



HOW A VOLCANO SPROUTS

One of the new geology films shows how a pencil of magma, working its way to the surface, develops the local supply of lava that becomes the working capital of a volcano.

rocks, slow-heaving rams of ice that pile up boulders on lake shores, massive rivers of ice that sculpture valleys like the Yosemite. Water is locked secretly in the crystals of the dry unchanging rocks, and water leaps bellowing as

volcanic steam when stones visit the sky and rock runs in cataracts of lava. The history of earth, these films demonstrate impressively, might well be called the history of water.

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PHYSICS—ASTRONOMY

Einstein's Relativity Theory To be Tested in Sun's Eclipse

THE NEXT eclipse of the sun will find Prof. Albert Einstein's theory of relativity again being tested to see whether it or its new challenger—the theory of Sir Shah Sulaiman, Indian judge and mathematician—better predicts the bending of star light grazing the sun's surface.

This new test is part of the latest phase of the scientific controversy over the new relativity theory of Sir Shah, who while chief justice of the High Court at Allahabad, India, is also an Oxford-educated mathematician.

The new stage consists of a defense, by Sir Shah, of previous criticisms of his revolutionary theory which would upset the work of Prof. Albert Einstein; and a counter-criticism of Sir Shah's defense by D. R. Hamilton, Princeton mathematician. (*Science*, Nov. 1)

Mr. Hamilton, working under the direction of Prof. H. P. Robertson, mathe-

matical physicist and associate of Prof. Einstein, presented, last March, the first critique of the Sulaiman theory which the Indian justice-mathematician now defends.

The new theory, as originally announced, sought to provide some link between the classical mechanics of Sir Isaac Newton and the modern Einstein relativistic mechanics. Using ordinary mechanics, Sir Shah has attempted and built up equations which as a first approximation reduce to those of Newton, and as a second approximation reduce to those of Einstein's relativity.

Also, as originally presented, the Sulaiman theory postulated the existence of tiny particles—gravitons—on which the pull of gravity depended.

In part, Mr. Hamilton's original criticism was based on these gravitons which, he said, was a concept originally

put forward by LeSage in 1764 and long since discarded.

Sir Shah in his new reply states, "I must remove the misapprehension that my mathematical theory is based on the assumption of gravitons." They are convenient, he adds, but not at all necessary for the theory.

Still another criticism of Sulaiman's original theory by Mr. Hamilton was the fact that on working out the calculations it turned out that the planet Mercury after 300 years would no longer be swinging about the sun in an elliptic orbit as it does but would change to a parabolic orbit and fly off into space.

"Fallacious"

Replying to this critique, Sir Shah points out that calculations like those of Mr. Hamilton, based on yearly increases on a large number of revolutions, are fallacious. Curves based on approximate solutions like those of the new theory, Sulaiman adds, are intended merely to represent only a geometrical picture of the orbit and then only to within the limits of whatever approximations are taken.

"Such a method," he points out, "does not at all profess to give the whole history of the revolutions of a planet over a long period."

He goes on to add that Einstein's equations fall down also when applied to the same test of a large number of revolutions.

"The obvious explanation," Sir Shah concludes, "is that the geometrical shape of the orbit is one thing and its whole history through its spiral path is quite another."

The next solar eclipse will furnish a final test of the relative merits of the Sulaiman and the Einstein theories for both predict by what amount the deflection of light from distant stars will bend if it passes close to the sun, declares the Indian magistrate.

"Still Found Wanting"

Mr. Hamilton, replying to Sir Shah's reply, points out that he soon will publish "a complete account of the numerical perturbations predicted by Sulaiman's formulae" and strongly implies that much is still to be found wanting in the whole new theory.

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At the Brooklyn Children's Museum, young "specialists" are encouraged to give lantern-slide lectures on their hobbies at the museum, and sometimes later at school,