DR. WILLIAM HANNA THOMSON ON THE ORIGIN OF LIFE

Author of "Brain and Personality" Discusses the World's Greatest Mystery, Which Has So Long Baffled Science.

Dr. Thomson.

Dr. William Hanna Thomson has an international reputation as a physician and an authority on nervous and mental diseases, besides being the author of a number of well-known works including "Brain and Personality," "What Is Physical Life?" and "Some Wonders of Biology." He was for some years President of the New York Academy of Medicine; is consulting physician at Roosevelt Hospital, the Manhattan Hospital for the Insane, and the New York Red Cross Hospital. Dr. Thomson is a deep thinker and has devoted many years to medical scientific research. His views on the origin of life—the world's greatest mystery—will be read with deep interest not alone by laymen, but by scientists and the medical profession everywhere.

By DR. WILLIAM HANNA THOMSON.

WHAT is the greatest mystery the world ever has or ever will be called on to consider? The origin of life.

I might here quote the old joke of the correct answers to three common questions, put equally by philosophers and by children, namely: "What is mind?" No matter. "What is matter?" Never mind. "What is spirit?" Quite immaterial.

Of these three questions, that of "What is matter?" seems the easiest to answer. Of course, we know what matter is. Every one of our bodily senses testifies to its external and objective existence, quite independently of any man's thinking or wishing, as when a brickbat falls on his head.

So solid are the grounds of our belief in matter that Mr. John Tyndall, the celebrated physicist, in his Presidential address before the British Association for the Advancement of Science, at Belfast, Ireland, in 1874, said that in matter we have the greatest certainty of certainties; that matter is indestructible and eternal, and would continue after we ourselves have lapsed into the infinite azure of the past. He further said that in matter we have the promise and potency of life.

From the same chair the President of the British Association for the Advancement of Science, Sir George Darwin, son of the eminent Scientist, Charles Darwin, in 1905, said that modern science now proves that matter never had an eternal past nor is it to have an eternal future, and, moreover, that the problem of the origin and nature of life is as inscrutable as ever.

Modern physicists, however, go much further than George Darwin, so that Prof. Larimore, who ranks very high among them, takes Oliver Lodge to task for not saying in so many words that matter is but a passing show.

The first one who started this kind of talk was Sir William Crookes, who demonstrated that besides the three common forms of matter—solid, liquid, and gaseous—there was a fourth, which he called radiant matter, shown by matter which remains in a glass globe after it has been exhausted as much as possible by a pump. In such a high vacuum matter can be made to behave in various queer ways and produce various strange effects.

Still there remained that irreducible thing, the atom, which, moreover, proved its existence by combining in definite proportions with other atoms to make up everything under the sun. The whole science of chemistry was long founded in this property of material atoms to combine in definite proportions.

But now comes the element radium, which has knocked all the views of these physicist investigators into shapeless confusion, for it shows the atom itself disintegrating and burning everything within reach in doing so. Woe to the man who puts a piece of radium in his pocket. So tremendous is the energy that might be set free from disintegrating atoms that one physicist says that a copper penny might destroy a quarter of the City of Paris if its constituent atoms could be suddenly disintegrated. Why the sun does not burn out is now ascribed to the radium which it contains, for Lord Kelvin, the great scientist, calculated that if it were wholly a mass of coal it would have been altogether consumed in 400,000 years.

Now, out of this prevailing confusion physicists have betaken themselves to discoverings into what the atom disintegrates, and among other things have met with "ions," each one of which is a hundred thousand times smaller than an atom. These "ions" rush at each other at a tremendous speed, the rate of which experimenters calculate by borrowing the wings of mathematics.

All this is startling because we are here beyond the testimony of every one of our senses, upon which we have so implicitly relied. We have to begin with the fact that no one has ever seen, felt, or tasted an atom, and as to "ion," the case is a hundred thousand times worse. But not content with that, our scientific friends tell us that matter after all is nothing but a "negative electron." I leave the reader to guess what this is, and will only help him with the hint that we are approaching that wonderful ether which fills all space and whose vibration gives us all the electricity and all the light we have.

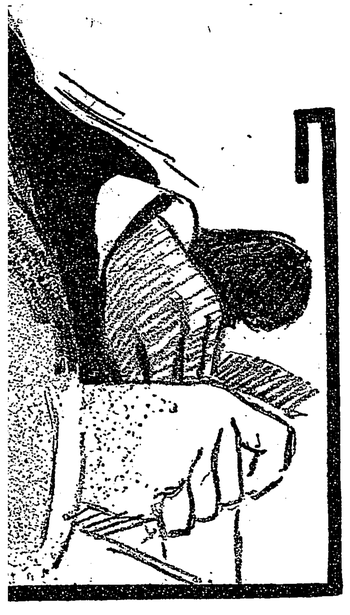
These men are not mere speculative philosophers, like Democritus or Bishop Berkeley, but as experimental observers prove what they say, while they go on to discover other wonders like that of a man talking across oceans without anything which can be seen, felt, weighed, tasted, or smelt. Thus our poor bodily senses do not report to us a tithe of the realities of the universe in which we live. For this we must use our brains, not our senses.

Now comes the all and ever-important question: the mystery of physical life.

Well might Sir George Darwin, in the address just referred to, declare that the problem of physical life is as inscrutable as ever. His father, the great Charles Darwin, never ventured to speak of the origin of life on this globe, but only of the origin of species, restricting himself altogether to the visible forms. To the largest as well as the most ancient divisions of the living kingdom, which contains that microscopic form of life, he never alluded. That this, in actual bulk, much exceeds every other, is plain from the fact that while the visible forms, whether a tree or a whale, are necessarily local, the microscopic forms are in all places where life is possible, whether in air, water, or on land.

As to the origin of different species, if Charles Darwin was after that he would have found in the microscopic world, the most ancient, stable and specific living forms that exist on earth. Thus, we have known historically tuberculosis ever since Hippocrates described it 2,300 years ago, and it is plainly alluded to in Eber's Egyptian papyrus, 1,700 years before Hippocrates.

Now, as the life cycle of the tubicle bacillus is only twenty to thirty minutes, instead of being three score years and ten, it follows that counting only venerable bacilli, half an hour old, we have 7,240,000 generations through which it has descended without once changing in its evil ways.



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Another element in the problem is that life existed on this globe for millions of years, and during untold ages built up great rocky strata before a single visible form appeared upon the scene. Hence, it would seem that according to the original plan all life must at first be microscopic, and so it is. Thus at one time in its individual existence an elephant is a barely perceptible microscopic dot. We cannot be at all sure that the real elephant is not as much smaller than that dot, as that in turn is smaller than the full grown beast himself. Size or bulk has no necessary connection with life, however formidable it be.

The living agent which causes hydrophobia, or yellow fever, easily slips through the pores of a Berkfield filter, which stops the larger bodies in the virus of smallpox. They are too small to be seen by any microscope yet made. Prof. Simon Flexner doubts if the human eye is constructed to catch sight of them, however it be aided by a high-power microscope. Yet these little agents are more dangerous to man than either a lion or a rhinoceros, while each remains after its own kind. Yellow fever no more resembles hydrophobia than a horse resembles a fish.

Therefore the biologist, or student of life, finds himself in the realm of the inconceivably little. In that single cell with which the elephant has to begin his physical life there is a vast collection of necessary things.

First, every one of the millions of cells of his future body must develop from that first cell. They are all constructed on the elephant-cell pattern, and according to no other pattern. Each cell must contain an even, never an odd, number, in its nucleus of those little bodies called chromosemes, and upon which heredity depends, because finally that first cell contains something which determines that it will grow into an elephant and not into a frog, according to its hereditary descent from the first elephant.

As a result, the absolute absurdity of the supposition of the spontaneous generation of life appears when we consider that it is not a living substance or thing which we are investigating, but a thing which can be a dot and then an animal, and then a dot again for any number of times. It would be easier to imagine a watch spontaneously generating itself than for an oak to become an acorn and then an oak again, and so on through all the years of its geological period.

Reproduction of like from like by means of an inconceivably complex series of consecutive changes is a characteristic of life only. It has not a single analogue in the non-living kingdom. There is no such thing as hereditary fire, though it may spread, any more than a hereditary glacier, however it may grow by accumulating snow and ice.

Inorganic chemistry, or that which deals with non-living substances, is simplicity itself by the side of organic life-originated chemistry. Thus one atom of hydrogen, one atom of chlorine, and one atom of sodium will make one molecule of sodium chloride or common salt. These three separate atoms might come together by chance—that only deity of the materialist—anywhere where these atoms exist, say in the planet Saturn. But for any animal on this earth with red blood it must, in order to live, have in its blood cells that definite substance called hemoglobin.

Now a molecule of hemoglobin must contain the following number of different atoms in their due proportions, namely, of hydrogen atoms, 1,130; of carbon atoms, 712; of nitrogen, 214; of oxygen, 245; of sulphur, 2, and of iron, 1, or 2,304 atoms in all. Moreover, if that one atom of iron, in its peculiar relation to the rest ("masked," as some physiologists say) were left out, the animal could neither absorb oxygen nor give off carbonic acid; in other words, it could not breathe.

I once asked a well-known physiological chemist, himself of German extraction and educated in Germany, how could those atoms in a molecule of hemoglobin thus come together by chance. His brief reply was, "D—n chance!"

But the complexity of hemoglobin is thrown into the shade by those chemical substances which medical research has discovered in the investigation of the mechanism of immunity against infectious diseases. Thus some serious infectious diseases, such as smallpox, yellow fever, and typhoid fever, usually attack the same person only once. Hence he is said to be thereafter immune against them. With other infections, like pneumonia, the reverse is true, for the first attack often appears to predispose to subsequent attacks. Of four children exposed simultaneously to scarlet fever, one soon succumbs to a malignant development of the disease; the second is made very sick by it, but recovers; the third has it so lightly that it wants to play all the while, while the fourth escapes altogether. Now the medical profession very properly wishes to know the "how" of this varying susceptibility and immunity, because such knowledge would lead to an immense saving of life.

But this research now resembles exploring a strange world, to describe which a new language has to be invented which none but these scientific leaders can understand, while they speak of antigens, amboceptors, complements, enzymes, lysins, precipitins, agglutinins, toxins, antitoxins, anti-antitoxins, &c. Nor are these at all fancy names, for they refer to subjects which already have been shown to have great practical bearing in the preservation of human beings from disease and death.

Modern science now finds that the problem of the origin of life becomes more and more inscrutable in proportion to the progress of investigations of the subject. One fact alone, among many others of like import, suffices to illustrate this statement, and that is the infinite complexity of the chemistry of any living thing or of anything which has been produced by vital agency compared with the chemistry of things with which life has nothing to do.

Thus, in the precipitins alone we encounter one of those biological marvels by which science has recently revealed the fact that the blood is the most hereditary thing about us, for its hereditary elements override everything in the make-up of the physical animal body, whether it be the shape of the skeleton, of the lungs, of the alimentary canal, or of the skin. It even overrides ancestral habits as to the great food question—Darwin's chief creator, which works by the strife in nature about how to eat or keep from being eaten.

This discovery of the hereditariness of the blood came about in this way:

Some of the most recondite investigations in the history of medicine have been about the mechanism of immunity, or why a single attack of certain infectious diseases renders a person immune from a second attack. It was through these investigations that some valuable antitoxins were discovered in the immunized blood serum, which raises hope that we may yet find the antitoxins for the worst forms of our deadly infections just as an anti-venom has been found for the cobra's poison, and another for that of the rattlesnake. But each of these antitoxins is specific in that it does not afford any protection except just against its own poison. This led Prof. Wasserman of Vienna to investigate whether the blood of each kind of animal did not contain some ingredients which would be specific to that animal, that is, not to be found in any other animal, a fact which, if found, might be of use in medico-legal cases.

His results made this so probable that Prof. George H. F. Nuttall of the University of Cambridge took the subject up, and has so extended its application that a single drop of blood from any animal now suffices not only to show by its peculiar chemical reactions what animal it comes from, but also how nearly related, or the opposite, an animal is by his blood to other animals.

It begins, therefore, to look as if the whole classification of zoology may have to be rearranged according to these blood tests. Thus, a drop of the blood of a walrus shows no relation with a drop of whale's blood, or of the blood of any other cetacean, such as seals or porpoises, which, like the walrus, are mammals that have taken to the sea. Instead of that, the blood of the walrus immediately reacts with the blood of horses, asses, and zebras, thus proving that he is an equine that no longer crops grass, but goes where he can live on an exclusively fish diet. Likewise, the hippopotamus is shown to be a modified pig.

Where blood relationship exists, but is distant, these reactions are proportionately faint, but where no reactions occur there is no relationship at all. Thus, geology indicates that birds are descended from reptiles, and, oddly enough, the blood of a bird shows a distinct, though very faint, reaction with the blood of a snake, but none whatever with that of a winged bat or the flying squirrel, for these are mammals.

These facts are quite sufficient to indicate how inconceivably complex the problems of life are. It may seem strange that we cannot know what life is until we also know what death is. Thus a stone never dies; but a flower, an insect, or a man dies simply because they once lived, and for no other reason.

Death may occur because of a great variety of different causes, but none of these causes explain just what death itself is. We are therefore much in the position of a man who, having never heard about electricity, cannot explain why a train of cars drawn by electrical traction comes to a dead stop.

The word "mystery" with many people means that which cannot be found out, when in fact a mystery is something about which we know a good deal, or else it would not be a mystery. Thus I have heard about a "fourth dimension of space," but as I myself know nothing about such a dimension and cannot find any one who does, that, whatever it be, is not a mystery to me.

The province of science is to investigate mysteries by means of that which is known, thus solving them. In so doing science has now solved many things that in former times were considered great mysteries.

Science is therefore clearly within her own province when she takes up the investigation of the mystery of life. She has found that life is altogether sui generis—that there is nothing corresponding to it in this world.

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