

AN EXCURSION INTO THE INFINITELY SMALL.

BY J. BARANDUN.

MILLIONS of people have already made excursions into the infinitely large—into the boundless universe. From star to star, from world to world, their minds have ascended, like Byron's "Cain," and like Byron's Cain they have come back to earth again—exhausted, defeated! Like Herbert Spencer they shuddered at the thought of infinity—ungraspable and nevertheless real; unthinkable, and nevertheless true! And they realized that our poor earthly brain was only made to grapple with earthly problems.

But very, very few people—a few lonely thinkers and scientists—have ever tried to penetrate into another world, another universe, the world of the infinitely small. Some philosophers of antiquity reached it on the wings of Pegasus, but returned empty-handed. In more modern times, Leibnitz, Herbart, Wundt, Fechner, Lotze, and with them a number of celebrated scientists, have dived into those mysterious depths, whither chemical investigation has never penetrated. On this field of research science is still in its infancy. But we shall use its results to form a diver's bell with which to dive down into those dark realms and to look for pearls. We think the reader who accompanies us will find himself richly rewarded.

First we arrive at the realm of the elements, the building material out of which the visible world is made. Here every educated reader is more or less at home, so we need not tarry long. We know these elements are composed of molecules, and these of *chemical* atoms—to be carefully distinguished from the atoms of which we shall have to speak later on. These atoms can be weighed, measured, and part of them seen. An atom that forms the five-billionth part of an inch is still accessible to the scientist. So chemistry is still *terra firma*, but it borders on a wonderland whose portals are locked to exact science.

Until very recently atoms were considered the ultimate units of

which the elements were composed. But to-day the most eminent scientists think that these units, or atoms, are likewise formed by numerous minor units which are themselves aggregates of still smaller units, and so forth, down into the infinite depths of the infinitely small, until the ultimate essence is reached, which shows itself as energy, force or will (Schopenhauer's will-to-live), and which in no case can be a mere nothing. According to its qualities or modes of action we might call it matter or spirit. It is in itself neither the one nor the other, but lies beyond both of them, or, in other words, matter and spirit are its manifestations for our intellect. (By the way mere words in themselves do not explain anything.) This unknown x is, then, the source of all life.

It is thought that in each molecule the atoms circle around each other like systems of stars. Thus the world of the infinitely small forms a parallel in more than one regard to the world of the infinitely large.

From this point we may reach a number of inferences which may seem strange to our readers, who may regard them as a dream.

In order that the reader may better understand what is to follow, we beg him to recall some facts of psychology. We must remember that the concepts or pictures of things form the foundation of mental life. If we look at a tree and then close our eyes, we have a concept of the tree. This concept must be the product of the reciprocal action of the atoms outside and inside of our brain. In other words, the atoms inside of our brain must have assumed the shape of a tree in conformity with the object outside. Out of such concepts our mental life is formed in the course of time. The sum a person has acquired of concepts and their relations forms what we may call his inner or mental world.

Du Bois-Reymond, the great scientist, regards the origin of a concept as the greatest world-riddle. No physiologist could offer the least explanation for such a riddle. But if we go down deep enough into the world of the infinitely small, a solution may at least be suggested.

Assuming that about a million atoms or smallest units move around in a molecule, and assuming also that another molecule with as many atoms be near; assuming, thirdly, that the atoms of both molecules be arranged differently (homogeneous, but not identical), then the atoms of one molecule will assume a position which corresponds to a likeness (picture, concept) of the other molecule. As an illustration we may think of one army facing another. Then the soldiers of one army will arrange themselves according to the way

those of the other army are arranged, for the purpose of self-defense (self-preservation). Not having more space at my disposal, I must leave a good deal to the reader's imagination. If he be of a philosophical turn, he will be able to follow me without great difficulty.

What I wish to show is that even the smallest molecules develop concepts within themselves, and with them a certain amount of mental or inner life. This inner life is infinitely below man's. It is of course unconscious, but it is there nevertheless. This fact—if fact it be—would explain in a very natural way the problems of inheritance and reproduction. Two seeds, for instance, may look almost exactly alike. Nevertheless each one of them produces a different plant or animal, because each seed contains an exact likeness of the plant or animal it came from, and this inner likeness or inner mental life realizes itself as the seed develops.

Thus we reach a much deeper and more worthy idea of life than a shallow materialistic philosophy possibly could. Assuming that each molecule preserves forever the inner (mental) world once acquired, and further assuming that it be at least as indestructible as the chemical atoms are supposed to be; then we would have in the whole universe, as far as it is in motion, an evolution of mental life, or an evolution of matter into mind. Every motion would produce concepts, at least in the molecules participating in it. The whole stellar world might then be regarded as a stupendous factory, where matter is changed into mind. Every motion, every feeling, every thought, would have a lasting importance which would reach far beyond our terrestrial life and perhaps out into eternity. In this connection many a reader will perhaps recall Haeckel's "animated atoms" (*beseelte Atome*) or Wundt's "animated will-centers" (*Willenszentren*).

These hypotheses would also throw new light on many phenomena of nature which Darwinism cannot satisfactorily explain, and also on nutrition which would mean, in a certain sense, an education of the lower atoms by the higher ones. The animal, for instance, cannot assimilate minerals, because the distance between the two classes of atoms is too great. Then the plant steps in between and gives the mineral atoms such an inner life that they become capable of associating with the animal's atoms. It is also easy to be seen that the real origin of life is to be sought deep down in the wonderful small world. Life began with motion itself, as soon as concepts began to be formed in the original molecules.

It is thus also easily to be inferred that there is life and motion, yea a species of concept life, even in the molecules composing the

hardest stone or metals. Space does not permit us to cite examples here. Chemistry tells wonderful stories about the force of the "animated" atoms. One gram of hydrogen, for instance, could produce sufficient heat to drive a steamer five times over the ocean. If we assume that one hundred atoms be sufficient to form a concept in a molecule, then the atoms of a single molecule would suffice to represent the mental wealth of the greatest genius!

We may safely assume that the "changing of matter into mind" (the production of concepts in the molecules) may have taken place long before our solar system was formed, and will go on taking place indefinitely. Now if we take it for granted that every molecule keeps for all times the inner little world of concepts once formed, from the lowest to the highest, then we would have found the way to a magnificent conclusion, or, perhaps rather, a dream. Suppose all those molecules, from the beginning till now and for all times, could unite and form a higher unity, this higher unity, containing all the animated molecules, would then be a kind of world-spirit or world-soul, the units (molecules) of which would all be in a certain sense individuals with their own independent inner life, and each individual or unit would know, according to its measure of capacity or inner life, all that the others know. This would be reward or punishment enough, if we think of the self-conscious units. The idea of such a transcendental world-order would also incite to greater mental activity in this life, in order to have greater capacity for enjoyment (mental pleasures) through eternity. The units of this world-soul (if a figurative expression be permitted) would come from all realms of nature. But we must not think of "souls" in the usual sense of the word. It would also be impossible for a unit (molecule) to leave the others or to return to the planet it came from.

If we ask, in conclusion, what pains or pleasures such a condition would offer to the individual units, then first of all it is not to be forgotten that complete extinction of all mental life would always be preferable, because no life can be without pain. Pain is in its ultimate essence the checking of a desire. If a concept finds an obstacle in its way when trying to rise into consciousness, then a painful feeling ensues. And such cases occur wherever there are concepts.

But as life cannot be extinguished, such speculations are idle. The inner life, the pains and pleasures, of the different units, would correspond to the degree of inner life attained before dissolution. A well-developed molecule or unit could survey all that had happened

during countless ages, seeing it in the molecules then taking part in the process of evolution. Its whole surroundings would be something like a theater with ever changing scenery and actors ever new, and new units would continually arrive from all parts of our universe. It might also be assumed that in different parts of the endless ocean of space different world-spirits of this kind might be forming or be in the process of formation. According to the laws of equilibrium we might even foresee the cessation—but not extinction—of all life of such a great union of disintegrated molecules; but this life would begin again with the slightest impulse from outside. We may also, thinking of the composite nature of the elements (see above), fancy the formation of different elements in different parts of space, which would lead to forms of life wholly incomprehensible to us. But to expound all these ideas, a whole book would be required. So I shall close with a stanza from Byron, which gives us a fair idea of what a highly developed unit might expect after dissolution from the other units (“death”) and which at the same time shows how the greatest poet of mankind looked at “eternal life”:

“Eternal, boundless, undecayed,
 A thing unseen, but seeing all,
 All, all, on earth or skies displayed,
 Shall it survey, shall it recall;
 Each fainter trace that memory holds
 So dearly of departed years,
 In one broad glance the ‘soul’ beholds,
 And all that was, at once appears.—
 Before creation peopled earth
 Its eyes shall roll through chaos back,
 And where the furthest heaven had birth
 The ‘spirit’ trace its rising track.”—

This may all be a dream, but in a poor world like this, it is so sweet to dream!