**SILURIAN EURYPTERID**

***This strange creature was an inhabitant of the seas in which the cement beds at Buffalo were laid down, and Buffalo is practically the only locality where good Eurypterids are found. The photograph is of a painting in the Buffalo Museum of Science.***

ASTRONOMY

# Other Planets Tell About Earth's Past and Future

WOULD you like to know what the world was like a billion years ago and what it may be like a billion years hence? Just look at two of the earth's near neighbors—Mars and Venus. In Mars scientists see the earth as it may eventually become. And in Venus they see a world like the earth may have been before life evolved upon it.

Speaking as retiring president of the American Association for the Advancement of Science Henry Norris Russell, distinguished Princeton astronomer, recently told what science now knows about the atmospheres of the planets. Atmosphere is essential for any consideration of life as it exists on earth.

All planets lose the original vapors, Prof. Russell pointed out, which make up their atmosphere. How soon they lose them depends on how large they are; how well the pull of gravity will keep the gases from flying off into space and becoming lost.

At one end of the scale are the small planets, Mercury and Mars, which have almost no atmosphere. At the other are the giant planets, Jupiter, Neptune and Uranus, so large that they retain even the lightest gases, helium and hydrogen, in their atmosphere.

Intermediate are the middle-sized planets, earth and Venus, which have lost some of their original atmosphere but have kept plenty also.

On the earth at least, important gases, such as oxygen, can be lost in other ways than by merely flying off into space. The chemical process of oxidation goes on and oxygen is going into chemical compounds from which it can be liberated only with difficulty. The formation of iron oxide, or rust, is a familiar example.

Through one way or another, Prof. Russell pointed out, the earth has lost over half of its original oxygen in the last billion years. Plants continually supply oxygen, through their use of carbon dioxide, but gradually and irreplaceably the irons and other elements in the earth turn life-giving oxygen into compounds hard to use in any convenient form.

On Mars, Prof. Russell suggested, this process has gone much further. The actual reddish color of the planet, unique among all heavenly bodies, may be due to the presence of vast plains of reddish iron oxide, or rust, on its surface.

If man lives on Mars (Prof. Russell said only "if" and not "does") he would have to dwell in great cities clustered about enormous oxygen-producing plants making the life-giving gas from rocks and iron oxide. Sealed rooms supplied with oxygen would be a necessity, and ordinary business outside buildings carried on with gas masks and the like.

All this is hardly a pleasant picture but life on the earth may some day be like that.

"Venus seems to be at the beginning of this oxygen shortage process," Prof. Russell said. "It is much as a lifeless earth might be. We do not know how life began here, but conditions may well have been much less favorable on Venus. The real puzzle is the apparent absence of water on Venus' surface. She is almost the twin of the earth in size, density, mass and so on and one might expect an ocean there of comparable volume."

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PSYCHOLOGY

## Proper Schooling Raises Intelligence of Children

THE intelligence of your child may be raised to a higher level in a few years of schooling if the school to which he is sent is like the one that Prof. Beth L. Wellman of the Iowa Child Welfare Research Station reported to the American Association for the Advancement of Science.

Contrary to the general idea, the IQ does not seem to be fixed once and for all. Good teaching, strenuous competition and other advanced educational

methods are capable of bringing out the best in the child. Prof. Wellman's results show that this tends to shoot the intelligence quotients as measured by the famous Binet tests up as much as 28 points in five years for below-average children. Gains were progressively less for brighter children and of course the few real geniuses were not benefited at all.

Working with the nursery school tots that started in their school life at the very mature ages of two and three at the State University of Iowa, Prof. Wellman retested for IQ the children who stayed in the university's elementary school and compared them with children who had gone to other schools. The remarkable gains in IQ were thus discovered.

"The school can be the dominant force in charting the course of intellectual development," Prof. Wellman told the scientists, "superseding whatever influences the home and other agencies may exert. Gains in intelligence are contingent upon the type of school in which the children are enrolled."

*Science News Letter, January 12, 1935*

PHYSICS

# Plans New Cosmic Ray Studies For Stratosphere Flights

COSMIC rays will be coaxed to confide new secrets next spring, when the Army Air Corps-National Geographic Society stratosphere balloon again takes to the never-clouded upper reaches of the earth's atmosphere. At the annual exhibit of the American Association for the Advancement of Science in Pittsburgh, Dr. W. F. G. Swann of the Bartol Research Foundation told Science Service of some of his plans for apparatus to be carried on the flight.

The heart of the setup will be a new group of Geiger counters, similar to the group carried on last summer's flight by Dr. and Mrs. Jean Piccard, but incorporating certain improvements. The Piccard flight instruments, now historic, are part of the exhibit of the Bartol Research Foundation.

Geiger counters are exceedingly sensitive electrical devices which register an electric "kick" when a ray or charged particle strikes a fine wire inside. If two of them are placed in line, and both of them register simultaneous "kicks," it means that the same ray or particle has hit both wires, thus indicating that it came from the direction in which the two counters are aligned. The set-up for cosmic ray study consists of several such pairs, each pair aligned in a different direction, to catch rays from as many angles as possible.

Dr. Swann stated that he is also considering sending up a "cloud chamber," coupled with his counter apparatus. A cloud chamber is a device that makes visible the path of a charged particle by means of a fog trail of condensed water particles, which can be photographically recorded. As a matter of economy in film, Dr. Swann said that this cloud chamber would be hooked up to the counter group by suitable amplification, so that an exposure would be made only when the counters registered a "kick."

X-rays, with their delicate but remorselessly searching fingers, are every day probing more intimately into the secrets of how atoms come together to make molecules, yielding information of high value as "pure" science and at the same time throwing light on practical questions.

At the exhibit of the Bartol Research Foundation at the meeting of the American Association for the Advancement of Science, was an X-ray camera which takes series of pictures by means of tiny beams of X-rays shot through crystals of various substances. Crystals look solid, but are really full of sub-microscopic holes, and the X-rays passing into those holes are bounced against the more solid stuff along their sides. The way they bounce out again—"diffraction," the physicists call it—when properly interpreted tells of the structure of molecules.

Thus, the Bartol Foundation scientists in charge of the exhibit have shown how the atoms in a molecule of one of the asbestos minerals link themselves to each other in small groups, like a row of children playing "crack-the-whip." This explains the valuable fibrous or "stringy" structure of the fireproof mineral.

Another crystal which has been photographed by X-ray is a complex arrangement of cobalt and oxygen. The X-ray analysis shows holes passing through it from one side to another, like openings in a sponge. Into these exceedingly minute pores liquids and gases can be adsorbed, made to associate closely with other substances, and come out as valuable products of commerce.

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GENETICS

## New Evening Primrose Variety Never Opens

A NEW variety of the evening primrose, which develops full-sized buds but never opens them, has been found this year among the experimental plants of Dr. George H. Shull, professor of genetics and botany at Princeton University.

So far as is known this variety has never appeared before, although modern geneticists have planted well over a million evening primroses during the last thirty years. It appeared this year out of a clear sky because of a gene mutation, or fundamental change in hereditary make-up, and has been named *Oenothera,* mutant *clusa.*

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