THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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HOW LIFE GOT ITS START

By Dr. Edwin E. Slosson.

One of the most baffling of the riddles of the universe is to explain how the first living being originated, or perhaps we should put it, how living beings originate. It is not a question of bridging the gap between non-living and living matter by transmuting one into the other. This is indeed a mysterious and inexplicable process, but it has lost its marvel for us since we are doing it all our lives. The material that makes up our bodies now was once part of the inanimate air and soil, most of it only a few minutes or months ago, and is rapidly being returned to the same inorganic world. We see, too, that a single cell can by acquiring such dead matter grow into an oak or an elephant. The geological record shows us further that the simpler forms of life may in the course of time develop into various other and more complicated creatures.

But in all the cases that we know anything about there is at least a single living cell to start with and nobody has yet seen such a cell originate from non-living matter. The old adage "All life comes from life" still stands uncontradicted. Here then is the real "missing link" in the chain of the evolution of the earth from a molten mass to an inhabited world.

But the harder the problem the more fascination it has for the scientist. It is now being attacked from both sides as when a mountain is tunneled through. The biologists from their side and the chemists from the other are boring through the barrier of ignorance that separates the two domains and they are both making progress. They have got within hailing distance, like the engineers in a tunnel head, but they cannot yet shake hands through the hole. The chemists are continually making larger and more complicated molecules, many of them the same as form part of living matter. The biologists are continually discovering simpler and minuter forms of life, some of them even smaller than the largest molecules of the chemist. And both are busy speculating on what sort of intermediate forms may lie on the borderline between chemistry and biology. They must obviously be simpler than the single-celled plants and animals, the bacteria and protozoa. This primitive organism, or this viable substance, has even been named in advance of its discovery, as a baby is often named before its birth. "Protococcus" and "Probien" this hypothetical being has been called. Professor J.W. Gregory of the University of Glasgow calls it "Protobion" and says in his article on "Geology" in the supplementary volumes of the Encyclopedia Britannica that:

"A carbonaceous jelly which has many of the properties of living matter can be made artificially, and would probably

> have been formed naturally under the conditions prevailing when the world was young. ---The environment of the muddy shores of the primeval sea, when the atmosphere was richer, warmer and moister than of the present day, and changes of temperature were slight, would have been especially suitable for this momentous development."

Other scientists go farther and hold that life did not only originate in some unique accident under the exceptional climatic conditions of the remote past but that it may be a common occurrence today. This view has been expressed by Dr. R. R. Gates, Professor of Botany in the University of London, and by Sir E. A. Schafer, President of the British Association for the Advancement of Science in 1912. So, too, the late Professor Benjamin Moore in his "Biochemistry", 1921, said:

> "There must exist a whole world of living creatures which the microscope has never shown us, leading up to the bacteria and the protozoa. The brink of life lies not at the production of protozoa and bacteria, which are highly developed inhabitants of our world, but away down amongst the colloids, and the beginning of life was not a fortuitous event occurring millions of years ago and never again repeated, but one which in its primordial stages keeps on repeating itself all the time now in our generation; so that if all intelligent creatures were by some holocaust destroyed, up out of the depths in process of millions of years intelligent beings would once more emerge."

If new forms of life are now appearing some of them may take sides against us and join the other disease germs in waging war against the human race. This disconcerting idea comes from Frederick W.Twort of the University of London who suggests that cancer may be due to some of the primary protoplasmic molecules breaking away from the orderly settled life of the cell and reverting to the free and independent life of their primitive ancestors; somewhat, I suppose, as a dog may obey the call of the wild and join forces with the wolves.

We see from these few citations that the theory of abiogenesis, the origination of living beings from non-living matter, was by no means killed by the negative experiments of Pasteur but is still regardedas an open question, and even serves as a stimulus toresearch. Many scientists hold that spontaneous generation happened once or repeatedly in geological history. Some hold that it takes place frequently but imperceptibly at present. A few hold that man may in time learn how to produce living creatures from dead matter in the laboratory. Prominent among these last was Professor Jacques Loeb, whose recent death deprived America of one of her most brilliant biologists. To him such an achievement was not merely a possibility but a purpose; for he says in his "Dynamics of Living Matter": "Experimental abiogenesis is the goal of biology". Paul Becquerel shares this hope, for he says: "With the astonishing means that modern science possesses already, with its continually increasing powers, I do not doubt that it will some day be sufficiently equipt to produce life artificially".

READING REFERENCE - Wilson, Edmund B. The Physical Basis of Life. New Haven and New York, Yale University Press, 1923.

SIMPLE SCIENCE

By WOW

MILK

There are many kinds of milk: - cocoanut, milkweed, milk of magnesia, cow, goat, milk of human kindness; the last is the scarcest.

Milk is a very old remedy. I think it's the oldest. All children have used it, except Adam and Eve. It's made from grass and water, and should be very cheap. Good milk is eighty-seven per cent. water. Chemists say the remainder is fat and not-fat. It's nice to know this, especially the not-fat. They also say milk is an emulsion, which is a good thing to know too, because you can then let the milk stand awhile and skim off the cream. The cream contains the milk-fat.

The not-fat is the hardest to understand. When a thing is hard to understand chemists give it a queer name that you can't remember, so you won't be likely to ask them about it. They call part of the not-fat protein or casein. Other people call it curd. Casein and milk-fat are used to make cheese. Casein contains about sixteen per cent of nitrogen. This nitrogen is very useful in making muscle. Dentists and school teachers ought to eat lots of cheese.

Another part of the not-fat is called lactose, which when translated, means milk-sugar. This is what makes milk go sour in hot moist weather, because it gets changed by bacteria into a sour substance called lactic acid, very much the same as sweet dispositions turn sour in bad weather.

The third part of the not-fat is a mixture of salts containing phosphates. These are good for making bones and brains. These are both good things to make especially if we are careful to make enough of both. Many of us are careless.

PROFESSOR URGES LATIN AS LANGUAGE OF SCIENCE

Latin was urged as the ideal international language for scientists by Prof. Roland G. Kent of the University of Pennsylvania at the recent meeting of the American Philosophical Society. It was so used until about 1800, he said.

Latin excelled artificial languages because it was more definite in meaning and more precise in expression, Professor Kent stated, drawing added arguments in its favor from its use by zoologists and botanists in the naming of plants and animals, as well as by the anatomist, the physician, and the druggist. Yet Professor Kent did not urge the sole use of Latin for publication, but considered that it should be reserved for abstracts and results, for articles of permanent value, and for books of an epoch-making character.

Powdered sugar is sometimes as dangerous as gasoline. A sugar-dust explosion destroyed a factory in Germany.

AIR DRIVEN BOATS BEAT EXPRESS TRAINS

A new type of water craft drawing practically no water is being developed at Paris for service on tropical streams in the French colonies hitherto unnavigable on account of shallowness, shifting sandbars or underwater vegetation. A boat that floats in six inches of water has also been announced from Lahore, India, where it is in daily use.

Hydroglissia is the name given to flat-bottom boats driven over the surface of the water by an aeroplane engine and propeller. In various races held at Monaco and on the Seine near Paris, the speed of express trains has been consistently equalled. The world's record is held by M. Besson whose hydroglissia officially made 74 miles an hour. His unofficial record for a later trial is 95 miles an hour.

The hydroglissia on the Sutlej river, India, is used for communication purposes. Its flat-bottom construction enables it to pass over sand-banks only a few inches submerged. In motion it rises to the surface. The keel of the boat is divided into two halves by a step of nine inches, this being an improvement on the French designs.

When the 90 horse-power engine is started, the boat moves forward compressing the water under its bow causing the first "step" to rise to the surface. The water then swirls under the nine-inch step and another wave is caused lifting the rear. As the speed is increased, the boat rises increasingly out of the water.

It is said that a speed of 35 miles an hour has been obtained with this craft carrying seven persons. The advantage of these boats in India is that at a high speed they can pass over submerged sandbanks which have always been found most difficult to locate by navigators of Indian rivers.

Hydroglissia are being prepared for service in French Africa and Indo-China. One type already built carries 20 tons of freight. Another type with two aeroplane propellers and two motors can run steadily at 45 to 50 miles an hour with a load.

HUMAN HAIR OPERATES FOG WARNING DEVICE

Incidents in which the heroine's life hangs by a hair now exist outside of ten cent fiction.

F. C. Hingsburg, assistant superintendent of the U.S. Lighthouse Service at Baltimore, has invented a fog valve which depends for its operation on strands of human hair. The invention is now in use.

The apparatus consists of a brass case containing hygroscopic valve mechanism. Human hair which has been treated to eliminate oil, grease, and all foreign matter is stretched over two lugs and is pulled up to the proper tension by an adjusting screw. About 400 to 500 hairs combed parallel are used, it being considered that by an increase in the number of hairs more accurate results are obtained.

The hygroscopic device controls the current to a motor which drives the striker of a 1000 pound fog bell mounted in a skeleton tower. Under the hair element a lever arm is suspended. There are two contacts in the electrical device, one being dry and one moist.

As the humidity approaches 96 per cent. the hair stretches and the lever arm drops, engaging a trip which breaks the dry contact and makes the moist one. The current through a relay is switched onto the motor which operates the striker.

As soon as the hair dries off after the fog is lifted, the moist contact is broken and the dry contact again made, which switches off the motor through a relay.

The contact control is not limited to fog bells, but may be used for all types of electric signals including the electric siren and various kinds of electrically operated horns.

In isolated locations where power is not available, it is necessary to resort to the energy of compressed gas. For lighthouse purposes the energy of compressed carbonic acid gas is used.

The fog valve acts as an alternate to the sun valve invented by Nils Gustáf Dalen, Swedish farm boy who won the Nobel prize for his invention. The sun valve operates on the principle that heat expands metals. His device lights electric bulbs or gas lights at night, and extinguishes them in the morning. In its four metal rods are exposed to the sun's heat. One is covered with lampblack and connected with a valve. The sun's rays heat this rod which is connected to a valve controlling the current or the flow of gas.

A CENTRAL AMERICAN REVOLUTION

With one stroke of a machete, a U. S. government entomologist recently started a minute revolution in Panama. The revolution was in an insect colony and chemical warfare was used by one of the opposing armies. Termites or white ants had built their nest on the same stump inhabited by their hereditary enemies, the true ants and were living in apparent peace. When the scientist cut into the stump, the termite hordes poured forth only to meet the throngs of furious ants. Each apparently blamed the other for the catastrophe that befell its nest. The ants rushed at the termites with open jaws, crushing as many as half a dozen at a time. The worker termites grappled with the ants, until the standing army of soldier termites could come up and open the chemical attack. They secreted a milky fluid from their beaks which apparently paralyzed the ants. After twenty minutes, the ants withdrew from the fight, leaving the termites the victors, but with hundreds of their numbers killed. The observing expert suffered no pangs of conscience at the casualties, as the United States Government in recent years has spent $10,000 repairing damage caused by termites to the woodwork of the Hotel Tivoli, at Ancon, C.Z., alone.

A California architect rejects modern hard plaster in favor of the old soft variety in order to eliminate echoes in auditoriums.

GALL BLADDER MAY BE PHOTOGRAPHED

A method for photographing the gall-bladder has been devised by Drs. Evarts A. Graham and Warren H. Cole of the Washington University Medical School at St. Louis. They have found that a drug known as tetra-brom-phenol-phthalein when injected into a vein, later appears in the gall-bladder. The drug is opaque to X-rays, so that if X-ray photographs are taken of a person from 15 to 24 hours after an injection of it, the gall-bladder appears clearly outlined. Gall stones can be located. Better photographs were obtained in the case of normal than in the case of diseased organs, but this itself was of value in making a diagnosis.

FIGHT ON PREDATORY ANIMALS CUASES CLASH OF SCIENTISTS

Wild cats, wolves, coyotes, and mountain lions were mixed up in a verbal battle royal between scientists attending the annual meeting of the American Society of Mammalogists in Boston, recently. The campaign against predatory animals as undertaken by the Federal Government was attacked as tending to upset the balance of nature and defended on economic grounds by Department of Agriculture experts.

Prof. H.E. Anthony of the American Museum of Natural History declared that the Government's present campaign against predatory animals is rapidly bringing about a critical condition. So-called predatory animals, such as the mountain lion, wolf, coyote, and wild cat, are doomed to extermination over large areas, if not the entire United States, he said. These animals should not be considered entirely harmful to man's best interest. When predatory animals have been subjected to a campaign of extermination, in nearly every instance it has been necessary to undertake stringent measures to keep down the rodents and injurious small mammals which formerly were preyed upon by the predatory mammals. In other words, the natural balance is distributed when predatory mammals are destroyed, Prof. Anthony maintained.

"The undertaking of a systematic, well organized and persistent campaign of extermination of predatory animals by the federal government and by the various state governments and game protective associations has an injurious effect on the public attitude toward animal life in general," Prof. Anthony told the society. "The public point of view toward the lion, the wolf or the coyote, becomes prejudiced, and in time a number of North American mammals are classed as 'pests', 'vermin', or similar opprobrious epithets, and this attitude is not conducive to the best interest of conservation."

Dr. W. B. Bell of the U. S. Biological Survey pointed out that the usual natural forces allow both the rodents and predatory animals to multiply inordinately and cause enormous losses to farmers and stock raisers. He presented results of examinations of the stomach contents of thousands of predatory animals killed during the past five years in all parts of the country which showed that their favorite fare is domestic animals, and not injurious rodents.

Timber wolves show a diet made up chiefly of domesticated animals, including full grown cows, calves, sheep, goats, horses, and swine. Mountain lions had a strong preference for beef and venison. Over a third of the items on the coyote bill-of-fare were domestic animals with sheep and goats strongly in the

lead, while bobcats also made heavy inroads on both domesticated and game animals. Dr. Bell said that the average annual destruction of livestock and game amounted to at least $50 for each coyote and bobcat and $1,000 for each wolf and mountain lion.

Major E. A. Goldman of the Biological Survey pointed out that the balance of nature has long since been overthrown and that effective control of coyotes is the urgent first need. Coyotes appear actually to be extending their range, he explained, and in recent years have pushed north through British Columbia to the upper part of the Yukon Valley where formerly they did not occur. There is also evidence that they are extended eastward of their former range and further into the higher and rougher sections of the mountains.

As a nature lover, Maj. Goldman said, he did not like to contemplate the extermination of any species, but that as a practical conservationist he was forced by the records to decide against such destructive animals as mountain lions, wolves, and coyotes. These animals no longer have any place in our advancing civilization, he declared, and to advocate their protection may defeat measures vital to the future welfare of the country.

READING REFERENCE - Nelson, E.W. Wild Animals of North America. Washington, D.C. National Geographic Society, 1918.

SLEEPING SICKNESS SAVES BIG ANIMALS IN AFRICA

Sleeping sickness, malarial fever, and a host of other diseases have done more for the conservation of big game in Africa than any man-established agency, Herbert Lang of the American Museum of Natural History, New York City, told members of the American Society of Mammalogists meeting in Boston recently.

Tracing the disappearance of the larger predatory animals before the advance of civilization, Mr. Lang pointed out how ineffective government efforts to protect game in Africa have been, but how Nature had done her best by rendering the invasion of the strongholds of wild life too dangerous for man to disregard.

"There can be no doubt," he said, "that with the further combating of these diseases by science most of the larger carnivores would naturally have to go, together with the magnificent heritage of countless herds of game. It might be otherwise if on the African continent there existed a single, united people who could and would set aside as lasting sanctuaries some really suitable portions of the country for the different kinds of wild life. In such a project the carnivores, however detrimental in appearance, would prove their real worth by continuing to exercise a necessary balance of nature, which no power of man could well supplant."

The gigantic size of some of the animals is one of the biggest obstacles the movement for African game preservation has to deal with. So actively predatory a giant as the lion has little chance for mercy when farmers are the chief law-makers, Mr. Lang said.

The lion once ranged all over Africa except in actual deserts and the heavily

forested parts, but it is now extinct in South Africa south of the Orange River and also throughout North Africa including Lower Egypt, and is greatly decimated wherever white man has established himself. The more secretive leopard, not to speak of many smaller types of carnivores, has had a definite setback, although the leopard has succeeded in maintaining a little better foothold than the others. Even the hyenas and jackals, the great scavengers, have been wiped out in many regions.

READING REFERENCE - Roosevelt, Theodore. African Game Trails. New York, Charles Scribner's Sons, 1910.

MOVIES USED TO STUDY MOLECULES

Movies to study the motions of molecules were described by Prof. Wesley G. France of Ohio State University in a paper delivered before the American Chemical Society. The motion pictures were those of the "Brownian movements", or irregular jerkings of very small particles immersed in fluids. The movements are caused by the jolting of fast-moving molecules against the floating particles, and although the molecules themselves cannot be seen, many things about them may be learned from a study of these "Brownian movements".

So Professor France took motion pictures of particles of basic carbonate of lead, about 1-25,000 of an inch in diameter, a powerful microscope being attached to the camera. The negatives thus obtained were then projected on a screen so that a total magnification of from 50,000 to 200,000 diameters was obtained. Measurements of the wiggling of the particles of lead carbonate were then made under varying conditions.

ALCOHOL MAY BENEFIT RACE BY ELIMINATING WEAKLINGS

Alcohol probably eliminates the unfit and races addicted to its use outstrip the teetotalers, declares Dr. Charles R. Stockard of the Cornell University Medical College in a striking article appearing in the April issue of the American Journal of Medical Sciences. His conclusions are based upon experiments in his own laboratory and upon a consideration of available evidence. Alcohol protects the race by killing off many of the weak members before birth, he asserts.

Dr. Stockard's experiments were made on guinea-pigs, which were treated with the fumes of alcohol to the point of intoxication six days per week for periods as long as six years. Some of the animals lived to become more than seven years old - the longest life span recorded for a guinea-pig, so far as was known to Dr. Stockard. His conclusion is that the daily inhalation of alcohol fumes does not injure the health or activities, or materially shorten the life of the treated guinea-pigs.

Definite injurious effects were discovered, however, in the offspring and later descendants of these guinea-pigs. They were studied by mating normal mothers alternately with normal and alcoholic males. Normal males were mated

81 times with normal females and 81 times with alcoholic. The 196 young born from the normal combination showed a mortality during the first three months of less than 23 per cent. and none of the offspring was defective. Of the 185 young sired by the same fathers with alcoholic mothers, only 56.6 per cent, lived to reach maturity. The mortality was double that of the young from normal mothers. Almost 6 per cent. of these offspring were structurally defective, while none from the normal combination showed any such defects.

The effects were still more striking in the case of normal females mated alternately with normal males and alcoholic males. The same normal mothers produced all the offspring. Out of 77 normal matings, there were 195 young, and only three failures to conceive. Out of 81 matings of the same females with alcoholic males, there were 182 young, but over 12 per cent. of the matings failed toresult in conception. There was a mortality of 17.4 per cent. among the offspring of the normal, with 35.1 per cent. mortality among the offspring of the alcoholic. Nine of the offspring from alcoholic fathers were defective as compared with none from the normal.

The mortality among the alcoholic progeny was twice as frequent before birth as after. This means, says Dr. Stockard, that the alcoholic tendency kills off the weak germ cells before birth. Carrying the interpretation further, it is Dr. Stockard's belief that alcohol acts as a selective agent to bring out a group of unusually strong speciments with superior vitality.

Against the argument which might be made that alcohol would injure not only the weak cells, but also the strong cells, Dr. Stockard says that human blood will not tolerate enough alcohol to injure the strong germ cells as well as the weak. No human beings would lead such alcoholic existences as were led by the guinea-pigs on which he experimented. He concludes:

"It is highly improbably that human beings have ever injured or eliminated their normal resistant germ cells with alcohol. Alcohol probably has eliminated some of the bad. Those nations of men that have used the strongest alcoholic beverages through many generations have now, from a standpoint of performance and modern accomplishments, outstripped the other nations with less alcoholism in their history."

Dr. Stockard is professor of anatomy at the Cornell University Medical School, and is well known as an authority on embryology.

YOUNG ANIMALS ARE INSULIN PRODUCERS

The insulin producing parts of the animal pancreas, the minute patches known as the "islands of Langerhans" are more numerous in childhood than in infancy or adult life, according to a paper presented to the American Association of Anatomists by Dr. Milton D. Overholser of the University of Missouri. The statement was based upon the examination of the pancreases of many albino rats at different ages corresponding to infancy, childhood, and adult life.

He found that the number of islets showed a progressive increase until the eighth week of life, and then a decline to a fairly constant number maintained through adult life. The average number of islets per weight of the animal was in inverse proportion to the body weight.

TABLOID BOOK REVIEW

VISUAL EDUCATION: A Comparative Study of Motion Pictures and Other Methods of Instruction. Edited by Frank N. Freeman. Chicago. University of Chicago Press, 1924. $3.50

A timely book detailing actual tests by prominent educators to determine the educational value of the movies. It should help to clear the air in the discussion of this vital subject and furnish valuable hints for both educators and film producers. The work is the report of an investigation made with the aid of a grant from the Commonwealth Fund.

A PLATINUM SUBSTITUTE

Platinum is a most valuable metal not only to the jeweler but to the chemist because it is so resistant to corrosion. But it is so costly that efforts are all the time being made to find a substitute. Among the latest of these are alloys of chromium, and the pure metallic chromium electro-plated on iron. The alloys may be used in place of platinum for negative poles in electro-analytic work, while the chromium plated electrodes are even more resistant. These discoveries tend to diminish the great demand for platinum by chemists, chromium being not only cheaper, but very much harder than platinum, and therefore not so apt to be hurt by mechanical treatment.

MOVIES OF HEART THROBS

Two French scientists have perfected a process whereby X-ray moving pictures can be taken of internal organs of the human body in action. At a session of the French Academy of Science, a film was exhibited showing the functioning of the heart of M. Comandon, one of the inventors.

It is predicted that this new application of cinematography will have great value in medical instruction, in the teaching of school physiology, and also in diagnostics.

METAL GARAGES AVERAGE NEARLY AS WARM AS BRICK

The great temperature differences supposed to exist between the interiors of brick and metal garages are mostly imaginary, J.H. Jones of the U.S. Weather Bureau recently told members of the American Meteorological Society. Mr. Jones measured the temperatures inside neighboring brick and metal garages for a period of six weeks of the coldest weather last winter and found thebrick structure to be on the average 3.8 degrees Fahrenheit warmer than the metal.

The highest and the lowest points in the United States are both in one small area, that of Inyo County, California.
