

# THE ORIGIN OF LIFE

SCIENTISTS once believed that life began in the warm waters of the primeval ocean. PROFESSOR L. R. RICHARDSON, of the Zoology Department, Victoria University College, here discusses another hypothesis.

SOME Eskimos believe that a crow once flew over Alaska, settled on a mountain, buried itself in the ground and later emerged as the first Eskimo man. This provides a pleasing and complete explanation of the origin of man. Eskimo children are as curious as any children. It is easy to picture an Eskimo child hearing the story, then asking, "Where did the crow come from?" The answer could be, "From the South, and don't bother mother any more. She has blubber to cook." The Eskimo story is like the idea of evolution. It answers a question, but raises others. It explains where the Eskimo came from, but not the crow.

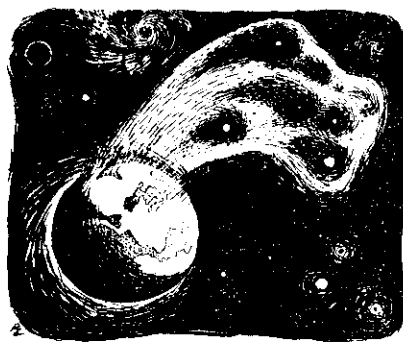
Evolution explains only the great variety of animals and of plants. It states that each kind came by change from an earlier and different kind of animal, or plant. The change has pattern. In general, the earlier kind was less complex in form and function. Ask a zoologist where man came from. He will describe an ancestry of mammals, reptiles, amphibia, fish, and one or other of the groups such as worms, or even starfishes and their relatives. Having thus responsibility in the matter, he must continue answering questions. These lead to the simplest form of life from which by his principle all living things are descended. You can ask him where this simplest form of life came from. Fifty years ago he would not hesitate to answer your question. He would describe the sudden accidental fusion of complex non-living matter to form a first living thing, a simple plant or an

animal possibly like *Amoeba*. Twenty years ago, he would discover that the blubber was burning, and hurry away. Today, he can offer an explanation without relying on a mysterious accident to overcome unexplainable difficulties.

The old theory has a lengthy history. When describing the things found in the world, Aristotle arranged them somewhat in an order of increasing complexity of structure, a system which became so highly developed in the 17th and 18th Centuries, that minerals, rocks, plants and animals were precisely arranged on a single long scale. Each had its place according to its structural complexity relative to other things. Of course, high on the scale were monkeys, then apes, then at the top was man. This arrangement, made before evolution was described, survives today in the popular belief that evolution means that apes gave rise to man.

Evolutionists rearranged living things in a tree-like manner, but there was still the idea that the tree rose from a line of non-living things. An idea of continuity remained. Attempts to describe the origin of living things centred around the region on the scale where the simplest living things were placed just above the most complex of the non-living. The scale of complexity which originally had no evolutionary significance indicated a possible origin of life, a possibility strengthened by other reasoning.

When the idea of evolution was becoming established, chemistry was showing that the elements of living matter were found in non-living things. Carbon, hydrogen, oxygen, nitrogen, phosphorus,



etc., occur in the air, in water, in the soil. Wohler manufactured urea artificially showing that an organic substance could be made without the aid of a "vital" force. Chemists were finding that chemical elements combine each in its proper proportion to form simple compounds and these join in an orderly manner into more complex ones. Geology was showing that the world was millions of years old. It was reasonable then that at least once in all those years the chemical elements could join accidentally into the complex substance of life.

Biologists demonstrated that life exists only in a limited range of temperature and of other conditions. Drought is fatal. Magnesium, potassium, calcium, sodium and other substances are necessary in carefully regulated proportions, much as they occur in the sea. The happy accident must have taken place in the ancient sea.

The improbability of such an accident resulting in life is now recognised. Life is known only in relation to proteins. These contain carbon, hydrogen, oxygen, nitrogen, etc., combined in due proportions; but the protein molecule is of tremendous complexity. Broken down in one or more stages, molecules of amino-acids are yielded. These in turn are highly complex. This can be illustrated by the calculation that if a blanket of amino-acids covered the earth half a

mile deep for two million years, the accidental formation of even the simplest protein is improbable. Proteins require enzymes to carry out vital functions, and functions such as respiration, contraction, etc., require two and more enzymes each of much complexity of structure. Further, the proteins in living substance are arranged as though they formed a crystal.

The accident which could produce an amino-acid is improbable; that which could produce the simplest protein is improbable; that which could produce enzymes coincidental with proteins in a complicated crystal-like form is utterly beyond probability. Nor can we recognise in space and time the possibility of a proper sequence of such accidents each one improbable in itself.

This does not drive the scientist back to the idea of creation. It only demonstrates that the origin of life was not a simple accidental transformation of complex non-living matter into simple living substance.

Present knowledge indicates that life formed in an atmosphere rich in gases such as methane (carbon and hydrogen in combination), ammonia, hydrogen, and possibly water as a vapour. Ammonia and methane are sensitive to ultra-violet light, which changes them to the simpler compounds of carbon, hydrogen and nitrogen. These can combine in turn to form more complex substances. By exposing a mixture of these gases to an electric discharge, amino-acids have been produced experimentally in less than a week in the laboratory. Contrary to popular belief, it is the transfer of hydrogen atoms, not oxygen, which is the primary energy-release mechanism in living substance, and it is now suggested that hydrogen released by ultra-violet light acting on methane and ammonia provided energy for the formation of substances nearing the complexity of protein. This is supported by the fact that some of the most basic energy-releasing enzymes in living substance are sensitive to light.

From here on, there is debate. Since the less complex substances are generally water-soluble, some consider these accumulated in the primitive oceans and then organised into living substance. Others prefer a theory that the molecules continued increasing in volume and complexity in the atmosphere and then contracted, so gaining mass and energy before condensing as living substance on to the earth's surface, much as water-vapour in the atmosphere turns to cloud and precipitates as mist, rain or snow.

Whatever the case, it is now realised that the substances which came to form living substance had their origin from gases and gained initial complexity under the operation of their own internal energy-producing mechanisms while still part of the ancient oxygen-free atmosphere. Countless years were not wasted waiting for some mysterious utterly impossible accident to spark life into being from complex substances containing only the chemical essentials of living things, but totally lacking the constructive energy mechanisms which are the very essence of living things. If a stone gains energy, it does not obviously change. Sooner or later it will lose equal energy. If a cell gains energy, it grows, reproduces or otherwise uses the energy in one or other of the functions of life. Here is the distinction no accident can overcome.

(Solution to No. 741)

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## Clues Across

- Replaces (4, 4).
- Tendon of swine.
- Inducing drowsiness, and if you're small enough you could have a nap in the middle of it.
- Apparently the boss adds years to the employees' ages.
- This sort of drawing requires no rules, or restrictions?
- Surely, more likely to be found in a vase than a toaster?
- Slackens, but start it off with what sounds like a meal and it does the same as 2 down in a mild way.
- The monarch gets the bird for showing off.

## "THE LISTENER" CROSSWORD

- Such an oyster is really an egg.
- Table ice (anag.).
- I do it, in a way, more fool me!
- "For the Colonel's lady and Judy O'Grady  
Are — under their skins"  
(Kipling).
- Keep these corkscrews under your hat!
- A beard, if disorderly, may scrape.
- No side from him, although he's responsible for thousands of records.
- In brackets, this assures you that the foregoing was correctly quoted.

## Clues Down

- Were the crew of this ship tied to the apron strings of dear little Buttercup?
- Severe sufferings of men involved in legal breaches of duty.
- "We few, we happy few, we band of —"  
(Shakespeare).
- Sh! my new pieces (anag., 7, 6).
- Sheridan's competitors.
- Strike out.
- Even if he is in the Royal Academy he's no gentleman!
- All said and done, they're better taken out.
- Smarten up.

No. 742 (Constructed by R.W.H.)

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