THE LABORATORY OF LIFE

by

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THERE would seem no longer room for doubt concerning the reconciliation of religion and science in view of the developments in science during the present century. Indeed the interpretations of these developments by scientists themselves would appear to establish the fact, enabling us to glimpse a renaissance in human thought and a new spiritual freedom for man through these remarkable discoveries.

There was never an essential cleavage. Religion and science were always one—in the search for truth by faith. The scientist, like the Bahá'í, rejects the human increment obscuring the reality of religion. As we know today, a negative equation established an apparent cleavage—the reaction of the scientific mind to ecclesiasticism in the Middle Ages.

Yet in the contemplative life of the scholastic period the fountains of thought were fed from the source of true religion and gave rise eventually

to Experimental Science, the spirit of "positive" research, so clearly the quest for fundamental truth. And the tremendous principle of evolution, appearing as a final point of cleavage, may be seen today more truly as the cap-stone of an arch, leading over into the Age of Reconciliation.

Some years ago a group of the distinguished leaders in science and religion issued a brief outline of the common ground on which they met—a statement broadly suggestive of the Bahá'í Teaching:

"It is a sublime conception of God which is furnished by science, and one wholly consonant with the highest ideals of religion, when it represents Him as revealed through countless ages in developing the earth as an abode for man and in the age-long inbreathing of life into its constituent matter, culminating in man with his spiritual nature and all his God-like powers."[1]

Today the astonishing fact stands

1—Professor R. A. Millikan and Bishop F. J. McConnell were of this group.
Quoted by Dr. A. H. Compton, Freedom of Man, p. 115.

out that the emphasis in science has changed since the rise of Bahá'u'lláh —the materialistic trend has been reversed. We are witnessing a new movement in scientific thought, based upon experimental science and mathematics. That such fundamental discoveries in the universe of matter, life and mind should have appeared almost simultaneously in the early Twentieth Century is declared by Hurst, the eminent British biologist, as "a remarkable coincidence amounting almost to a miracle of thought."[2]

The development of pure mathematics has enabled Einstein to expound his original views of the relativity of the universe—conceptions far more revolutionary than were those of Newton in his time. The discovery of the electron and proton has changed our knowledge of the fundamental basis of matter, which is seen no longer as inert substance but as materialization of energy. The experimental behavior of the electron

2—Heredity and the Ascent of Man, C. C. Hurst, Pr.D., Sc.D., p. 115.

has led to the establishment of a new principle in physics—the principle of indeterminacy, changing the old Causation Law, the basis of former materialistic concepts.

The new law is conceived as validating "something in the inorganic" analogous to free-will in the higher reaches of the organic, as suggesting spontaneity or consciousness at the core of life. Thus, in being pledged no longer to a deterministic law, science begins to see the universe in its relation to a Supreme Creator, and approaches the Bahá'í concept of Primal Will as first cause. Since order and design in nature presume intelligence, the world-process is interpreted as the outworking of an Infinite Intelligence.

The new principle of indeterminacy is proven by the Quantum Theory of Planck, the essence of which is the introduction of "a new and universal constant, namely the elementary Quantum of Action. It was this con-

stant," writes Planck, "which like a new and mysterious messenger from the real world, insisted on turning upside-down every measurement." The Theory of Relativity is described by Planck as, in a word, "the fusion of time and space in one unitary concept."[3] The human mind now probes beyond space-time.

Thus a New Philosophy of Physics has been born. And such new knowledge has enabled the philosophers in science to propose entirely new conceptions of the nature and origin of the universe. Sir James Jeans shows us a universe of thought, and pictures its creation as an act of thought, set in time and space. He writes:

"The river of knowledge has made a sharp bend in the last few years. Thirty years ago we thought, or assumed, that we were heading toward an ultimate reality of a mechanical kind. . . . Today there is a wide measure of agreement . . . that the stream of knowledge is heading toward a

3—Universe in the Light of Modern Physics, Dr. Max Planck, Univ. Berlin, p. 20.

non-mechanical reality; the universe begins to look more like a great thought than a great machine.

"Mind appears no longer as an accidental intruder into the realm of matter; we are beginning to suspect that we ought rather to hail it as the creator and governor of the realm of matter—not of course our individual minds, but the mind in which the atoms out of which our individual minds have grown exist as thoughts."[4]

In defining the world of Physics and introducing his new Quantum Theory Dr. Planck reveals to us the spirit of the modern physicist:

"Physics is an exact Science and all the ideas employed in it are derived from the world of sense perception. Many scientists and philosophers believe from this that at bottom Physics is concerned exclusively with this particular world—the world of man's senses. This cannot be refuted by logic since logic itself cannot lead beyond the confines of our own senses.

4—Mysterious Universe, Sir James Jeans, pp. 147-8.

"In Physics as in every other science common sense alone is not supreme; there must also be a place for Reason. Reason tells us that if we turn our backs on an object, the object still continues to exist. Also that man, and mankind as a whole, together with the entire world of our senses, is no more than a tiny fragment in the vastness of nature, whose laws are in no way affected by any human brain. They existed long before there was any life on earth, and will continue to exist long after the last physicist has perished.

"It is considerations of this kind, and not any logical argument, that compel us to assume the existence of another world of reality behind the world of the senses; a world which has existence independent of man, and which can only be perceived indirectly through the medium of the world of the senses, and by means of certain symbols which our senses allow us to apprehend. . . . But besides

the world of sense and the real world, there is the world of Physics. It differs from the other two because it is a deliberate hypothesis put forward by a finite human mind; and as such it is subject to change and to a kind of evolution. . . ."

Dr. Planck concludes his Introduction with the statement that the goal of Physics, although theoretically unobtainable, is "the apprehension of true reality."

"Modern Physics," he declares, "impresses us particularly with the truth of the old doctrine which teaches that there are realities existing apart from our sense-perceptions and that there are problems and conflicts where these realities are of greater values for us than the richest treasures of the world of experience."[5]

The question of free-will—whether or not man is responsible for his actions as a free agent—has been a fundamental problem in religion, philosophy and science since Pythag-

5—Universe in the Light of Modern Physics, p. 107.

oras discovered the precision of nature's laws and taught a doctrine harmonizing human life and conduct with them.

If our actions are the outcome of past history, the atoms of our bodies following an unchanging law of cause and effect, responsibility ceases and the basis of morality disappears. Religion has taught responsibility to God; philosophy has offered no rational proof of freedom, while science has hitherto affirmed the physical determination of man's actions.

That a new spirit has been felt in science may be recognized from the words of Dr. Arthur H. Compton, winner of the Nobel Prize for his contribution to the New Physics:

"Not only the physical and biological sciences, but to a large extent psychology as well, have made great strides in interpreting nature on the basis of mechanical laws involving cause and effect. The motions of planets, the flight of airplanes, the

swing of pendulums, are nicely described in terms of well-established laws of motion. . . .

"Yet is it possible in terms of the motion of atoms to explain how men can invent an electric motor or design and build a great cathedral? If such achievements represent anything more than the requirements of physical law, it means that science must investigate the additional controlling factors, whatever they may be. . . . For a science which describes only the motions of inanimate things but fails to include the actions of living organisms cannot claim universality. If man's actions are not determined by physical law it becomes a vital question for science to find whether his actions are determined, and, if so, by what factors."[6]

The development and general acceptance of the principle of uncertainty in physics during the past ten years would seem the answer to this new quest in science. Dr. Compton con-

6—Freedom of Man, pp. 2, 3.

tinues:

"Natural phenomena do not obey exact laws. This statement marks perhaps the most significant revolution in the history of scientific thought. . . . Has science, with its continual searching of fundamentals finally undermined its own foundations? Or is it possible that under the new physics a more adequate picture of the world can be drawn, one in which purpose is effective and life again has human meaning?"

In brief, today, "Man is left by science in control of his own actions within the bounds set by natural law. . . . Instead of removing the foundation of morality, science now presents new reasons why men should discipline their lives and supplies new means whereby they can make their world more perfect.

"It is possible to see the whole great drama of evolution as moving toward the goal of the making of persons, with free, intelligent wills,

capable of learning nature's laws, of seeing dimly God's purpose in nature, and of working with him to make that purpose effective."[7]

Side by side with these developments, so fundamental in their significance for man, new concepts of the individual, of life and the mechanics of evolution have emerged through the discovery of the *gene* by Mendel.

During the past thirty years, through millions of experiments in plants, the higher animals and Man, the new science of Genetics in biology has been established as an exact science. The gene has been shown as the "prime unit" and basis of life, the determiner of individuality, the foundation of human thought and action. Genetical experiments in the realm of mind have revolutionized all the former concepts of psychology. Clearly such an advance is capable of drawing in its wake a lengthy evolution of thought.

7—Freedom of Man, pp. 7, 66, 115.

Although the Austrian abbot Mendel died without recognition of his genius and his original papers were lost, they were restored to science at the turn of the present century after others had labored in his field, and a great truth, beautiful in its simplicity, is associated with his name.

Muḥammad ascribes glory to Him "Who created all the sexual pairs, of that which the earth groweth, and of themselves, and of that which they know not."[8]

Mendel discovered that the characters of organisms are controlled by definite units (which he called factors), one-half of which are directly inherited from the mother parent and the other half from the father; that these are single, independent units which remain absolutely pure and unadulterated no matter how they may be mixed in breeding; that *in the germinal cell* of the organism they *form up in pairs.* (That some of the genes are dominant and some recess-

8—Glorious Koran, XXVI, v, 35.

ive is a secondary principle: they are divided equally in the germinal cell.)

"In the higher organisms, and in Man," writes Hurst, "every growing cell carries a complete complex of genes which organizes and controls the development and expression of the individual personality. In Man the individual gene complex is composed of 48 distinct groups of genes known as chromosomes, 24 of which are directly derived from the egg-cell of the mother parent and 24 from the sperm-cell of the father."[9]

The gene itself is so minute that it cannot be seen even by the highest powered ultra-microscopes, yet countless experiments have proved its presence and its positions in the chromosomes. With regard to the nature of the gene, Hurst writes:

"It is inferred that the gene is a physico-chemical structure of minute size. These particles are by experimental inference molecules (or more or less complex combinations of

9—Heredity and the Ascent of Man, p. 111.

atoms), but different from ordinary molecules . . . the genes may be regarded as auto-catalysts. Since these genic molecules give rise to different reactions it may be inferred that each one must be of different constitution and structure . . . it is clearly evident that they were concerned directly with the first origin of life. . . .

"Recent genetical research leads us to 'the inevitable conclusion that, in general, living genes are relatively immortal. The original protogene of a thousand million years ago may not be alive to-day, but since every gene is a part of a previous gene we can safely say that all the thousands of millions of genes in existence to-day are parts of the progenes of a thousand million years ago and of the original protogenes. We can also safely predict that all the genes in existence a thousand million years hence or more will be parts of the genes of to-day and the progenes of long ago . . .a close approximation to

immortality."[10]

Writes Dr. Arthur H. Compton: "Biologically speaking, life, whether it be an apple seed or the germ cell of a man, is essentially continuous and eternal . . . there is continuity of life in the cells. . . . May we not also logically say that continuity of consciousness, mind or soul may be presumed from the essential eternality of the germ cell?"[11]

Just as physics has attained another level in its adaptation to new knowledge, so biology is elevated through a new perception of reality. In disclosing the germinal cell as the real laboratory of life, the discovery of Mendel alters essentially the mechanics of evolution, and reveals to the scientific world an entirely new conception of the individual. In transferring the direction of research, the concept of the individual is returned to its fundamental aspect—to the characteristics of the individual.

In the light of this discovery the

10—Heredity and the Ascent of Man, pp. 32-5, 131.
11—Washington Star, Apr. 12, 1936.

mystery of life recedes from developed forms to a sphere relatively apart from matter, in which the individual in developing obeys and fulfills the germinal potentialities. Since the problem of heredity, the complex transmission of characteristics, rests wholly with the germinal cells, the individual body becomes nothing more than a "temporary expression" of those germinal characteristics which have united to give it consistency and form. The individual may not be interpreted through himself alone but through the history of his family; and the characteristics which he may transmit are not those of his own body but of his origin.

This conception of the individual now appears in the scientific world as new and revolutionary. In Bahá'í thought, however, "the outworking of the qualities" is a familiar principle; its discovery lifts the science of Man to the plane of reality, in the Bahá'í view. In his Teaching con-

cerning Love as the creative principle 'Abdu'l-Bahá explains this subject clearly in throwing light upon the process of evolution.

"Love is an outpour from God and is pure spirit. . . . It is the immediate cause of the laws which govern nature, the endless verities of nature which science has uncovered. . . . This Manifestation of God is active, creative, spiritual. It reflects the positive aspect of God. There is another Manifestation of God which is characterized by passivity, quiescence, inactivity. . . . This Manifestation is matter. Matter, reflecting the negative aspect of God, is self-existent, eternal, and fills all space.

"Spirit, flowing out from God, permeates all matter . . . impresses its nature upon the atoms and elements. By its power they are attracted to each other under certain ordered relations, and thus, uniting and continuing to unite, give birth to worlds and systems of worlds. The same laws working

under developed conditions bring into existence living beings. Spirit is the life of the form and the form is shaped by the spirit. The powers of spirit are evolved by the experiences of the form, and the plasticity of the matter of the form is developed by the activity of the spirit. . . .

"The forms or bodies of component parts, infinite in variety, which in the course of evolution spirit builds as the vehicle of its expression are, because of the instability of matter, subject to dissolution. As they disappear others are built following the same patterns, carrying on the characteristics of each. . . . Similar types recur again and again. . . . So flowers and fruits come this year from like seed or from the same bush or tree as those of last year, each in the line of succession of its kind, the same in essence, but differing in substance. . . .

"Through these successive evolutionary steps spirit develops characters having divine attributes. The

positive, creative aspect of God is reflected in them. Individuality is derived from expression in individual form. Self-consciousness accompanies individualized character, and the being thus endowed has the potentiality of rising to the knowledge of God. . . ."[12]

But perhaps the most important development of the present century is the synthesis achieved by science in the expansion of these discoveries. All the major sciences now converge in one, as though to create a science of another order through the study of radiant energy or light.

Planck tells us: "According to the modern view there are no more than two ultimate substances, namely positive and negative electricity."[13] Jeans writes: "Matter proves to be nothing more than a collection of particles charged with electricity. With one turn of the kaleidoscope all the sciences which deal with the properties and structure of matter have become

12—God and the Universe, Bahá'í Scriptures.
13—Universe in the Light of Modern Physics, p. 16.

ramifications of the single science of electricity."[14]

And showing us that the three major conservation laws—those of matter, mass and energy, now reduce to one, Jeans says:

"One simple fundamental entity which may take many forms, matter and radiation in particular, is conserved through all changes; the sum total of this entity forms the whole activity of the universe, which does not change its total quantity. But it continually changes its quality . . . forever the tangible changes into the intangible. . . . These concepts reduce the whole universe to a world of light, potential or existent, so that the whole story of its creation can be told with perfect accuracy and completeness in the six words: 'God said, Let there be Light'!"[15]

We have long known that the radiant influence of light nourishes life. We know today that within the human body light forms the basis of

14—Mysterious Universe, p. 32.
15—Idem, pp. 73-8.

consciousness. For centuries man has concentrated his genius upon the study of inanimate matter. The idea now converges in many minds that in the study of light, science approaches the problem of life itself. Indeed science now seeks the mysterious law by which light, life and mind are bound-up together.

James Young Simpson, Professor of Natural Science at the University of Edinburg, writes: "The suspicion that there is 'an organic category' more fundamental and inclusive than anything subsumed under the inorganic, slowly gains ground. . . . If this last dualism is to be resolved, the probabilities are that the resolution will be in the direction of the priority of creative mind. . . .

"We are in the midst of a movement in thought comparable to one of the 'major revolutions' of the geologists—those movements of upheaval of land masses and continental areas which mark off the end of one secular

aeon and the beginning of another. The days in which we live are truly days of revelation. We stand upon the threshold of amazing discoveries."[16]

Thus from its own field science discerns the dawning Era. From the Mount of Vision and inspired research one Voice declares the millennial Age. In contemplating the truths of religion and science it is significant to realize that fundamental concepts in both realisms of modern science—the universe and man—are now based upon invisible realities, the electron and the gene.

Nothing is more characteristic of the changing order than the new attitude on the part of science. Before the miracles of modern thought its affirmations hold a new humility. Having identified the world-process with Mind and resolved analysis into synthesis, the principle of Life, may not science yet recall the familiar words to ponder them anew — "In

16—Nature: Cosmic, Human and Divine, pp. 117, 3, 154.

Him was life; and the life was the light of men?"[17]

Surely, looking backward in the future, the present century must be seen as the beginning of the period described by 'Abdu'l-Bahá and associated in His thought with universal peace—the discovery of the "new and hidden sciences," to revolutionize all the conditions of existence. The new body of thought which attends the rising of the Prophet provides at once the proof of His validity and the interpretation of His Teaching.

In the Tablets of Bahá'u'lláh, inscribed more than fifty years ago, we find these words: "The worlds were formed through the force emanating from the reaction of the active and passive principles; although the worlds are always the same, nevertheless they change constantly. . . . Verily the actor and the acted upon were created by the unresisted Word of God, which is indeed the cause of creation, and aught beside His Word was created

17—John 1, v. 4.

and caused. . . . Then know that the Word of God (exalted and glorified be He!), is far superior to what is comprehended by the senses; because it does not belong to the nature nor essence, rather it is sanctified from the known elements. . . . It became manifest without an utterance made, or a voice breathed. It is the command of God, the protector against all the worlds.

"Nature is the manifestation of the Will of God in the apparent world. Verily it is the preordination on the part of One, the predestinator and omniscient. Should it be said that nature is the Divine Primal Will manifested in the created world, no one has the right to object to that, for a great power is ordained therein of which the limit and essence could not be comprehended by the people of the world. Verily, the clear-sighted cannot see in it aught save the transfiguration of My Name, the Creator. Say, this is a state to which corruption

has no access. This is a being which made nature confounded regarding His appearance, His proofs and His effulgence which encompassed the world. . . ."[18]

"Regard thou the one true God as One Who is apart from, and immeasurably exalted above, all created things. The whole universe reflecteth His glory, while He is Himself independent of, and transcendeth His creatures. This is the true meaning of Divine Unity. He Who is the Eternal Truth is the one Power Who exerciseth undisputed sovereignty over the world of being, Whose image is reflected in the mirror of the entire creation. All existence is dependent on Him, and from Him is derived the source of the sustenance of all things. . . ."[19]

"All things, in their inmost reality, testify to the revelation of the names and attributes of God within them. Each according to its capacity indicateth, and is expressive of, the knowl-

18—Tablet of Wisdom, Bahá'u'lláh.

19—Gleanings from the Writings of Bahá'u'lláh, p. 166.

edge of God. So potent and universal is this revelation that it hath encompassed all things visible and invisible. . . . in the tradition of Kumayl it is written: 'Behold, a light hath shone forth out of the morn of eternity, and lo, its waves have penetrated the inmost reality of all men.' Man, the noblest and most perfect of all created things, excelleth them all in the intensity of this revelation, and is a fuller expression of its glory. And of all men, the most accomplished, the most distinguished, and the most excellent are the Manifestations of the Sun of Truth. Nay, all else besides these Manifestations live by the operation of their Will, and move and have their being through the outpouring of their grace. . . ."

"Whatever is in the heavens and whatever is on the earth is a direct evidence of the revelation within it of the attributes and names of God, inasmuch as within every atom are enshrined the signs that bear eloquent

testimony to the revelation of that Most Great Light. . . . How resplendent the luminaries of knowledge that shine in an atom, and how vast the oceans of wisdom that surge within a drop. To a supreme degree is this true of Man, who, among all created things, hath been invested with the robe of such gifts, and hath been singled out for the glory of such distinction. For in him are potentially revealed all the attributes and names of God to a degree that no other created being hath excelled or surpassed. . . ."[20]

". . . I beg of God to manifest His Cause in all countries, and that the servants may attain such a position that He may explain to them that which He desires, without veiling or concealment: that He may teach them the wonders of His knowledge. . . ."[21]

20—Gleanings, pp. 177-8-9.
21—Tablet of Manifestation, Bahá'u'lláh.

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