



Science News-Letter

The Weekly Summary of Current Science

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GENERAL SCIENCE

A.A.A.S. Meeting

The 83d meeting of the American Association for the Advancement of Science will be held in Philadelphia December 27 to January 1. The highlights of this important meeting, at which some 2,000 scientific papers will be read, will be given in the next issue. A special edition of the SCIENCE NEWS-LETTER will be distributed at the A.A.A.S. meeting.

Thirty-nine affiliated organizations will join with the sixteen sections of the A.A.A.S. in meeting during Christmas week. It is estimated at over two million words will be spoken during the various sessions.

Science News-Letter, December 25, 1926



MICHAEL IDVORSKY PUPIN

Prof. Pupin is retiring president of the American Association for the Advancement of Science; his address will be the principal address at the Philadelphia meeting. Dr. Pupin holds the position of Professor of Electro-Mechanics at Columbia University

CHEMISTRY—PHYSICS

Making and Unmaking Matter

By EDWIN E. SLOSSON

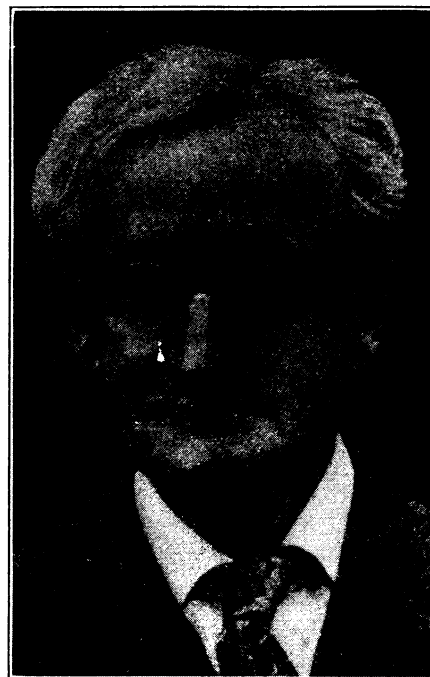
The greatest scientific achievement of the nineteenth century, in the opinion of those who lived in that century, was the formulation of two fundamental physical laws of the universe, the conservation of mass and the conservation of energy. According to these matter and energy were immutable in amount and neither could ever be created or destroyed in the minutest measure.

But the twentieth is an unsettling century. Such mental revolutionists as Einstein, Planck and Bohr have opened our eyes and widened our outlook. We cannot be so cocksure about many ideas as were the simple-minded scientists of the former century. Some of the generalizations which seemed to them absolute and universal principles of nature appear to the more critical eyesight of the present generation to be disguised definitions; similar, as Eddington puts it, to the Great Law to which there is no exception, that there are three feet in every yard.

For instance, the law of the conservation of energy. We see a lump of burning coal giving off energy at a great rate as radiant heat and light. Where did that energy come from? Where was it when the lump was cold, if no energy can be created in the course of combustion? The reply of the nineteenth century chemist was clear and decided. The energy was there all the time in exactly the same amount, although its presence could not be demonstrated because it was in the form of "potential energy." Obviously this was unanswerable as an argument, although not very enlightening as an explanation. We are nowadays disposed to suspect that

this "potential energy" was put into the coal by logic rather than by geology, and that if it exists in nature at all it is in the nature of the human mind. The twin laws of conservation of matter and energy are as useful as ever, for they still serve to clarify our conceptions and to guide our experimentations. No experiment has ever been able to detect the slightest flaw in them, and it may never be possible to devise tests so delicate as to disclose any discrepancy. Yet neither

(Just turn the page)



LIBERTY HYDE BAILEY

Dr. Bailey is president of the American Association for the Advancement of Science, and will officiate at the Philadelphia sessions. He has for many years been this country's leading author, editor and publisher on horticulture and related subjects, as well as a keen systematic botanist.

(193)

Unmaking Matter

(Continued from Page 193)

er law is now regarded as absolute in itself and it seems that we shall have to substitute a general law which will include the two and allow for the transformation of matter into energy and *vice versa*. Einstein has worked out the formula for the equivalence of matter and energy, so we can now calculate how much heat will be produced if a certain mass of matter is annihilated. This idea has been welcomed by the astronomers who have long been hard put to it to devise means of keeping up the furnace fires of the sun as long as mankind would like to live. They have now figured out by Einstein's formula that the sun is losing weight through the destruction of its material and the emission of immaterial energy of the rate of four million tons a second. But even though wasting away at this appalling rate the sun can hold out for ten million million years. This gives a welcome extension of time for the life of our world and permits us to hope that we may get our social system perfected before we all become Eskimos.

This principle of the interchangeability of matter and energy must apply to all chemical reactions where heat is produced or absorbed. Wherever coal burns there matter is being converted into radiant energy. Wherever a green leaf grows there matter is being manufactured out of solar energy. In such cases of course the quantity of matter or energy transmuted is too small to be demonstrated. In the burning of coal the heat evolved means a loss of about one part in ten billion of the joint mass of the carbon and oxygen combined. But this loss of matter becomes appreciable when we consider the world-wide consumption of coal. If we assume that all coal is pure carbon and that the combustion is always complete, the carbon dioxide produced by all the coal that burned in a year throughout the world would weigh about five billion tons. This would involve a disappearance of matter amounting to half a ton. The substance of the world is therefore being slowly consumed by the combustion of coal.

Science News-Letter, December 25, 1926

A gallon of water to a goldfish is a good recipe for a fish tank.

About 45,000 Greek athletic fans could be packed into the stadium in which the famous Olympic games were held.

STUDY HELPS FOR SCIENCE CLASSES

These articles will be found to be especially useful in class work

GENERAL SCIENCE

A. A. S. Meeting, p. 193. Science Service and E. W. Scripps, p. 201. Niagara's Suicide, p. 205. Homeric Cosmogony, p. 205. Child Intelligence, p. 207. Anniversaries of Science, p. 207. Articles marked with * in classifications below.

HYGIENE

Disease May Stop Plague, p. 195. Lungs and Marriage, p. 199. Advertisements on pp. 19, 198, 200, 202, 204, 206.

CHEMISTRY

Making and Unmaking Matter,* p. 193. Old Silks Made Into New,* p. 195. Helium

(This will fit on

Science News-Letter, December 25, 1926

Found in Ontario, p. 199. Advertisements on pp. 198, 200, 204, 206.

BIOLOGY

Gorilla Has Calm Disposition, p. 195. American Oaks in France, p. 195. World's Greatest Menagerie,* p. 197. X-Rays Hurtful to Plants, p. 203. Nature Ramblings,* p. 203. Color Affects Reproduction, p. 203. The Way of a Butterfly, p. 205. Advertisements on pp. 196, 198, 200, 202, 206.

PHYSICS

Making and Unmaking Matter,* p. 193. Helium Found in Ontario, p. 199. Advertisements on pp. 198, 200, 202, 204, 206.

a 3 x 5 card.)

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The current *news* of science, reported for Science Service by its own staff and correspondents throughout the world is presented and commented upon in each issue.

Books are *reviewed in brief* as they are received from the publishers.

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Important *anniversaries* of science are appropriately noted week by week in a special department.

Regular articles tell of the happenings in the *skies* and in the great *outdoors*.

Photographs aid in the telling of the week's science.

Great care is taken to keep its editorial content not only *interesting* but *accurate* as to fact and implication.

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