The Atheistic Platform.

III.

THE GOSPEL OF EVOLUTION.

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THE ATHEISTIC PLATFORM.

UNDER this title it is proposed to issue a fortnightly publication, each number of which shall consist of a lecture delivered by a well-known Freethought advocate. Any question may be selected, provided that it has formed the subject of a lecture delivered from the platform by an Atheist. It is desired to show that the Atheistic platform is used for the service of humanity, and that Atheists war against tyranny of every kind, tyranny of king and god, political, social, and theological.

Each issue will consist of sixteen pages, and will be published at one penny. Each writer is responsible only for his or her own views.

I. "WHAT IS THE USE OF PRAYER?" By ANNIE BESANT.

II. "MIND CONSIDERED AS A BODILY FUNCTION." By ALICE BRADLAUGH.

THE GOSPEL OF EVOLUTION.

A NEW and better Gospel is now preached to men. That which has for a long time gone by the name of Gospel (good news) is neither news nor good. It is not news, for it has been preached for nearly nineteen centuries. Not that length of time alone could make it old and effete. But the Gospel of Christianity has not within itself that inherent and strong life of reality which makes even old truths to have a perennial freshness, an eternal youth. Nor is the Gospel of Christianity good. In the tales that it tells us of the past, in the advice that it gives us for the present, and in the hopes and threats it holds out for the future, it is a misleading guide, a poor philosopher, a false friend.

The legends have it that on the coming of the central figure of the discredited evangel the angels sang together: "Peace on earth, good will to men." It was a false alarm. Neither peace nor good will was forthcoming. But with the advent of this scientific gospel, the Gospel of Evolution, comes the possibility of "striking a universal peace through sea and land," the possibility of the universal brotherhood of man.

Perhaps we are all of us too anxious and too hopeful in the feeling that some one idea will save the world. The religious creeds of different races and times are the expression of this anxiety. We that have rejected all belief in the supernatural must take care that the same fancy that has spoilt the lives of so many does not mar our own. We must have a care lest we make too much of some truth,

even though it be a scientific conclusion, based on scientific observation and reasoning. And we must not forget that, of all the great generalisations, that of Evolution is the one most likely to be thus regarded, for it is a generalisation of generalisations. The mind of man is always longing for some solid resting-place. Man wants to get back and back, to something certain. He wants to feel that, whatever happens, some one great principle stands fast. The children of the decrepit gospel dreamed that this was found in God. The children of the new Gospel know that in the indestructibility of matter and of motion, and in the infinite nature of the transformations of matter and motion, they have a solid fact on which to fall back when all else fails. Only it is very important to remember that, great as any idea may be, the mental effort needed for its understanding and its acquisition is to the individual of as much moment as the idea itself. The exercise of our faculties is of as great value to us as the results attained by the exercise. The old parental habit of asking of the schoolboy or the school-girl : "What prizes have you gained?" is only one form of a general error. The question is not, "What prizes have you?" but "What have you learned?" We are coming to recognise this in some measure in our estimates of grown men and women. Still, however, to the vulgar, the measure of a man is the banker's balance. But the thoughtful, as yet few in number, although the number grows hourly, and even the commonplace people, if they are in the unaccustomed atmosphere of culture, are estimating the value of a human being by that which he actually does and is, rather than by the magnitude of the cheques he can draw.

What is, then, this Evolution? In the asking this question and in the attempt to answer we see how much happier is the position of the new gospel as compared with that of the old. The good news of Christianity, having no scientific and indeed no natural basis, has been Protean in its forms. These have been indefinitely varied according to the taste and fancy of the age and of the individual. The Gospel as preached by Messrs. Benson, Booth, Baldwin Brown, Spurgeon, Liddon, Moody, is somewhat mixed. But the new evangel is founded wholly on a natural and scientific basis. There may be slight differences of opinion as to matters of detail among its apostles and its disciples,

but the fundamental principles are accepted by all. Upon these, no doubt, much less any dispute reigns.

Evolution is the name for the idea of the unity and continuity of phænomena. The popular and unscientific notion was that there was not only an original effort on the part of the supernatural causing the natural, setting it going, in fact, but a continual interposition of the supernatural from without, controlling the natural. Evolution is the doctrine of non-intervention. According to this gospel, matter and motion are all in all. Matter is the convenient name for all that which can affect the senses of man. Motion is change of place, whether it be of large, palpable masses, as when the arm is raised, or of minute impalpable molecules, as when heat or electricity is at work.

The ordinary notion of movement is wholly confined to that which is called molar, that is, the motion of masses. Moles=a mass. Thus the movements of a running man, or of a football when kicked, or of a railway train when the engine draws it along, are all cases of molar motion. But a finer kind of movement has of late years come within the ken of mankind. It has been at work probably eternally. It is molecular movement, or movement of small masses. But only very recently has the mind of man been able to take cognisance of this form. The researches of the physicists, the chemists, the biologists have demonstrated that there is a whole world of movements that affect only the minute particles of bodies. Thus heat is a mode of motion; electricity is another; magnetism is a third. The familiar phænomena of light are no longer regarded as due to any actual matter that has been thrown from a luminous body. They are the result of waves of a fluid imponderable and universal called ether, and there seems every reason to believe that the phænomena commonly called vital are of the same or of a kindred order. Life, it would appear, is but a mode of motion. And though we know life generally only by its manifestations of molar motion, as in the blow of the arm, or the stride of the leg, yet these massive movements are but the outward representatives of a large number of internal movements, of chemical nature in digestion, of nervous nature in the sense-organs and nerve tissues. Every bodily movement visible to the ordinary eye is only the

obverse aspect of many molecular motions, not as yet visible to man.

The reasons why we regard matter and motion as all-sufficient in the explanation of all the phænomena of the universe are several. In the first place, no destruction of matter has ever been witnessed. Second, no destruction of motion has ever been witnessed. The creation of either matter or motion has been equally unseen. Transformations of matter from one of its infinitely many forms to some other are constantly visible, and they are always unattended by the smallest increase or diminution in the actual quantity of matter. So also with motion—transformations without any change in quantity are continually occurring.

Thus, we see the rocks disintegrated by the action of rain and running water, "weathered" by the action of the air. We see the matter of which they consisted worn away and carried down by streams and rivers to be deposited at the mouths of rivers or on the beds of seas. Or we set fire to a candle and watch its matter combining with the matter of the air to form the products of combustion, carbon, dioxide, steam, and their fellows. Or a dead animal or plant is seen to decay slowly into these same gases that the burning candle gives forth and into certain inorganic salts. And these are all cases of the transformation of matter without any creation or destruction.

Or we see the molar motion of a student's hands bringing together some acid and two metals. At once chemical action, a form of molecular motion, is set up. The molar motion of hands, a piece of silk, and a glass rod results in electricity, a mode of molecular motion. Or we apply heat, a mode of molecular motion, to a bar of metal which expands, to a mixture of hydrogen and oxygen which unite chemically. Or to a crystal of tourmaline, one end of which becomes positively electric, the other negatively. These are all cases of the transformation of motion without any creation or destruction. In all these cases the amount of matter and the amount of motion remain unchanged. Only the quantities of particular kinds vary. The generalisation that the quantity of matter and motion in the universe is the same yesterday, to-day, and for ever, appears to be thoroughly established.

More than this. Not only is there no scientific basis whatever for the fancy of a creation or of a destruction of matter

or of motion. The fancy is unthinkable. No human mind is capable of picturing to itself the passage from the material to the immaterial, the moment of time in which the non-universe began to be the universe.

Yet again. Up to the present time every explanation of every phænomenon of the universe has been in terms of matter and of motion. The law of gravitation, Kepler's three great generalisations in astronomy, the phænomena of attraction and repulsion in electrified and magnetised bodies, the nature of chemical elements and compounds, the relation between plants and animals in regard to their effect on the air, the principles of variation, of natural selection, of heredity, of adaptation—these and thousands of other truths that unseal our eyes to the beautiful meaning of nature, are all explanations as to how certain forms of matter are in certain states of motion. And if up to the present hour all the explanations that have been forthcoming of natural things are in terms of the natural, we are entitled to conclude that all explanations hereafter will be in kindred terms.

Or we may look on the question in another way. In the days of man's greater ignorance everything was primarily or ultimately referred to the supernatural. All phænomena were at first directly due to the action of the supernatural. But, as time and knowledge advanced, these references grew fewer and fewer in number. They were replaced by perfectly natural explanations of events, and we are entitled to believe that this process of elimination has now gone on sufficiently far for us to hold that since supernaturalism is unnecessary for the primary explanation of phænomena, it is also unnecessary for their ultimate explanation.

From all that I have just said it will be understood that the Gospel of Evolution has a wider significance than popular notions imply. The general idea as to Evolution, that it is synonymous with Darwinism, is not accurate. The Darwinian teaching is only a part, though in one sense it is the most important part, of the Evolution truth. Evolution itself means, as we have seen, the unity of phænomena.

All things are, according to this new principle, one huge continuity. Whilst Darwinism shows that man is not distinct from the lower animals, and that all species of animals, and all species of plants are artificial groups

gliding one into the other, just as in their gradual development they glided one out of the other, Evolution goes further than this and does not fare worse. For the evolutionist not only believes that which the works of Darwin have made an assured truth, but he believes that plants and animals have had a common parentage, that living matter has originated from the non-living, that there has been no break in the vast series of phænomena at any point.

Some of the general grounds for this belief have been given. Let us look rapidly at some of the more special. The principle of the conservation of energy already mentioned indirectly is, in a sense, the starting point of thought on this subject. Grove's essay on the "Correlation of the Physical Forces," published a few years since, was the first clear enunciation of the generalisation towards which so many observations had led. When he reminded men that chemical action, electricity, heat, sound, light, magnetism, and life were all convertible, one into the other, and thus convertible in definite numerical proportions, mathematically calculable, the keynote of the idea of Evolution had been struck.

Harsh as it may seem, an idea in any branch of knowledge has never attained a sure basis until it is expressible in terms of mathematics. There was a time when physics and chemistry were divorced from mathematics to a large extent. Now even the phænomena of electricity and the reactions one upon another of chemical bodies are expressed in algebraical formulæ. This is the result of the increased precision of our knowledge. Following in the footsteps of physics and chemistry the biological sciences are becoming every day more mathematical. We have formulæ to express the manner of the arrangement of leaves upon a stem, the manner of arrangement of the parts of a flower. One of these days every structural and functional fact in regard to every living thing will be related to some formula of mathematics more or less general. We shall not all become martinets or dryasdusts. There is a beauty in exactness. I sometimes think that the difference between the loveliness of our thinking and of our dreaming on natural phænomena, as compared with that which the older thinkers and dreamers enjoyed, will be as the difference between the joy of a game of chess between skilled players

or between those that know not even the moves. The child pushes the kings and queens and rooks and knights and bishops and pawns about at random, and laughs gaily. But the master of the game, moving them according to definite rules, obtains a far higher enjoyment, and produces a combination that has its poetry.

The very sciences that deal with these different modes of matter and motion are now by no means as clearly marked off one from another as their earlier students thought they were. Physics, chemistry, geology, botany, zoology, anatomy, physiology, how they all dovetail into, or actually overlap each other. It is impossible to say sometimes to which domain of science a particular fact belongs. The distinctions between the physical and the chemical properties of bodies are confessedly artificial. Botany implies a study of the anatomy and the physiology of plants. Physiology in its turn becomes only a question of chemistry; its phænomena are becoming reduced to mathematical expressions. We are learning to calculate the actual amount of work done in the performance of different functions of the living body, in the same terms as we calculate the work done by a steam engine. The respiratory organs or the muscular during the day do so many foot-pounds of work. The foot-pound is the unit of measurement employed in the study of work. Work is done when matter is moved through space. The foot-pound is the amount of work done when the mass of a pound is raised one foot against the gravitation attraction of the earth. A steam-engine does per day a certain number of foot-pounds of work. Its capacity for work is usually expressed by saying that it is so many horse power. One horse power is equivalent to 33,000 foot-pounds per minute. The physiologists are, by means of very intricate and careful calculations, enabled to calculate with ever-increasing accuracy the equivalent in foot-pounds, *i.e.*, the mechanical equivalent, of each of the body functions of the average man *per diem*.

If we turn to any of the special sciences the same dove-tailing and over-lapping appear. In chemistry it is difficult to mark off any group of bodies from all other groups. The three sets of bodies that chemistry is supposed to study are elements, mixtures, and compounds. An *element* such as carbon or gold, is a body which has not yet been

decomposed. A *mixture* is that which results from putting together two or more substances, without those substances undergoing any change of properties. Thus brandy and water, or gunpowder is a mixture. The properties of the brandy and of the water in the one case, and of the charcoal, nitre and sulphur in the other, are unchanged. A *compound* is the result of the union of two or more elements with change of properties; thus water is a compound of hydrogen and oxygen, and its properties are those of neither hydrogen nor oxygen. The fundamental distinction supposed to be at the basis of all chemical study, that between elements and compounds, is found to be inapplicable when we study such bodies as cyanogen, a compound of the two elements carbon and nitrogen, that behaves like an element. Ammonium, a compound of four atoms of hydrogen and one of nitrogen, also behaves like an element, taking the place of such metallic elements as potassium or sodium. In fact all the so-called "compound radicles" which enter so largely into our study of organic chemistry are groups of two or atoms of two or more elements that behave as simple bodies. The metals and the non-metals are connected by such forms as arsenic or selenium, placed by one chemist among the metals, by another among the non-metals. Hydrogen, usually classed with the non-metals, has the power of replacing metallic elements. It does this so persistently that, on theoretical grounds, chemists had long spoken of hydrogen as probably essentially a metal. When the French chemist Pictet succeeded in liquefying hydrogen, until then only known in the gas form, the liquid fell upon the floor of the laboratory with a metallic ring. And who is to say positively whether an alloy of copper and zinc is to be regarded as a mixture or as a compound of the two metals?

Still more important is the bridging over the supposed gulf between the inorganic and the organic chemical substances. A few years back this gulf was supposed to be great, fixed, impassable. The mineral or inorganic was makable by man. The organic was not, and never would be. The chemist might go on continually manufacturing hydrogen and oxygen, carbon dioxide, ammonia. But he was never to hope to make alcohol, sugar, urea, any of the multitudinous substances called organic. And now all this folly of forbidding is at an end. The organic bodies are

manufactured by man. The inorganic and the organic are no more regarded as clearly distinguishable. Even the chemistry books by their very titles recognise and proclaim this fact. We have no longer works on organic chemistry. We have volumes on the chemistry of carbon compounds.

In geology the different kinds of rocks graduate into each other. Between the aqueous, or sedimentary, and the igneous, or those due to the action of fire, range the metamorphic, *i.e.*, sedimentary rocks that have been afterwards subjected to heat. The various systems of sedimentary rocks are known now to be purely artificial if convenient divisions. From the Laurentian up to the recent rocks there has never been any real hiatus. Nowhere is there the slightest evidence of pause or of recommencement. Our groups are artificial. Nature is like Gallio and cares for none of these things.

Whilst rocks thus glide one into the other, the fossil remains that they contain do likewise. If the view of the special creationist were accurate we ought to find isolated forms of dead animals and plants, we ought to find sudden appearances in the rocks of forms not allied to these already encountered, we ought not necessarily to find a series of organic remains ascending in complexity of structure. If the view of the evolutionist is accurate, we ought to find no forms of dead animals or plants isolated; we ought never to find a form appearing without preliminary heralds of its coming in the shape of kindred forms; we ought to find a series of organic remains whose later members are in advance of the earlier. These latter expectations are realised.

In like manner the gap supposed to exist between the kingdoms of the non-living and living is closing up. As long as men had only studied the higher forms of living things there was no difficulty in defining and distinguishing living organisms. To define and to distinguish the lowest forms of those now known is impossible. How completely this is true can only be understood by those who have studied the protoplasmic masses that hover on the border line between the organic and the inorganic. But even the unskilled in microscopic work will be able to grasp something of the great truth if they will take the trouble to look up the innumerable definitions of life that have been given by various persons, and note how unsatisfactory, how contradictory and often self-contradictory they are.

If we pass up into the kingdoms of the living, and study plants and animals, the same unity of phænomena meets us. Our classification terms—order, genus, species, and so forth—are as artificial as our names for the geological systems. No one holds to-day that any single species is clearly marked off from all others. Connecting links abound in our vegetable kingdom. The lichens, long regarded as a separate class of lowly organised plants are now known to be fungi that are parasitic upon algæ. The higher cryptogams or flowerless plants are found to be at one in their structure and functions with the lower phænogams or flowering plants.

The distinctions between plants and animals are found to have vanished. Once again it is easy enough to distinguish high plants from high animals. But no man can satisfactorily draw the line between the lower members of the two kingdoms. The old definitions of the animal and the plant given with a suicidal glibness in old books on botany and zoology, when tried in the balance of criticism, are found wanting. Even the food-distinction, supposed to be the best distinction between the two groups, fails. It is no longer true that plants feed on the inorganic, and animals on organic substances. The cases of vegetable parasites and of insectivorous plants give a direct contradiction to this statement. And it is very interesting to notice how gradual are the transitions in this as in all cases. A group of plants known as saprophytes, that feed on decaying organic things, is the natural transition between the ordinary plants that eat inorganic food-stuffs, and those plants that, like animals, exist on organic substances. So marked is this difficulty of distinguishing between the lower plants and the lower animals, that it has been suggested that a third kingdom of the living should be constructed midway between the two generally recognised. This is to be called Protista, and is to include all the doubtful forms that are not clearly members either of the Kingdom Animalia or of the Kingdom Vegetabilia.

If the arbitrary nature of all our systems of classification is understood, this new division will do little harm. But for the systematist the difficulty is by the establishment of this group only doubled. Heretofore he had only to struggle over a particular living thing, with the view to determine whether it were plant or animal. Now he will

have to struggle over it with the view of telling whether it is Protistic or animal, or Protistic or vegetable. But the true evolutionist will only look on the group of the Protista as containing forms that represent the parent condition of both vegetables and animals.

The animal kingdom, no less than the vegetable, gives these results. Amphioxus, the little Mediterranean fish, links the Vertebrata, or back-boned animals, for ever on to the Invertebrata. The classes of the Vertebrate sub-kingdom have their connecting links or intermediate forms. These classes, adopting for popular exposition the old classification, are the Pisces, Amphibia, Reptilia, Aves, Mammalia. Whilst Amphioxus at the lower end of the class of fishes connects these with the soft-bodied animals, or Mollusca, at the upper end of the Pisces, we have the Lepidosiren, or mud-fish. It is impossible to say whether this animal is more of a fish or a reptile. With limbs rather than fins, with three cavities to its heart, and a swim-bladder that acts as a lung, it has yet so many parts of its anatomy that are piscine as to lead Professor Huxley still to place it as a solitary representative of the highest order of Pisces.

The class Amphibia is itself a confirmation of the general truth, for its members, such as the frogs, are in their early condition fish, and in their adult state reptiles. Pterodactyl of the Jurassic strata is the winged lizard. Its name tells us that we have a form intermediate between the classes Reptilia and Aves. The duck-billed Platypus, or Ornithorhyncus, of Australia, is a furred mammal that suckles its young, and yet has a bird's bill, a bird's feet, a bird's wishing-bone, a bird's heart, a bird's alimentary canal. If we turn to the individual classes, the same thing obtains. To take but the the highest class, the Prosimiæ, or half-apes, among the Mammalia are an order, that stands centrally to the Insectivora, Rodentia, Cheiroptera, and Primates. There is no gap between man and the rest of the Primates. Not a single mark of anatomy, of physiology, or of psychology, clearly distinguishes man from the highest apes.

If we study the individual animal, the same fact of the unity of phænomena is again borne in upon us. The bodily functions are by no means so distinct in their nature as we were wont to think. To take but an illustration.

The sense-organs of man are all found to be only so many modifications of the integument.

The skin or tactile organ is the integument. The tongue or taste organ is but the integument folded inwards and a little modified. The nasal cavities are also lined with a modification of the same tissue, and even the most complex sense organs that are at the same time the most important —that is the eye and the ear—are, as the study of development or embryology shows us, only the result of a series of remarkable changes affecting certain parts of the epidermis of the animal.

Those physiological functions of the human body that appear to be clearly marked off are really not completely demarcated. Take as example the excretory action of the skin, lungs, and the renal organs. The lungs get rid especially of carbon dioxide; the skin of water; the renal organs of the products of nitrogenous decay. But each of these organs also eliminates those products which are eliminated by the other two. Thus the lungs, whilst they get rid principally of carbon dioxide, also get rid of water in the form of steam and of nitrogenous matter. The skin gives off a certain quantity of carbon dioxide and nitrogen excreta. And the renal organs also eliminate all three of the chief forms of excretory matter. When any one of these three organs is not functioning at its best, extra work is thrown upon the others, and in some extreme cases this metastasis, or transference of function, is very remarkable. Thus an ulcer in the human body has been known to secrete milk.

Try to realise at least something of what all this means. It is no longer possible to mark off clearly the various domains of science. Science is one, for it is the study of nature, and nature is one. In every branch of our knowledge that daily grows more unified, the transitions are found to be innumerable and the gradations infinitesimal. Our chemical groups, our geological rocks and strata, our inorganic and organic kingdoms, our plants and animals, our classes, orders, genera, species, all are seen to be artificial.

Here is then the new message that science is uttering to man. It is in truth good news. There is no break anywhere. The universe is one vast whole. It is true that at first there seems to be a loss because of the indistinctness

that now veils the old lines of demarcation. At first something of a shock is felt when we realise that the old definitions and classifications are only matters of convenience, and really represent nothing in nature. But our view of the whole gains incomparably. We are led to take a larger and more true conception of the universe. If the subdivisions disappear the unity of the whole comes out with wonderful clearness. We study phænomena from below upwards, and see something more than an unbroken series. We see that actually there is no below and no above. The mineral kingdon of the non-living passes into the living. This by gradual stages of ascent rises to the loftiest forms of plants and animals yet known. But these in their constant decay and in their death once for all as individuals, return to the mineral kingdom again. If only we grasp the full meaning of this new gospel founded on science, all life acquires a new significance. Most of all our own life, as the highest expression known to us of the phænomena of matter in motion, becomes more solemn and more full of hope. In it more than in any other are gathered together the forces of the universe. The attraction of the stone for the planet, and of the particles of rock one for another, the loves and hates of chemical atoms, the energies of electrified and magnetised bodies, the variations of innumerable simpler forms of organisms, long chains of heredity reaching back through incalculable times, myriads of adaptations, struggles and failures, deaths and lives, all have met in us. We, more than all others, are the heirs of the ages. While our less fortunate brethren, the lower animals, the plants, the minerals, are playing their good part in the universal history, without the consciousness in full of the meaning of it all, we read the signs of the past and of to-day. "We know what we are, but we know not what we may be," in all the detail that our children's children will see and live. Yet we know that the race has a future that will transcend its past, as that past transcended the dark dumb lives of the ancestry whence our kind has sprung.

The Gospel of Evolution is replacing that of Christianity. Science is taking the place of Religion and yielding to mankind the poetry that its forerunner missed. Nature is our all in all. Only the whisper of a secret thought here and there of hers has yet reached our ears. But

every sound of her voice, faint or thunderous, tells us that the supernatural is worse than doomed. It does not exist.

The preachers of this new gospel are nature herself and all her children. Thus the history of man, all science, all human lives, we that live and love, are the apostles of the new evangel. And its temples, marred as they are in some instances by the worship now and again of the dead god, are the halls of universities, the state-schools, the science classes for our young men and maidens, the laboratories and the studies of the philosophers, the hearts of all that seek for truth.

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