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THE BEGINNING OF LIFE, A BILLION YEARS AGO, IS SUBJECT OF MURAL

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Life nearly a thousand million years ago is the subject of one of the paintings by Charles R. Knight which appear on the walls of Ernest R. Graham Hall (Hall 38). The picture represents pools of hot water fed by hot springs such as may be seen in Yellowstone Park at the present time. Numerous rounded lumps of limestone are growing in the pools. These lumps are colonies of cryptozoa, primitive plants of the class of algae now represented by the seaweeds. The fossils of these are the earliest remains of life yet discovered.

These algae grew as a thin coating on rocks. They excreted, as some modern algae do, a substance which precipitated lime from the surrounding water, and thus covered themselves with a thin coat of limestone. The algae penetrated and grew over this limestone coating and formed a second stone layer over the first one. Growth continued until the nodules were of considerable size, some exceeding two feet in diameter. These nodules, owing to their mode of formation, have a laminated structure like that of an onion.

The remains of such fossils are abundant in some parts of the world, notably in Montana and parts of Canada, where they form thick beds of limestone. The picture shows the conditions under which some of them were formed; what they looked like is also shown by some of the fossils themselves exhibited near-by. The cryptozoa exhibited are from a somewhat later period, but are otherwise essentially the same as those in the painting. They are accompanied by specimens of the *eoazon*, for years the subject of much controversy in geological circles. If the *eoazon* is a true fossil, as is most probable, it is the oldest one in the collection. When it was discovered by Sir William Dawson he thought it was an animal and called it *Eoazon canadense*, which means, the "dawn animal of Canada." A controversy over its nature lasted for years, but now it is generally, though not universally, accepted as an alga much like the cryptozoon.

Owing to the dispute over the *eoazon*, the cryptozoa as pictured in the mural must be considered the remains of the earliest life of which actual fossilized remains have been discovered and certainly identified.

They grew during the Huronian period of the Proterozoic era, nearly a billion years ago. Even at that early time the earth's climates were of the same general nature as climates of all later times, including the present. There were alternations of mild and cold climates and even glacial periods.

Although these cryptozoa are the oldest fossils known, there is reason to believe that they do not represent the earliest life. The algae, although primitive in character, are not the most primitive forms of life, and

there is more carbon in the form of graphite in the rocks of a single period of the Archeozoic era than there is in all the coal of the Carboniferous period.

Life on earth began some time during the unrecoverable beginnings of earth history, a time so remote that all rocks formed then have since either disappeared or changed so as to be no longer recognizable. Various theories of how life originated have been propounded, but there is little to substantiate any of them and they can all

be taken as little better than guesses. Two that seem least probable are interesting because they postulate that life came to earth from other planets. The noted physicist, Arrhenius, thought that the pressure of light waves was able to drive germs from the outer atmosphere of planets into space and that some of these might reach the earth. Dean Charles B. Lipman of the University of California believes that bacteria reach the earth in the interior of meteorites (as noted in the March, 1933, issue of FIELD MUSEUM NEWS), but geologists believe that conditions of outer space are such that no germ could make such a journey and live. They believe that life originated on

the earth itself. It is possible that during the formative period of the earth's history some contacts between gases, water, and other substances may have gradually evolved a primordial protoplasm, the physical basis of all life. This is, however, extremely vague, and we can only say that the origin of life remains a mystery.

Warthog Enters Home Backwards

There is one animal which always goes into its home backwards. This suspicious creature, which fears to take its eyes from the possible approach of enemies as it enters its burrow, is the African warthog, of which several specimens are on exhibition in a group in Carl E. Akeley Memorial Hall (Hall 22). The animals, obtained in Somaliland, were mounted by the late Carl E. Akeley.

The warthog is so ugly that one writer has described it as "more like the incarnation of some hideous dream than any other living animal." It is a distant cousin of the domestic pig. It gets its name from warty protuberances on its face, which are especially marked on the male.



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Life Begins in a World Hitherto Uninhabited

Restoration, in painting by Charles R. Knight, of series of pools in which grew minute water plants, algae, first form of life of which remains are known and certainly identified. In Ernest R. Graham Hall.

it is probable that the simplest forms of living things were the first to appear. These earlier forms were small and soft-bodied. They had no hard shells nor skeletons to be preserved and hence left no fossils. The Huronian algae also would have left no fossils were it not for the formation of limestone crusts about them. These crusts are not true shells but merely a precipitation of lime which was caused by the excretions of the algae. Much later, in Cambrian time, necessity for body protection by a shell armor suddenly arose from some unknown cause, and at the same time hard skeletons for body support developed. Fossils from that time to the present are abundant.

Although the soft-bodied plants which came before the Huronian cryptozoa left no fossils, they did leave other traces by which we may infer their existence but not their characters. This evidence is the presence in the early rocks of enormous quantities of graphite, a form of carbon. This is probably a residue from the decay of primitive marine plants, much as coal is the residue from the decay of plants of a much later time. The vegetation of that early time must have been abundant, for



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