the atmosphere to make the heavenly show, Drs. E. O. Hulburt and W. H. Bennett of the Naval Research Laboratory in Washington believe. Rather, the particles interact with the very thin atmosphere a few hundred miles up, Dr. Bennett told the National Academy of Sciences meeting.

Auroras come in two types. Shimmering curtains that seem to be streamers or rays are believed to follow the earth's magnetic field. Also found are formless, luminescent clouds that continually shift and change.

Drs. Hulburt and Bennett assume that the sun sends out a jet of particles, some

charged positively and some negatively, balanced so that the overall stream is neutral. Because of its magnetic field, such a stream is self-focusing.

If this jet stream of solar particles is aimed toward the earth, our planet's magnetic field diverts it to the northern auroral latitudes. There the incoming protons stir up the atmosphere, mostly oxygen and nitrogen atoms, to cause the brilliant auroral colors. Besides this incoming action, there is an explosion back out when a particle hits one of the atoms.

Dr. A. B. Meinel of Yerkes Observatory,

Williams Bay, Wis., has found particles of hydrogen, or protons, bombarding the earth with speeds of 1,800 miles a second. In order to reach the auroral region, Dr. Carl Stormer has calculated that the protons would have to have a speed about 63,000 miles a second.

Drs. Hulburt and Bennett suggest that the protons themselves are not directly responsible for the aurora, but cause it indirectly by reacting with the earth's outer atmosphere. Dr. Meinel's observations were probably on the slowest section of the particle stream, they believe.

Science News Letter, May 8, 1954

CYTOLOGY

Wild Cell Proteins May Be Tumor Cause

► WILD, MUTANT cell proteins may be a cause of tumor origin in plants, Dr. Samuel G. Wildman, associate professor of botany at the University of California at Los Angeles, believes.

His concept is based upon the idea that some nucleoproteins may be self-reproducing, rapidly-multiplying units like a virus. These particular proteins may be independent of gene control.

It has long been known that self-duplicating viruses mutate to yield new strains.

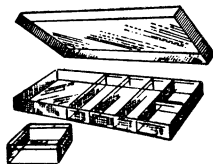
"Perhaps this is true of normal nucleoproteins," Dr. Wildman declared, "with the result that a rare mutation gives rise to a new 'strain' of normal nucleoprotein which the protoplasm is unable to control in rate or amount of formation."

This unrestrained condition may be transmitted as an infection to adjacent cells, like the spread of a virus, thus leading to a cancerous condition.

Indicative of such a mechanism is the fact that many hybrids of tobacco give rise to spontaneous tumors. This may result from two different strains of normal nucleoprotein, each originally contributed by a different parent, recombining, mutating or interacting to yield a new strain less susceptible to protoplasmic control.

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