

BIOLOGY

Life is a Growing Crystal Pattern; In Death It Sets

Progress in Field of Physical Sciences Following X-Ray Photography of Crystals Extends to Biology

DEATH is a crystalline pattern permanently set. Life is associated with the formation and destruction of crystals. The living organism is crystalline in nature, just like the material of the non-living world. Evolution began with the joining of basic elements to form very simple compounds long before life was born on earth.

These new ideas of life, death and evolution were presented to the American Association for the Advancement of Science at its Denver meeting, by Dr. George A. Baitsell, Yale biologist, as the result of recent X-ray studies which reveal the crystalline structure of living matter.

Since Alue of Switzerland demonstrated in 1912 that X-ray photographs can determine with great precision how molecules are arranged to form metal and other crystals, there have been vast practical and theoretical strides in metallurgy, chemistry and physics because of the new facts obtained.

Evidently biology now stands on the threshold of a similar development. For workers in this field have found a crystalline structure in all sorts of organic substances which are the building materials of life. First it was proved that cotton's cellulose, silk's and wool's protein and the stuff of other plant and animal fibers consist of strings of molecules joined to form minute crystals. And then everywhere the X-ray was turned, upon the fibers of our connective tissues known as collagen, upon fibrin of clotted blood, the basic crystalline pattern was revealed. Even the jelly-like protoplasm of muscle and nerve cells is fundamentally crystalline and striations in muscles are caused by a definite crystal structure within them.

Form and Reform

The very processes of life, according to Dr. Baitsell, are associated with the breaking down and the reforming of cellular structure, crystalline in nature. When the living cell loses this ability to form and reform the crystals, it is dead. Look into the chromosomes, those bear-

ers of heredity that pass life on from one generation to another, and there also crystals will be found at the very citadel of our germ cells.

Just as the chemist knows that the invisible molecule made up of atoms is the smallest possible unit of any non-living substance, so Dr. Baitsell views the cell of the biologist as the analogous indivisible unit of life. Like the inorganic molecule it is essentially crystalline in nature.

"Each cell is a living crystal, a complete functional unit of life with a precise pattern characteristic of its particular tissue and species," Dr. Baitsell explained.

Out of this uniformity of living units comes the opportunity for that progress in the living world known as evolution, that process that gave rise to new kinds of plants and animals. Just as the chemist can skillfully insert a new atom into a molecule and change its nature,

so nature remodels its cells and lo, a permanent change or mutation takes place, giving a modified animal or plant.

If this is the mechanism of evolution, as Dr. Baitsell believes, then it could have begun long before there were any living organisms. Evolution began when water was first formed out of hydrogen and oxygen, when carbon and oxygen formed carbon dioxide, when these two products formed sugar and when sugar joined with other elements to form complex proteins, necessary for building living substances.

Dr. Baitsell drew a striking analogy between the states of matter and the way living things are organized. In a gas the molecules are all free and independent, flying around as they desire. Likewise microscopic one-celled living organisms are independent and live their own free lives. In a solid the molecules are firmly fixed in a crystalline pattern, regimented completely. So also the cells in the higher organisms, including man, have lost all independence and cannot live apart from the organized whole.

Thus to Dr. Baitsell the evidence today points conclusively to a principle of uniformity in all nature, which has hitherto been lacking. The biologist has regarded the world of life as being unique in its structural characteristics, but the X-ray shows crystals in everything and basic uniformity everywhere.

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ANCIENT SPORTS

Civilizations of 5,000 years ago had their sports, too, as new discoveries by Dr. E. A. Speiser, director of the joint expedition of the University Museum of the University of Pennsylvania and American Schools of Oriental Research have disclosed. The life-like pose on the left shows in stone relief two boxers that differ little from the champions of modern days. At right is a bronze figurine of two wrestlers posed in what later became known as Greco-Roman style of wrestling. The little cup on their heads added utility to the tiny art work. The finds were made at Khafaje, near Baghdad.