Annihilation of Matter Keeps Sun Going

Astrophysics

Light "Particles" Stream From Broken Atoms

ANNIHILATION of matter in the sun to form the energy which is radiated as heat and light is the process that keeps the sun going, Dr. C. G. Abbot, secretary of the Smithsonian Institution, said in a Science Service radio talk over the Columbia Broadcasting System.

"What supplies the sun itself with such an enormous output of energy?" Dr. Abbot asked, and answered: "Astronomers and physicists now think that the sun and all the stars are gradually consuming. I do not mean that they are burning up as coal is burned. When coal is burned it takes on oxygen, and the product in carbonic acid gas is nearly four times as heavy as the coal that is burned. Nothing like this takes place in the sun. The temperature there is so tremendous that water would turn to steam, the steam into oxygen and hydrogen, and the atoms of oxygen and hydrogen largely into electrons and protons, and all this with explosive violence if any water at all could ever reach the sun.

"All chemical compounds are thus broken up in that fierce heat. We have nothing on earth so hot. Iron melted in a blast furnace would look like a black spot against the sun, and even the arc light would seem a dull red glow against such transcendent brilliance as the sun's surface. If, then, the sun is much too hot to burn, even on its surface, and perhaps ten thousands times hotter still at its center, what do we mean by that consuming that gives out its tremendous radiant energy? We mean nothing less than the annihilation of the solar substance. Take hydrogen for example. Its atom, so far as we know, consists of nothing but a separation of two units of electricity, one positive and one negative, kept apart by some tremendous energy of motion. We suppose that in the center of the sun, under prodigious pressure and exhalted temperature, the two electricities may sometimes be forced together. When thus the atom ceases to exist, the energy that formerly forced its two units of electricity apart appears as radiation, and journeys outward into space."

Dr. Abbot also described new researches on the relation of plant growth to light.

"At the Smithsonian Institution we are making studies about this fascinating subject," he said. "We are growing plants out of jars of water containing suitable chemical plant foods. They stand in closed chambers where sunlight can be imitated by electric lights. We control the color of the light and seek to know just how efficient the different colored rays are to produce plant growth. Thus, without sight of sun or feel of earth, our plants are grown under exactly measured conditions. This will bring new knowledge of exactly what is necessary to make plants grow in natural surroundings. Perhaps improved varieties of useful plants may result from such studies."

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educational methods might be. At present, having no such method of checking, we can only argue about it.

Dr. Blakeslee stated that a preliminary survey of the school population in New York City indicates that there is a sufficient number of identical twins to fill a special "twin school," if the funds can be found to operate it. He suggested that for such a double school it would be desirable to obtain pairs of teachers who are themselves identical twins, so that the "control" method might be extended as far as possible.

Ancestry of Lowest Fish

A FOSSIL "missing link" with an existing creature that looks like a missing link itself was described by Dr. W. B. Scott, professor of geology at Princeton University.

One of the most puzzling of existing animal forms, Dr. Scott said, is the hagfish or lamprey-eel. In spite of the piscine suggestion in its name it is not really a fish but a sort of remote relation of the fishes, and a very poor relation at that. It has no eyes, no scales, no fins, no jaws, not even any bones. Its mouth is a mere sucking circle, armed with sharp horny teeth. One of the world's leading authorities on fishes once expressed the opinion that it had no long ancestry, but reached its present low estate in comparatively recent times through degenerative evolution.

But fossils recently discovered in Norway and studied by Dr. Scott now produce evidence that these humble fishlike creatures have a lineage as ancient as that of any higher animal. The Norwegian stones from Silurian formations, much older than the Coal Age, show a creature possessing many of the characters of a modern lamprey-eel, but decidedly more primitive in structure.

Interestingly enough, however, these ancient creatures had well-developed scales, as well as incipient traces of fins. But there is no evidence that they had any bones, and they had no teeth. The pineal gland, which was once a third eye, opened to the surface on the middle line of the head, whereas in the modern lamprey-eel it is buried under the skin and other tissues.

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A centipede usually has about twenty legs, although its name indicates that it has a hundred.

It has been found that salmon contains the vitamin that prevents the disease of pellagra.