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THE CONFLICT OF TRUTH

THE CONFLICT OF TRUTH.

LETTER FROM DR. GEORGE MATHESON, D.D., LL.D., F.R.S.E.

19, St. Bernard's Crescent,
Edinburgh,
December 10, 1902.

My Dear Sir,

About a fortnight ago my attention was directed to your book. I bought the book, and began to study it. I opened it with great prejudice. I felt sure it would be another of the commonplace efforts after the restoration of orthodoxy, whose frequency is only equalled by their abortiveness.

As I read, I passed through a series of transformations. I was first arrested by the beauty of the style, and then by the bold claim to absolute originality. By-and-by I was more than arrested—I was bound hand and foot. I felt I was in the grip of a master who would by no means let me go till I had paid the uttermost farthing. I have as yet only read two hundred and thirty pages; but I am simply enthralled, enchained, spellbound, by the magnificence of the reasoning and the striking freshness of the treatment.

I have never in the field of Apologetics seen anything like it. The nearest approach to it is Butler's Analogy; but Butler is content with proving that Nature has equal difficulties with Revelation; that does not content you.

You have succeeded in establishing, not equal difficulties, but equal agreements, and to an extent that to me is simply marvellous.

With deep respect,
I remain,
Yours very sincerely,
George Matheson.
(Formerly Minister of St. Bernard's, Edinburgh.)

[*For opinions of the Press, see end of volume.*]

THE CONFLICT OF TRUTH

BY

F. HUGH CAPRON

B.A., F.R.A.S., F.L.S., F.R.G.S.

AUTHOR OF
"THE ANTIQUITY OF MAN FROM THE POINT OF VIEW OF RELIGION"

"Science and Religion express opposite sides of the same fact—the one its near or visible side, and the other its remote or invisible side."—HERBERT SPENCER.

"Ye are from beneath; I am from above: ye are of this world; I am not of this world."—JOHN.

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Part I

INTER-RELATIONS

PRELIMINARY CHAPTER

"It is an incredible hypothesis that there are two orders of truth, in absolute and everlasting opposition."—HERBERT SPENCER.

SOME explanation, if not apology, is doubtless due from one who ventures to offer to the public a yet further attempt to vindicate the claims of Religion against the aspersions which have been so freely cast upon her by the votaries of Science. So much has already been written upon the subject of the reconciliation of the two "Great Irreconcilables," that nothing short of a claim to genuine novelty can warrant any further intrusion upon the public attention. With the greatest thinkers of the age ranged upon either side of an intellectual arena which, though large, can scarcely be called unlimited, it may well be thought that Religion and Science have alike said their last say upon the questions at issue, at all events until some totally new scientific discovery shall arise, to add fresh fuel to the smouldering flames of the controversy.

Now, in this opinion I do not share. With all the apparent probabilities of the case against me, I yet venture to ask for the ensuing pages a patient perusal, on the distinct ground that they contain something new. I claim that the materials upon which I propose to base my argument have never been used for this purpose before. It appears to me that there is one point upon which Religion and Science have alike gone wrong—a point upon which any misunderstanding was very little to be expected, and a point of such transcendent importance to the matters in question, that no effort to direct

attention to the subject can be fairly regarded as superfluous. Within the last fifty years there has appeared the most complete, and in many respects the greatest, system of philosophy that the world has ever seen. Whether or no we agree with its ultimate conclusions, it is beyond dispute that in boldness of conception and adroitness of execution, in a happy combination of originality in matters of theory, coupled with a faithful adherence to authority in matters of fact, Mr. Herbert Spencer's *Synthetic Philosophy* has dwarfed all preceding philosophical systems. Few who have given the subject a thought will deny to Mr. Spencer's work a place in the very foremost rank of human productions; and for this reason, if for no other, the question of its bearing upon the great religious controversy must necessarily be one of transcendent importance.

It was not, of course, to be expected that such a work as the *Synthetic Philosophy* would meet with a unanimous acceptance; and various portions of the *Philosophy* have been subjected to the usual processes of critical torture. But there is one point upon which all parties, admirers and detractors alike, have exhibited a remarkable consensus of opinion. It has been universally assumed by both hostile and friendly critics, and it is undoubtedly the opinion of the author himself, that the *Philosophy* is irreconcilably inimical to the doctrines of Revealed Religion. A vague sort of Natural Religion—or, as Matthew Arnold not inaptly terms it, Religiosity—Mr. Spencer expressly recognizes, in his assertion of the existence of an Absolute Inscrutable Power, transcending and underlying all experience and all knowledge. But all the world is agreed that the very possibility of a Revealed Religion is absolutely negatived by Mr. Spencer's views. The relations between his *Philosophy* and the Bible are universally believed to be those of fire and water. Either, if brought into contact with the other, must immediately destroy its rival, or be itself consumed.

That this is the view entertained by Mr. Spencer's admirers

is common knowledge, and is openly avowed by them. That it is the view of his opponents is proved by the fact that they attempt to support the Bible by arguing that the *Philosophy* is in error upon this point or that. That it is the author's own opinion is clearly shown by a perusal of the opening chapters of his *First Principles*. Upon this point, at least, there appears to be a universal consensus of opinion, that we have to choose between the Bible and the *Synthetic Philosophy*, for that we cannot retain both ; that the acceptance of the one necessarily involves the rejection of the other. If we are disciples of Mr. Herbert Spencer, we cannot, we are told, (in intellectual matters, at all events,) be disciples of Jesus Christ.

Now, against this all but universal opinion I venture to raise my voice in solitary protest. I venture to think that upon this one point the critical world at large, and Mr. Spencer in particular, are for once in the wrong. It appears to me that the *Synthetic Philosophy* has furnished to the world the most powerful argument in support of the truth of the Bible, not only as regards its professedly scientific portions, but also as regards its higher and more essential doctrines relative to spiritual life, that has yet been forthcoming ; and in the following pages I shall endeavour to show that in the *Synthetic Philosophy* are to be found undeniable evidences in support of this proposition. I shall attempt to demonstrate, by a comparison of certain portions of the Bible with corresponding passages in the *Synthetic Philosophy*, that the doctrines of Revealed Religion rest upon the surest foundations known to Science ; and the novelty of my method will consist in this—that I shall argue that the Bible is to be believed, not because Mr. Spencer is wrong, but because he is right.

If this proposition can really be established, it is impossible to over-estimate its value to the cause of Religion. The *Synthetic Philosophy* contains to a greater degree than perhaps any other work the requisite qualifications which

render it a reliable standard by which to measure the scientific truthfulness of the Bible. The three necessary conditions of correctness in point of facts, soundness in point of reasoning, and freedom from bias in favour of the cause which I am espousing, are here to be found in a pre-eminent degree. Considering the position which it occupies in scientific literature, I am fairly entitled to treat both its scientific facts and its reasoning as above suspicion ; and few will accuse its author of having unduly favoured a cause which he himself claims to have overthrown. Hence, if the case of Revealed Religion can be supported by an appeal to the *Synthetic Philosophy*, it will thereafter, so far as rational evidence is concerned, (with which alone I am now concerned,) rest upon the surest foundations that can be furnished by the human intellect.

In order to appreciate the force of the ensuing argument, it is very desirable to have a clear perception of the leading characteristics of the *Synthetic Philosophy* ; and I may, therefore, perhaps be pardoned if I briefly narrate the effect which its first perusal had upon my own mind. When I first opened the pages of *First Principles*, I did so with considerable curiosity, not unmixed with anxiety. I had been warned that I was approaching a work absolutely hostile to the beliefs which, rightly or wrongly, I treasured as sacred. The *Philosophy* was described to me as dangerous and pernicious, subversive of truth and designed to mislead. Its arguments were compared to the enticing paths of a tortuous maze—easy of ingress, impossible of retreat. However, I had long been firmly convinced that a creed which could not stand the test of scientific enquiry was, properly speaking, no creed at all ; that if my beliefs could be maintained only by ignoring established facts, the sooner I discarded them the better. Accepting Christ's definition of the word of God—"Thy word is truth"—I felt bound to bid welcome to truth, from whatever quarter, and in whatever guise, it might come. An "unscientific religion" was, therefore, to

me an expression necessarily involving a very obvious, and a very real, dilemma. Nor could I for a moment bring myself to believe in the reality of a Supernatural, which rested for its support upon any other basis than the Natural.

Accordingly I approached Mr. Spencer's *First Principles* with something of the feelings of a gamester who has staked his all on a single throw. Here to me was the last stronghold of scientific scepticism. Here also was the most advanced outpost of religious belief. If my faith could stand this test, I need fear no other. If, on the other hand, it should here fall before the onslaught of Intellect, then the very citadel of my Religion might at once surrender at discretion. The question at issue was spiritual life or spiritual death.

I read, and was enchanted. It seemed as if my eyes were suddenly opened to new sights and new scenes. Things which before had seemed strange and inexplicable now grouped themselves into orderly and well-understood forms. Apparent miracle resolved itself on all sides into the sublime simplicity of Law. As at the touch of a magician's wand surrounding objects seemed to stand before me, clothed in a new and more glorious light. It was as if a prism were held before my eyes, through which I beheld the white light of Truth decomposed into its constituent rainbow rays.

> "Largior hic campos æther et lumine vestit
> Purpureo."

Surrounding objects retained their old familiar shapes, but their colours seemed altered. And as I gazed at them, bathed in this new and more searching light, mystery seemed to melt into transparent mist, dissolved, like morning clouds, before the rising sun of knowledge.

Thus as I read on with ever-increasing interest, wandering down the pleasant paths of an easy logic, or loitering with fresh delight beside the flowers of a faultless rhetoric, the conviction gradually took possession of my mind that, whatever might be the consequences to Religion, here, at

all events, was Truth—Truth as I had never seen her before, pure and undefiled.

Indeed, to a student and a scholar the writings of Mr. Herbert Spencer leave but little to desire, whether in point of matter or of style. Regarded merely as literary compositions their merits are of the highest order. If we gauge them by their author's own test—the economy of force—they must be permitted to take their rank among the foremost of philosophic expositions. Seldom, if ever, have problems, often the most profound, been elucidated with such apparent ease to the writer, and at the expense of so small an effort to the reader. In point of diction Mr. Spencer combines the two great literary merits of simplicity and dignity,—a simplicity always natural and free from affectation ; a dignity rising on occasions into eloquence.

Few, probably, will refuse this meed of honour to one who undoubtedly ranks among the greatest thinkers of the day ; but I may perhaps be permitted to cite a single passage, chosen almost at random from *First Principles*, as a specimen of Mr. Spencer's style. He is justifying the action of a philosopher who, impressed with the firm conviction that the established Religion of the day is a necessity to the well-being of the great mass of mankind, nevertheless determines to promulgate views which he believes to be true, but which he knows—or at least believes—to be subversive of that Religion ; and he thus proceeds :—

" Whoever hesitates to utter that which he thinks the highest truth, lest it should be too much in advance of the time, may reassure himself by looking at his acts from an impersonal point of view. Let him duly realize the fact that opinion is the agency through which character adapts external arrangements to itself—that his opinion rightly forms part of this agency—is a unit of force, constituting, with other such units, the general power which works out social changes ; and he will perceive that he may properly give full utterance to his innermost conviction : leaving it to produce what effect it may. It is not for nothing that he has in him these sympathies with some principles and repugnance to others. He, with all his capacities, and aspirations, and beliefs, is not an accident, but a product of the time. He must remember that while he is a descendant of the past, he is a parent

of the future; and that his thoughts are as children born to him, which he may not carelessly let die. He, like every other man, may properly consider himself as one of the myriad agencies through whom works the Unknown Cause; and when the Unknown Cause produces in him a certain belief, he is thereby authorized to profess and act out that belief. . . . Not as adventitious therefore will the wise man regard the faith which is in him. The highest truth he sees he will fearlessly utter; knowing that, let what may come of it, he is thus playing his right part in the world—knowing that if he can effect the change he aims at—well: if not—well also; though not *so* well." [1]

I do not know that it would be easy in the whole range of literature to point to a passage in which a difficult, and perhaps somewhat dangerous, case is more admirably stated than in the foregoing lines.

But apart altogether from its literary merit, the *Synthetic Philosophy* is a masterpiece of philosophic reasoning. In profundity and versatility of knowledge, in purity of logic, in boldness and originality of conception, and, above all, in that inexhaustible wealth of illustration with which he seems to carry by storm the most impregnable fastnesses of opposition, the great Apostle of the Intellect stands forth before all mankind, unrivalled and unapproached. Whatever exception may be taken to occasional details, there are few who will deny that, taking his *Philosophy* as a whole, Mr. Spencer has succeeded in building up a majestic structure, based upon the sure foundation of established facts, and destined to form a lasting basis upon which future generations of philosophers may build.

But this being so, how fared it with my Theology? What was the effect upon my religious beliefs of what I could not help recognizing as an established Philosophy, believed by its author, and by the world at large, to be subversive of existing creeds? To this transcendent question I received what was to me the most unexpected of answers. As I read and assented to Mr. Spencer's propositions one by one, ever and anon there flashed across me the feeling that beneath all that was seemingly so fresh and novel there

[1] *First Principles*, p. 123 (5th ed.).

was an underlying something which was not new. Like that strange and weird sensation which occasionally, in some ordinary conjuncture of life, seems to steal across us with the warning that we have at some forgotten, far-off time gone through it all before, so from the pages of the *Philosophy* would occasionally start forth a recognizable shape—an old friend in a new dress—a familiar truth in an unfamiliar form. Without for a moment impugning the originality of Mr. Spencer's methods or conclusions, I came gradually to realize, with an ever-increasing intensity, that the picture which his pages brought before me was but another aspect of a well-known landscape, seen somewhere else before—somewhere, but where?

I turned to the Bible, and there with wonder and delight I found the obverse of that sublime medallion of which Mr. Spencer's work presented the reverse. The deepest and most elaborate of his inductions, what were they but the simply expressed, yet sublime, deductions which Religion had proclaimed to a misunderstanding world three thousand years before? Not only the facts and theories of Science—Mr. Spencer's premises—but also his own grand generalizations—the conclusions deduced from those premises—I recognized them now. In the pages of the Bible I found not only the laws and history of Matter and Motion, as postulated or proved by modern Science; but I found also Mr. Spencer's own peculiar creation—the nature and characteristics of the universal law of evolution; not the vague evolution with which I had before been familiar, but Mr. Spencer's own evolution, with its integration of matter and dissipation of motion; with its change from the indefinite to the definite, from the incoherent to the coherent, from the homogeneous to the heterogeneous.[1] All these seemed now to start into life from the pages of the Bible, where—for me, at least—they had so long lain hid; and that

[1] See Chap. IX., "Fundamental Truths."

which filled me with the greatest wonder was not that I saw them now, but that, being there all the time, I had not seen them long before.

And when, provoked by this new revelation, I came to look further into that great Beyond, which, unexplained and unexplainable by Science, constitutes the peculiar sphere of Religion, I found that here, too, the lamp of Science, as kindled by Mr. Spencer, threw a welcome, because a guiding, ray. Thus in the teaching of the *Synthetic Philosophy* I found, not only new reasons for believing old truths, but also new meanings in those truths themselves.

And here the question naturally arises, If my contention is sound, what is the flaw in Mr. Spencer's reasoning which has misled himself and his critics into so profound an error, as to misunderstand the bearing which his whole work has upon the great problem of Revealed Religion? Accepting all his primary conclusions, on what grounds do I justify my rejection of this, the practically most important of his ultimate conclusions? In order to answer this question, it is necessary to enquire on what grounds Mr. Spencer rejects Revealed Religion.

Mr. Spencer opens his *Philosophy* by seeking a reconciliation between Science and Religion. Recognizing that there has been an immemorial antagonism of belief between Religion and Science; recognizing, also, that there is a truth underlying Religion, just as surely as there is truth underlying Science; and further recognizing that, inasmuch as it is an incredible hypothesis that the truth which underlies these two antagonists can be of two distinct orders, in absolute and everlasting opposition, there must necessarily be some mode of reconciling the apparent antagonism; Mr. Spencer sets himself, by the process of eliminating the discordant constituents of the truth professed by either, and observing what remains after the discordant constituents have been eliminated, to ascertain in that remaining constituent the truth which is common to both. In that common truth

will be found the reconciliation, and the only possible reconciliation, between Science and Religion.

This common ground of reconciliation Mr. Spencer finds to be the recognition of the existence of an Inscrutable Power lying behind all phenomena :—

> "If Religion and Science are to be reconciled, the basis of reconciliation must be this deepest, widest, and most certain of all facts—that the Power which the Universe manifests to us is utterly inscrutable."[1]

Now, up to this point, whatever may be thought of the details of Mr. Spencer's scheme of reconciliation, we obviously cannot object to the principle upon which it is based. That the required reconciliation can only be obtained by eliminating discordant constituents is obvious ; and if we take any exception to Mr. Spencer's conclusion, it will be either on the ground that he has not eliminated all the discordant constituents, and so has not arrived at a true reconciliation at all ; or else that he has eliminated too much—that he has shut out as discordant some constituents which are not really discordant, and which should therefore have been retained ; —in other words, that he has not arrived at "the only possible" reconciliation.

Of these two suggested objections to Mr. Spencer's conclusion, the former is clearly untenable. It is impossible to deny that the recognition of an Ultimate Mystery is ground common to both Religion and Science ; and if so, it obviously affords a true basis of reconciliation. The latter objection, therefore, alone remains to be considered. Is this true reconciliation the only possible reconciliation ?

It is impossible to exaggerate the importance of the issue which this question raises. To answer it in the affirmative is to devitalize Religion. If the only possible reconciliation between Religion and Science is mystery ; if, in other words, the reverent recognition of an Absolute and Incomprehensible Mystery is the only point upon which Religion can

[1] *First Principles*, p. 46 (5th ed.).

possibly be scientific; and if the least departure from this attitude must necessarily render her either irreligious, or unscientific, or both; then, obviously, we may as well bid farewell to Revelation for good and all, for Revelation becomes at once equally impossible and useless. How could an incomprehensible mystery be *revealed*? There is self-contradiction in the very question. And even if such an impossible Revelation were possible, what good could it possibly do to mankind? If we require to know on what ground Mr. Spencer rejects Revelation, we need not look beyond this, his first conclusion; for it carries with it the rejection of all Revelation. It raises an objection which aims deep down at the very root of Religion, and strikes, not at her details, but at her fundamental principle. Unless the theologian can dispose of this attack, it is useless to proceed further with his defence of Religion, for there is nothing left to defend. Before the Gorgon eyes of such an assailant the living, energizing vigour of Religion freezes into a stony Religiosity.

Here, then, is a fundamental objection to Revealed Religion. It rejects Revelation, not merely as an impostor, but as an impossibility. Any attempt, therefore, to support the credibility of the doctrines of Religion must meet this objection, by showing that Mr. Spencer's basis of reconciliation, though a true, is not the only possible basis. Accordingly, in the ensuing chapters I shall endeavour to establish this proposition. I shall seek to show that upon other questions besides the recognition of an Ultimate Mystery there are between Religion and Science points of contact which are also points of coincidence. I shall maintain that upon certain matters, with regard to which Religion and Science are generally supposed to be hopelessly at variance with each other, the most perfect harmony really prevails.

In advancing such a contention, can I really maintain the position with which I commenced—that I accept all Mr. Spencer's facts and arguments; and that I seek to

support Religion on the ground, not that he is wrong, but that he is right? Can two such conflicting conclusions be logically supported by the same premises? I think they can; and for this reason—that by Religion Mr. Spencer does not mean what I mean. If it can be shown that by this term we respectively mean two different things, then it may very well be that the very facts and arguments which shatter his "Religion" to atoms serve only to confirm and strengthen mine. What, then, do we mean by this term?

For the purpose of the ensuing argument my definition of the term Religion is extremely simple. The only form of Religion which I am concerned to defend is the Religion of the Bible. To the Bible I look as the sole repository of religious ideas. Everything that rests upon any other authority I leave out of consideration. Nor am I concerned with any special interpretation of the Bible, coined by any particular sect or creed. I take the Bible as it stands in its native simplicity. I place upon its statements that meaning which the words, in their natural and ordinary sense, and read in conjunction with the context, would naturally and reasonably bear. And the result is that "Religion" which alone I am concerned to defend. For this purpose I use the term as synonymous with the Bible.[1]

What Mr. Spencer means by "Religion" is not quite clear, inasmuch as he has not, so far as I am aware, expressly defined the term. But that he uses the term

[1] I should, however, perhaps here guard myself by mentioning that the ensuing argument makes no attempt to defend the Bible *as a whole*, or even to vindicate the truth of any other portions of the Bible than those to which immediate reference is made, and, of course, such other parts of the Bible as directly or indirectly harmonize with those portions.

Stated in two words my argument is this:—that certain portions of the Bible to which attention will be drawn contain statements the existence of which is only explicable upon the assumption of their truth, and which, consequently, we are *logically bound* to believe. Hence, if it could be shown—I do not suggest that it can—that any other parts of the Bible are contradictory to my selected portions, or are in any respect scientifically untrue, such a demonstration would not in the least affect the validity of my argument, or impugn my

in a wider sense than that which I attach to it is evident from a variety of facts. Thus, when he comprises in this term both "Pantheism" and "Theism," and includes amongst what he calls "religious ideas" "aboriginal creeds," "fetishism," "ancestor-worship," and other similar superstitions, it is apparent that by Religion he means, not merely the Religion of the Bible, but the aggregate of religious beliefs, past and present, pagan and Christian. When, again, he accuses Religion of displaying "an imperfect belief in that which it especially professes to believe," he is obviously attacking her, not on the ground that her doctrine is untrue, but on the ground that her practice of that doctrine is defective, which shows that in the term Religion he includes practice as well as doctrine—a meaning which is excluded from my definition of the term. But it is not essential to the ensuing argument to frame any exact definition of what Mr. Spencer means by the term Religion. All that is necessary is to observe that his definition, whatever it may be, is wider than mine. And this being so, my method of argument will be to show that his facts and arguments, fatal as they undoubtedly are to the credibility of what he means by Religion, serve only to establish the credibility of the Religion of the Bible.[1]

But now, what do we mean by Science? If it be necessary to define the term Religion, it is at least equally necessary to define the companion term. For Science, like Religion,

conclusion as to the logical necessity of believing those statements, a disbelief of which is, as I shall endeavour to show, a logical impossibility

Without, therefore, pronouncing any opinion as to the permissibility, from the theological point of view, of the doubt expressed by the authors of *Lux Mundi* (p. xxvii. 13th ed.) as to whether the Bible is "a volume to be received in all its parts as on the same level, and in the same sense, divine," I am logically both entitled and bound to point out that my argument is self-contained in the sense that it is independent of all questions of "canon"; independent, too, of all questions as to the truth or untruth of any other parts of the Bible than those with which it directly deals.

[1] From what has been said it must not be supposed that the term Religion is always used in the ensuing pages in the restricted sense

has a spurious counterfeit, so amazingly like her in appearance that the two are habitually confused together; yet so disastrously unlike her in reality, that no pains can be considered superfluous that may help to render the distinction clear. So strong were the views held by the late Professor Huxley as to the absolute necessity of emphasizing this distinction, especially in connection with controversial theology, that he coined a special term by which to distinguish Science the impostor from Science the true. The former he christened Pseudo-science; and in an essay entitled "Science and Pseudo-science" he succeeded in demonstrating, in a manner which appears to me to be entirely conclusive, that theologians fall occasionally into the error of citing as Science propositions which, on a closer examination, are found to be nothing better than Pseudo-science.

I heartily endorse this conclusion. I think, as has often been said before, that in this connection Religion has suffered more from her friends than from her foes. But, while endorsing, I still take exception to, Professor Huxley's conclusion. For I venture to think that it is defective—not in having gone too far, but in not having gone nearly far enough. It seems to me pretty clear that, so far as Pseudo-science is concerned, theologians enjoy no monopoly in the use of this convenient, but unwholesome, commodity. Pseudo-science is a noxious weed which, like many another member of the same irrepressible genus, has an unhappy knack of seeding itself just where it ought not to be. It flourishes, it is true, at times in the garden of Theology. But, with an almost equal persistency, it succeeds in taking root

implied by my own definition of the term. On the contrary, it will frequently be employed in the wide and somewhat indefinite meaning in which Mr. Spencer employs it, as connoting all the religious beliefs which have ever guided or deluded mankind. The reasons which necessitate the occasional employment of the term in this extended sense will become clear as the argument proceeds. I believe that in every case the context will readily disclose in which of the two senses the term is there used. All, therefore, that is here necessary is to point out the double use to which the term will occasionally be put.

also in the trimmest and best-kept parterres of Science. For a verification of this assertion we have not far to look; for Professor Huxley, the merciless exposer of Pseudo-science, was himself one of its most conspicuous victims.

In support of this assertion I will take as an illustration of Pseudo-science one of the not infrequent errors which Professor Huxley perpetrated in his well-known criticisms of the first chapter of Genesis. In discussing the opening verses of that chapter he writes as follows:—

"Next, we read in the revisers' version, in which I suppose the ultimate results of critical scholarship to be embodied: 'And the earth was waste ['without form,' in the Authorised Version] and void.'"[1]

Mr. Huxley then proceeds to criticise these two alternative translations of the Hebrew term תֹּהוּ (*tohu*) as follows:—

"'Waste' is too vague a term to be worth consideration. 'Without form,' intelligible enough as a metaphor, if taken literally, is absurd; for a material thing existing in space must have a superficies, and if it has a superficies, it has a form. The wildest streaks of marestail clouds in the sky, or the most irregular heavenly nebulæ, have surely just as much form as a geometrical tetrahedron. . . . As poetry, these lines are vivid and admirable; as a scientific statement, which they must be taken to be if any one is justified in comparing them with another scientific statement, they fail to convey any intelligible conception to my mind. . . . *Science knows nothing of any stage in which the universe could be said, in other than a metaphorical and popular sense, to be formless.*"[2]

These remarks were written by Professor Huxley in the year 1886, and it will have been observed that they express the Professor's opinion as to the scientific applicability of the two alternative renderings of *tohu*—"without form" and "waste"—in a manner which is at once emphatic and contemptuous. The term "waste," in this connection, is "not worth consideration." The term "without form" is "absurd."

Now, it so happens that in the year 1869 Professor

[1] *Essays on Controverted Questions*, p. 119 (1892 ed.).
[2] *Ibid.*, pp. 120–21.

Huxley had given to the scientific world his own view of what the primordial condition of nebulous matter really was. In a paper entitled "Geological Reform," being the anniversary address to the Geological Society, of which the Professor was then President, he gives a vivid account of a theory first propounded "by that famous philosopher, Immanuel Kant,"[1] and which formulated "a doctrine in all essential respects similar to the well-known 'nebular hypothesis' of Laplace."

This doctrine Professor Huxley cites with entire approval. It is a "geological speculation," to be sure; but, as compared with the "natural history" of the earth, it "is just as much Science as the other, and indeed more; and it constitutes geological ætiology."[2]

It is, therefore, a matter of considerable interest that, having learnt from the foregoing citations from *Essays on Controverted Questions* what, in his view, Religion ought *not* to have said about the primordial condition of nebulous matter, we should now enquire what he considers Religion ought to have said on the subject. What term ought Religion, in Mr. Huxley's view, to have substituted for her despised and rejected *tohu*? This is what the Professor says:—

"Kant pictures to himself the universe as once an infinite expansion of *formless* and diffused matter. . . . In vivid language he depicts the great world-maelstrom, widening the margins of its prodigious eddy in the slow progress of millions of ages, gradually reclaiming more and more of the molecular *waste*, and converting chaos into cosmos."[3]

May I be permitted to draw special attention to the two words which I have taken the liberty of italicizing in the above quotation? They are our old friends "formless" and "waste." Alas for Religion in the hands of Pseudo-science! Well indeed for her that her condemnation or acquittal rests elsewhere than on professorial caprice! "What," enquires

[1] *Lay Sermons*, p. 208 (1891 ed.).
[2] *Ibid.*, p. 207.
[3] *Ibid.*, pp. 208-9

the Professor, with a sneer, "was the earliest condition of nebulous matter?" "*Tohu*," is the theologian's ready response. "And what," rejoins the Professor, "may *tohu* mean?" "Without form," the theologian replies. "Ridiculous!" responds the President of the Royal Society; "the term in this connection is absurd." There is safety in the indefinite. "Waste," suggests the cautious divine. "Contemptible subterfuge!" rejoins the man of science; "your term is too vague to be worth consideration." "Well," responds the discomfited theologian, "I have given you my answer; let me have your's. Tell me what Science has to say on the subject." "By all means," replies the scientist, with bland complacency; "I will tell you all that can be told. I cannot, indeed, give you what Science knows; but I can give you what she thinks. The question is still in the stage of speculation, and is, therefore, not wholly free from doubt. But there are the strongest possible scientific reasons for believing that the earliest condition of nebulous matter was *formless* and *waste*."

Surely, if ever there was an instance of Pseudo-science, we have it here. If not, I can only say that the instance before us appears to me to furnish an amazingly close imitation of the genuine article. By what right the Professor claims to reject as unscientific in Religion what he expressly accepts for Science, I do not pretend to know. But if no explanation be forthcoming, it would certainly be interesting to enquire how the advocates of the Infallibility of Science would propose to get rid of this highly inconvenient presidential utterance.

The Roman Catholics, when called upon to defend their doctrine of the Infallibility of the Pope in respect of cases where some papal pronouncement may have been conclusively shown to be inconsistent with facts, are often accused of taking refuge behind a convenient sophism. The Pope, it is said, is infallible only when he speaks from his chair of office; and as often as some papal utterance is

shown to have been fallacious, his advocates effect a somewhat ignominious escape under cover of an airy "Non ex cathedra!"

I do not know whether, in the present case, the votaries of Science would propose to avail themselves of this somewhat slender method of defence; but, if so, the case for Religion is proved. For that portion of the Professor's words which was uttered by him from the presidential chair of the Geological Society, and which must, therefore, on the view put forward by the suggested defence be deemed to have been pronounced *ex cathedra*, and, consequently, to be infallible, is in exact agreement with the corresponding allegations of Religion.

Nor can it be urged in Mr. Huxley's defence that he may have changed his views as to the scientific propriety of the terms "without form" and "waste" between the years 1869 and 1886; for in the later paper he cites his earlier paper with approval. Further than this, he republished as lately as 1891 the earlier paper in the form in which it has been cited above. And, finally, in an essay entitled "Scientific and Pseudo-scientific Realism," published in the year 1892, he mentions, apparently with entire approval, that "Kant, in his famous *Theory of the Heavens*, declares the end of the world and *its reduction to a formless condition* to be a necessary consequence of the causes to which it owes its origin and continuance."[1]

I have chosen the foregoing instance as my illustration of Pseudo-science not only because it illustrates the wonderful ubiquity of Pseudo-science, by showing that even the highest scientific authorities are not exempt from its insidious encroachments; but also because it furnishes a somewhat appropriate introduction to the ensuing argument. Already, in discussing it, we have stumbled upon a point of contact between Religion and Science which is also a point of

[1] *Essays on Controverted Questions*, p. 248 (1892 ed.).

coincidence. Upon the question of the primordial condition of Matter, Religion and Science are agreed.

Nor is this a point of small importance in the controversy. For reasons which will be more fully discussed hereafter, it is of great moment that we should be able to show that the starting-point of Religion is also the starting-point of Science. And here is unanimity upon a question not far removed from the starting-point of either.

Nor, again, can it be said that the value of the coincidence is vitiated by the fact that it arises out of a self-evident, or obvious, proposition. On the contrary, so far from being obviously correct, Religion's assertion is of such a nature that it strikes even so shrewd and well-informed an observer as Professor Huxley as being obviously wrong—in fact, actually absurd. "Without form," he tells us, "if taken literally, is absurd. . . . Science knows nothing of any stage in which the universe could be said, in other than a metaphorical and popular sense, to be formless." But, as we have seen, Religion turns out to be right after all. When we turn from Pseudo-science to the utterances of Geological Ætiology, we find that the doctrine of Kant and Laplace is but an echo of what Religion had fearlessly proclaimed three thousand years before.

Here then, taking leave of preliminaries, we may proceed at once to the discussion before us. Having indicated Mr. Herbert Spencer's *Synthetic Philosophy* as the foundation upon which I propose to build ; having defined the "Religion" which I desire to defend ; and having distinguished the Science upon which I intend to rely from the Pseudo-science with which true Science is too often confounded ; I will now proceed, without further preface, to the exposition of my argument.

CHAPTER I

INTERDEPENDENCE

"The views entertained respecting governments in general, are now widely different from those once entertained. Governments were in ancient times supposed to have unlimited authority over their subjects. Individuals existed for the benefit of the State; not the State for the benefit of individuals."—HERBERT SPENCER.

"Whosoever will be great among you, shall be your minister: and whosoever of you will be the chiefest, shall be servant of all."—MARK.

THERE are certain misconceptions, which, though they appear to offend against every known law of Science, have nevertheless succeeded in travelling down the ages with an inexplicable persistency. Like those fugitive stars, technically known as "runaways," which by their immense proper motion, without any apparent attracting cause, seem to set the laws of gravitation at defiance, these mysterious visitants pursue their lawless way, apparently unaffected and unhindered by the gravitating influences of Truth.

One of the most conspicuous of these unlicensed wanderers is that curious misconception popularly called "Freedom." By this term, in its natural and proper sense, are expressed some of the most alluring ideas that ever dazzled the imagination of the painter or the poet. To be "exempt from subjection to the will of others"; to be "not under restraint, control, or compulsion"; to be "able to follow one's own impulses, desires, or inclinations"; "not dependent"; "at liberty"—all this, according to the lexicographer, is to be "free." And freedom is held up to us as the most glorious object of desire, the aim and end of civilization. We

speak with rapture of a "free people," of "free institutions"; we pant and struggle to be free. And all the while we are chasing a phantom. For freedom is a thing which has no place in the universe—a monstrosity, like a vacuum, which Nature abhors.

Wherever we turn our eyes we are met by this tremendous truth. In the physical universe the one ubiquitous fact which Science is perpetually dinning into our ears is the wonderful dependence of the parts. Every existing thing stands or moves in obedience to the influence of others. Dependence is everywhere; independence nowhere. No atom, no molecule, no planet, no sun, no star, but is the slave to some overmastering despot. The atom to the molecule; the molecule to the planet; the planet to the sun; each is bound to its lord by fetters which are never broken, save at the bidding of some mightier tyrant. And even the majestic Sun himself can claim no exemption from this universal law of servitude. In the far-off depths of the constellation Hercules is a Power which saith to him, "Come," and he cometh.[1]

When we come to think of it, it is a wonderful thing that dependence, which mankind affects to loathe and abhor as a thing hateful and debasing, should be Nature's glory and crown. Yet in the physical Universe, at all events, this is an undoubted fact. Here the standard of man is the standard of Nature reversed. We speak of slavery as a curse, and of freedom as divine. But with Nature it is just the other way. To her, servitude is the one ennobling influence, freedom the one degrading vice. And, as if to illustrate this truth with a terrible emphasis, she suffers here and there an occasional breach of her great law, in order, as it were, to exhibit with a peculiar significance the

[1] The Sun, with his attendant train of planets, comets, etc., is travelling towards the constellation Hercules at the rate of about half a million miles a day. This was the view of Sir William Herschel. The later investigations of Stumpe and others appear to show that the Sun's pathway is directed rather towards the star known as δ Lyræ.

heavy fate which awaits the transgressor of her commands. For physicists tell us that there are certain volatile substances, such as free hydrogen, which by reason of their immense initial velocity occasionally succeed in escaping from the earth's attraction, and wander forth into space never to return. In these rare and exceptional cases, the slave has, for the time at all events, broken Nature's great commandment—it has burst its fetters, and is free. And Nature revenges herself by placing the truant under the ban of her most terrible curse. She shuts it out from the beneficent operation of Evolution. An exile to progress and improvement, henceforth it may take no further part in the glorious evolution of the Universe. The sentence of outlawry is upon it; and for it all hope of promotion in the scale of existence is at an end. It went forth free hydrogen, and it will remain free hydrogen for ever. One only chance of regeneration is left—to return to the ennobling condition of servitude. In terrible earnest, in physical Nature there is no condition so glorious as dependence, so degrading as to be free.

This, then, is a truth which, though frequently overlooked, is nevertheless to be found written with an unmistakable emphasis in every corner of the physical Universe, that servitude is the all but universal rule, independence the rare exception. And as a corollary to this primary truth we find everywhere imprinted this further complementary truth, that in the physical Universe, at all events, dependence must be regarded as the highest of all conditions, and independence as the lowest; for the former is the invariable concomitant—and, indeed, the cause—of all stability and all progress, while the latter is the inseparable attendant of stagnation and chaos.

When from the physical we pass to the psychical sphere, the same truths meet us at every turn. Here, again, upon examination it will be seen, not only that dependence is the rule and freedom the rare exception, but also that dependence

is the highest, and freedom the lowest, of conditions. It is often asserted, and still more often assumed, that civilization is a passage from dependence to freedom. The very reverse is the fact. It is much more correct to say that civilisation is a passage from freedom to dependence. What are the essential requisites for civilization? Here is Darwin's answer to this question :—

"The possession of some *property*, a *fixed abode*, and the *union of many families under a chief*, are the indispensable requisites for civilization."[1]

These, then, according to Darwin, are the three essentials, without which barbarism cannot emerge into civilization—(1) *property* (especially *real property*—"a fixed abode"); (2) *family*; and (3) *government* ("a chief"). If we now glance very briefly at each of these three factors, we shall find in every case that its history has been that of a passage from freedom to dependence.

That government—subordination to a chief—is a form of dependence is a self-evident proposition. The man whose actions are controlled by a chief is obviously less free than the man who is controlled by none. So far as this requisite is concerned, civilization is manifestly a passage from liberty to dependence.

As regards the second factor—property—it is scarcely less obvious that here, too, the same law holds good. It is not merely that the very institution of property—the distinction between *meum* and *tuum*—by limiting my right of action to the things, always comparatively few, and generally actually few, which I can call my own, obviously entails a limitation of my freedom of action, and, in so doing, necessarily involves a corresponding diminution of liberty. But it is also that a moment's glance at the history of property will suffice to show that that history again exhibits a transition from liberty to bondage. The earlier rights of property were exercised

[1] *The Descent of Man*, p. 133 (1890) ed..

under less restraint—that is to say, were more free—than modern rights of property. Consider that most important class of property, on which Darwin lays especial stress—land. By primitive man landed rights were acquired by the simplest of processes—by occupation, or by force. Once acquired, they were, it is true, liable to sudden disruption by superior force. But whilst they lasted they could be exercised free of all restraint, except such as the possessor chose of his own free will to impose upon himself.

With these unfettered rights compare the freest form of ownership of land which the law of England permits—and which, with an unconscious touch of irony, she terms a "*freehold*." In theory, this form of property is not even a property at all; it is merely a *tenure*. In practice, the exercise of such rights as it confers is frequently fettered by the restraints of settlements and entails. Often the land itself is *subservient* to various easements—rights of way, ancient lights, rights of drainage from adjoining lands. Even such rights as remain in the owner, after these limitations have been duly discounted, may be exercised only subject to the most rigid restrictions. Both the acquisition and the alienation of land are hampered by tedious and difficult questions of title, always involving expense, and occasionally litigation. When once acquired, the land is liable to be suddenly and compulsorily snatched away, against the will of its owner, for the purpose of a railway, a street, or an allotment. Even while the limited ownership continues, its exercise subjects the owner to restraints of all sorts. Does he desire to excavate? He must first provide adequate support for his neighbours' adjoining buildings. Does he desire to build? He may do so only in accordance with plans, and with materials, approved by the Local Authority. If he makes any use whatever of his property, he is heavily taxed for numerous purposes. If, on the other hand, he abandons it, he is subjected to various penalties should his buildings become dangerous, or his land a "nuisance."

Thus we see that whilst the primitive man's ownership of land was unrestricted while it lasted, the so-called "freehold" of modern civilization is subject in every direction to the most rigorous restraints imposed by the will of others. It is fettered as regards its acquisition; it is fettered as regards its alienation; it is fettered as regards its user; it is fettered as regards its non-user. The history of the rights of property is the history of a change from a condition of freedom to a condition of bondage.

Turn, now, to the third factor—family—and consider for a moment the institution upon which the family relationship is based—the institution of marriage. Admitting—and, indeed, claiming—that to this institution social progress is more deeply indebted than to any other factor whatever, we must simultaneously admit that the *modus operandi* by means of which this institution has produced the benefits which it has undoubtedly conferred upon mankind has constantly been the curtailment of Liberty. For what is marriage? The Law knows it as *vinculum matrimonii*—the matrimonial *bond*. It is, in fact, as its very name declares, a species of *bondage*. Even those who most persistently confuse together those two incompatible commodities, security and liberty, and who look upon marriage as the inseparable attendant of a "free state," nevertheless habitually speak of it as "the marriage *tie*." Still more strikingly is the truth that marriage is a curtailment of liberty attested by the fact that its antithesis is, by way of contradistinction, termed "free love."

But leaving out of the question inferences which may be drawn from the phenomena of nomenclature, we have only to glance at the condition of marriage to see that it is essentially a curtailment of liberty. In every direction it imposes, both upon the parties to the marriage and also upon all the other members of the community, restraints upon free action. Among other obvious obligations which it thus imposes may be mentioned obligations upon the

parties to conjugal fidelity, to mutual assistance, to support and education of children ; upon the offspring of the marriage obligations to filial obedience, and (often) to support of parents ; upon all the rest of the community the obligation to exercise such self-restraint as will secure to the married parties the exercise of their matrimonial rights ;—all of which obligations are in highly civilized communities enforced by rigorous pains and penalties, entailing corresponding restrictions upon free action.

It is not, of course, for a moment here contended that these changes from freedom to bondage constitute a retrograde movement. Few will deny that submission to government, the fettered rights of property, or the restraints of the domestic tie, which are, according to Darwin, "the indispensable requisites for civilization," far outweigh in value the freedom of action exercised by primitive man. Undoubtedly the commodity which we have purchased from civilization is a commodity of transcendent value. But it is not freedom. On the contrary, freedom has perished in the transaction. What civilization has conferred upon us is not freedom, but security. And security is a possession which we justly hold in such high esteem that, in order to acquire it, we have voluntarily bartered away even liberty itself. In subjecting himself to government, in restricting his rights of property, in submitting to the marriage tie, in adjusting the various relations of political, social, and domestic intercourse, civilized man has, in fact, struck a bargain with Nature—a bargain, it is true, by which he is immeasurably the gainer, but a bargain still. He has purchased security—at the price of freedom.

It will be seen at a glance that if this proposition be true, our estimates of the relative values of freedom and dependence must be altogether wrong. Recognizing progress as the highest known aim of existence, we can scarcely avoid the conclusion that those conditions towards which phenomena progress will be higher and more noble than those conditions

from which they have emerged. But, be this as it may, it is indisputable that, if progress is the highest aim of existence, then those conditions which are actually conducive to progress must be higher than those conditions which are conducive to stagnation. And if so, then freedom is at the lowest, and dependence at the highest, grade in the scale of existence. For Nature, as we have seen, everywhere visits independence with the curse of stagnation; but uses dependence as the machinery by means of which all progress is effected.

How comes it, then, that mankind has fallen into so grave an error as to have exactly reversed the verdict of Nature? How is it that Nature has found something, which we have failed to see, so ennobling in dependence, and so debasing in liberty? The fact is that we have based our conception of dependence upon an entire misconception. Consciously or unconsciously, we habitually regard dependence as the descendant of that degraded institution which, under the name of slavery, has won for itself the universal execration of mankind. And, arguing that a bitter fountain cannot send forth sweet water, we condemn dependence without further enquiry, as necessarily containing those defects which we should expect would naturally flow from its tainted pedigree.

It is not difficult, however, to show that this conclusion is entirely erroneous. True it is that dependence is an invariable associate with, and indeed a prominent feature in, slavery. But it is not the most prominent, nor, for the matter of that, the most essential, feature. Paradoxical though it may sound, the essential element in slavery is not dependence, but liberty; and that which in the eyes of all civilized communities stamps slavery as the worst of all possible institutions is the fact that slavery is, not an excess of dependence, but an excess of freedom.

For, consider the case for a moment. The primitive man possessed the fullest amount of freedom which Nature can

be conceived to have originally permitted to an individual. Within the limits of his natural potentialities he had the free control of his actions. Within those limits his freedom of action was subject only—or, at least, principally—to two restraints—fear and pain. These were the two sanctions by means of which Nature prevented, or punished, his abuse of his liberty. But with the introduction of slavery it is obvious that the original *quantity* of freedom, instead of being diminished, was actually increased. The slave, it is true, lost his freedom. So far as that individual was concerned, liberty ceased to exist. But to the community it was by no means lost,—it was simply transferred; and in the transfer its quantity was augmented. Whilst it belonged to its original possessor it was subject to the natural restrictions of pain and fear; but upon being transferred to its new possessor it became exempt from those restrictions. The slave-owner by the transaction became the possessor of more than double his original amount of freedom. He retained his old freedom over himself, with its original natural limitations of pain and fear; he acquired also a new freedom over his slave, from which these old natural limitations were eliminated.

Now, it is pretty easy to see that it is this increment of freedom that is the principal vitiating element in slavery. For not only is this the precise point at which the institution of slavery is both liable to abuse, and has, as a matter of fact, habitually been abused; but it is also the exact point in respect of which slavery differs from that form of dependence which Nature loves, and which she honours with her universal approbation.

For Nature hates independence with such a perfect hatred that, while the system of dependence which she everywhere inaugurates necessarily involves the existence of a governing entity, as the necessary correlative of a dependent entity, she nevertheless so skilfully adjusts the inter-relations between these two, that the governing entity is scarcely less dependent

than is the dependent entity itself. In other words, the form of dependence which, as Nature's approved ideal, we are compelled to recognize as the highest of all conditions is the condition in which simple dependence has passed into compound dependence—in which unilateral dependence has become mutual interdependence.

That interdependence is a condition in which dependence reaches its maximum, while independence is reduced to a minimum, requires no demonstration. And that it is the condition to which all progress tends, alike in the physical and in the social universe, may be made clear in either case by a single illustration. In the physical universe we may take as our instance the inter-relations of the Sun and the Earth. Every one knows that the orbital motions of the Earth are controlled by the Sun; but it is not every one who recognizes the fact that the movements of the Sun are largely influenced by the Earth. Yet so it is. The Sun is never in the position which he would occupy if it were not for the presence of the Earth. Just as surely as the Sun is perpetually dragging the Earth towards himself, so surely is the Earth perpetually dragging the Sun towards herself. True it is that, owing to the vast disproportion in mass between the two bodies, the tractive power of the Sun so immensely predominates over that of the Earth that, in spite of the immense distance which separates the two bodies, their common centre of gravity is actually within the Sun's disc; yet in spite of this the fact still remains that the tractive force of the Earth does exercise an influence upon the Sun's movements. In his journey towards the constellation Hercules he travels, not in a direct line, but in a series of curves dictated by the alternating presence of the Earth on either side of his path.[1]

[1] Of course, the movements of the Sun are immensely complicated by the presence of the other planets, etc., and his path is probably in the nature of a gigantic curve, rather than of a straight line. But for the purposes of the present argument these complications may be disregarded.

Turning to the psychical sphere, we are confronted by the same phenomenon. There, too, we see unilateral dependence giving place to reciprocal interdependence. In the early stages of society government was entirely—or, at least, almost entirely—a condition of unilateral dependence. The subject was dependent; the governor was free. The services, the property, the very lives of the subjects, were at the free disposal of the sovereign. All were his property, and he might do what he would with his own.

But such a state of things could not long be tolerated in a freedom-hating Universe. It might do very well for the early stages of social progress, but it was wholly unsuitable for the higher stages. Nowhere is Nature's abhorrence of freedom more conspicuously exhibited than in the development of governments. Every step towards civilization has been marked—as it has been produced—by an increase of dependence, and a corresponding decrease of freedom. The first stage is the introduction of unilateral dependence. The second stage is the introduction of bilateral dependence. This later change is thus described by Mr. Herbert Spencer :—

"The views entertained respecting governments in general, of whatever form, are now widely different from those once entertained. Whether popular or despotic, governments were in ancient times supposed to have unlimited authority over their subjects [that is to say, governments then were free]. Individuals existed for the benefit of the State; not the State for the benefit of individuals. In our days, however, not only has the national will been in many cases substituted for the will of the king; but the exercise of this national will has been restricted to a much smaller sphere. In England, for instance, though there has been established no definite theory setting bounds to governmental authority; yet, in practice, sundry bounds have been set to it which are tacitly recognised by all. There is no organic law formally declaring that the legislature may not freely dispose of the citizens' lives, as early kings did when they sacrificed hecatombs of victims; but were it possible for our legislature to attempt such a thing, its own destruction would be the consequence, rather than the destruction of citizens. . . . Thus our political beliefs are widely different from ancient ones, not only as to the proper depositary of power to be exercised over a nation, but also as to the extent of that power."[1]

[1] *First Principles*, pp. 7–8 (5th ed.).

How exactly Christ, whose philosophy is never at fault, anticipated this far from obvious truth, is apparent from His dictum cited at the head of this chapter: "Whosoever will be great among you, shall be your minister: and whosoever of you will be the chiefest, shall be servant of all." How paradoxical—if not meaningless—must these words have sounded to His immediate hearers! With what a depth of meaning do they fall on the ear of modern Science! For have we not here an express assertion of what Philosophy has since proved to be the ultimate, and highest, aim of government? "Great—minister:" "chiefest—servant." What are these but the factors of that theory of governmental interdependence, which in the days of the Roman Empire must have seemed little less than an impossibility, but which two thousand years of social evolution, under the influence of Christianity, have shown to be a scientific necessity?

Thus we see that while early forms of government were based upon the assumption that the governed existed for the sake of the governor, and the subordination which they implied was unilateral, the actions of the governed being under subjection, but the actions of the governor being free; later and more highly evolved forms of government are built upon the opposite assumption. It is now recognized that government exists for the sake of the governed. Government is looked upon no longer as an unrestricted right conferring upon the governor unrestrained freedom of action, but as a right imposing upon its possessor heavy obligations. Subordination to external control is still the first article in the creed of civilization, but not subordination to an irresponsible tyrant. Unlike primitive man, civilized man demands, and succeeds in obtaining, from his governor a reciprocity of obligations. And among civilized nations a government which should venture to disregard these principles could not stand for a day.

Thus the history of government presents us with the

curious spectacle of the simultaneous growth of two apparently incompatible elements—the actions of the subject ever becoming more and more completely subordinated to the wishes of the governor; and, cotemporaneously, the actions of the governor ever becoming more and more completely subordinated to the wishes of the subject. And we further see that social progress, which, in the aspect in which we are now regarding it, may be sufficiently defined as "increase of security purchased at the expense of freedom," attains most nearly to its maximum, in proportion as the loss of freedom which it involves approximates most nearly to that form of dependence in which freedom is reduced to a minimum—that condition in which unilateral dependence passes into reciprocal interdependence.

Recognizing the foregoing truths, we shall be in a position to form a true estimate of the respective values of Freedom and Dependence. What is Freedom? It is worshipped by the visionary as a bright and morning star heralding the dawn of civilization. But pursue it, and it shrinks back into the dank recesses of stagnation and chaos—a mischievous *ignis fatuus*, a misleading will-o'-the-wisp. It is extolled by the poet as a life-giving sun. In reality it is a dismal wake-light, hovering over the graves of Barbarism and Ignorance.

Dependence, on the other hand, which is habitually decried as base and ignoble, is in reality the one ennobling condition. The source of all stability and all security, of all progress and all development, its beneficent action has throughout all ages been silently at work in every corner of the Universe. In the physical Universe interdependence is merely another name for that benign influence which has transformed chaotic matter into orderly and coherent worlds and systems. In the psychical sphere it has converted barbarism into civilization. In a word, it is to the condition of interdependence that we owe that most priceless of all commodities, without which Evolution itself

is impossible—that commodity which in physics we term *stability*, and in economics *security*.

Translating the foregoing conclusions into practical language, we find that subjection to external control is not merely an imperious necessity, but is also the highest of privileges. For it is by means of such subjection that the high purposes of Evolution are wrought out. This is one of Nature's universal precepts, illustrated in every corner of the Universe. In the physical sphere escape from that external control, which is the keynote of Evolution, constitutes an act of disobedience which Nature visits with her most heavy curse—the curse of stagnation and steriiity. Nor is it one whit less so in the psychical sphere. In this matter there is one law for all. The organic, the inorganic, the superorganic—all must submit to the great law of interdependence, or must suffer the sentence of stagnation and sterility. Using the terms "freedom" and "dependence" in their natural and widest senses, no truth is more certain, or more universal, than this—that the most degrading of all conditions is freedom, the most ennobling is interdependence.

CHAPTER II

THE COMPOSITION OF FORCES

"When a body is acted upon by only a single force, it is clear that, if it is not hindered by any obstacle, it will move in the direction of this force; but if it is simultaneously acted upon by several forces in different directions, its direction will not, speaking generally, coincide with that of any one of these forces."—GANOT.

VERY possibly the conclusion arrived at in the last chapter will appear to many to possess no great practical importance. If, as is the fact, mankind is for the most part fairly well agreed as to what is, for practical purposes, the object most worth pursuing in life, what matters it what name we may choose to give to that object? Undoubtedly the march of civilization, all the world over, is directed towards one goal. What practical difference, then, can it make whether we call that goal "Freedom" or "Security?"

But to Science the distinction, which the careless thinker may thus affect to disregard, is a matter of vital importance. To her no distinction is trivial. Her whole life-work may be summed up in the word "classification." Her undeviating method is to compare phenomena together, and observe their points of resemblance or difference. Those phenomena which are alike, she classes together; those which are unlike, she classes separately; and she knows that by the detection of apparently insignificant likenesses and unlikenesses many of her most splendid successes have been achieved.

Now, it is not difficult to see that, if Science regards even the most trivial differences as matters of the utmost importance,

such a mental confusion as that involved in the confounding together of freedom and security—conditions which are really as mutually incompatible and antipathetic as fire and water—may involve, for scientific purposes, consequences of the most disastrous kind. And for the same reason the disregard of Nature's universal law of interdependence--which disregard is, as we have seen, a natural consequence of confusing independence with security—may absolutely vitiate many of our conclusions, which we should otherwise have been entitled to regard as indisputable. These considerations may prepare us to expect that a due recognition of this great law may lead to discoveries of immense philosophic importance. Nor will this expectation be disappointed. For it so happens that upon this recognition hangs the solution of the most momentous problem that has ever baffled the human intellect.

Of all the problems that can occupy the mind of man, that which claims precedence, by virtue both of its intrinsic difficulties and of its immense practical importance, is the problem of the great Hereafter. This is the question of questions, momentous above all others beyond compare. What will become of me after death? Is there a life beyond the grave? If so, what are the conditions to which I must conform, in order to acquire that life? These are questions which men have never ceased to ask themselves and one another from the dawn of intellect until now, and which no man has ever answered to satisfaction. Distressed by the horror of death, or the grief which the death of others entails, even those of us who are most absorbed in the engrossing occupations of life turn at times for encouragement, or consolation, to Religion, and drink in with all the longings of desire the gracious promise which she proclaims. For a time we hope against hope. We stifle our doubts and misgivings, and persuade ourselves into a faint and feeble belief. But ever and anon we are disturbed by a consciousness of insecurity, a feeling as if the faith to which

we cling were sinking under our weight. We have the promise of Religion ; but where is her proof ?

We shall possibly be answered by the theologian that the proof of Religion is to be found in herself. "If any man will do His will, he shall know of the doctrine, whether it be of God."[1] Nor may the admissibility of this answer for a moment be called in question. There is a world of truth in the homely adage that the proof of the pudding is in the eating. And Religion is well within her philosophic rights when she offers us her "taste and see."[2] The answer is all right as far as it goes. The only objection to it is that it does not go far enough. Granted that millions have "tasted and seen," and have satisfied themselves of the truth of Religion's central doctrine ; yet, how about the millions upon millions who either cannot, or will not, taste ? These, surely, no less than their happier brothers, are entitled to call for a proof which they too can accept. But, alas ! for such a proof the vast majority of us call in vain. And with a sigh we admit that our dearest hope is for us but a hope after all—a thing which Religion can promise, but cannot prove.[3]

Suddenly, in the very night of our despair, the light of a new hope dawns within us. We hear of the achievements of Science ; of her all-reaching grasp—her all-penetrating gaze ; how she unriddles the story of the forgotten ages ; how she reads the secrets of the stars. And with the desperate courage of a gamester who risks his all on a single throw, we call upon her to answer this burning question, and confirm, or annihilate, at a single stroke our one absorbing hope. And even while we call upon her, our

[1] John vii. 17. [2] Psalm xxxiv. 8.

[3] Mr. Frank Ballard, who speaks from a wide practical experience, estimates that "in England, confessedly the most Christian nation on Earth, three-quarters of the population are apparently unconvinced of the Deity of Christ," and consequently of "the supreme present import of His message to mankind" ; and he attributes this irreligious attitude largely to "honest and even pathetic doubt."—*Miracles of Unbelief*, pp. 19-21 (2nd ed.).

hearts die within us—for she answers us with a blank. She who knows all things else, of this one thing knows nothing.

There is something appalling in the very contrast between the universality of her knowledge elsewhere, and her utter nescience here. If only she were less reliable in all other matters, there might be hope that her inability to help us in this one matter was due to some imperfection on her part, and not to the impenetrability of the mystery itself. But when we see how, in every other department of knowledge, she surmounts every difficulty and overleaps every obstacle, and yet makes, in this direction, not one single step of advance, we are overwhelmed by the contrast between her power and her impotence. The all that Science has done does but throw into darker shadow the one great thing which she has not done, and which she can never do.

Thus upon this all-important question Science can give us no affirmative answer. She can offer us no proof of Eternal Life. And though we may faintly console ourselves with the reflection that she is certainly equally unable to furnish any positive disproof, we are nevertheless fain to admit that there is not wanting a certain disquieting element even in the negative attitude which she thus assumes. The brilliancy of her achievements in every other direction seems to impart a sinister significance to the dark hiatus which marks her one momentous failure. Her silence here, by its very contrast with her all-embracing knowledge elsewhere, seems to grimly invite us to the unwelcome conclusion, that the only reason why she is unable to solve the mystery of death is that there is, in fact, no mystery to solve; that physical death is the end of all things; that there is nothing beyond; that the spiritual life which Religion so glibly promises, and so complacently propounds, is, after all, nothing but a fond and vain illusion—a mockery—a dream.

Where Religion thus fails us, and where Science thus deserts us, is there any higher power which we can invoke to our aid? To this question, at first sight, none but a

negative answer seems possible. Indisputably, upon questions of truth or error, Religion and Science are the two highest authorities to which the human intellect can appeal. And if so, it is certainly, at the first glance, difficult to see where any higher authority than Religion, on the one hand, or Science, on the other, is to be sought.

But a moment's consideration of Nature's great law of interdependence will serve to convince us that our first conclusion is—or, at all events, may be—wrong. Nowhere do we see the transcendent importance of this law more strikingly illustrated than when we contemplate the effects often produced by combination. Few substances, regarded separately, appear more innocent than charcoal, nitrate of potash, and sulphur. But combine them in certain proportions, and there results that "villainous" explosive, which has transformed both the theory and the practice of war, and has proved one of the most potent factors in the development of the history of the human race. So, too, in myriads of other cases. A thousand substances might be named, each one of which exhibits, when in solitude, characteristics which are quite unlike those which it displays when in combination with other substances.

Great as are the effects of combination among substances, its effects, when applied to forces, are no less conspicuous. For all forces are capable of entering into combination with other forces; and a composite force differs always, either in intensity, or in direction, or in both, from either of the forces of which it is compounded. As an illustration of the extraordinary effects which may be produced by the composition of forces, the familiar instance of a sailing vessel may be cited. Few things could, at first sight, appear more impossible than that a wind travelling *from* the north could impel a sailing vessel *towards* the north. Yet that such a result may be effected is common knowledge; and the phenomenon itself is easily explicable by the application of the laws of the composition and decomposition of forces.

Now, no one will deny that Religion and Science are both possessed of forces. How great are the energies which they have respectively exercised upon the thoughts and activities of the human race, all history testifies. It matters not, in this respect, whether Religion be true or false. Whether we include in the term all the myriad false religions beliefs that have deluded mankind, or confine it to that one set of religious beliefs which some of us believe to be true, upon this point makes no difference. Nay, even the question of the truth or untruth of that one set of beliefs is here immaterial. Whether we regard Christianity as a divine Revelation, or as a monstrous fable, cannot alter the indisputable fact that the beliefs, whether true or false, which are connoted by the term "Christianity" have had, and still have, an influence on the thoughts and actions of men. And from this it necessarily follows that Religion is a centre of force.

Neither, for present purposes, does it matter whether we restrict the term "Science" to scientific truth, or include in the term the countless errors which have been perpetrated in her name. We may take her, if we will, with all her mistakes and shortcomings, and the fact still remains, that our thoughts and actions are daily, and hourly, influenced by Science—which, again, is simply to say that Science, too, is a centre of force.

But if Religion and Science are both centres of force, their forces must possess that capacity for composition which is characteristic of all forces. They must, if subjected to the required conditions, compound into a composite force which will affect us quite differently from the way in which we are affected by solitary Science, or by solitary Religion. This is a certain and inevitable corollary, deducible from the laws of the composition of forces. And this being so, the question at once arises, Are we justified in the suspicion, already expressed, that this composite force will be of such a nature as to assist us in solving the problem of Eternal

Life? With a view to answering this question, let us glance very briefly at the laws which regulate the composition of forces, in order to determine what is likely to be the nature of the resultant force to which a fusion of the forces of Religion and Science will give rise.

If two given forces, neither diametrically opposed nor exactly parallel, act upon a given point, they will produce as their resultant a force which differs, always in direction, and usually in intensity, from either of the two component forces. As regards *direction*, whenever the two component forces act in directions that are nearly parallel to one another, the direction of the resultant force differs but little from the direction of either of the component forces. As regards *intensity*, if the directions in which the two components respectively act diverge to a large extent from one another, the intensity of the resultant force will be feeble as compared with the sum of the components ; but if, on the other hand, their directions diverge so little as to be nearly parallel to one another, the intensity of the resultant force will be correspondingly great, being, in fact, nearly equal to the sum of the intensities of the two components.

In the cases just mentioned the forces are termed "concurrent"— that is, their directions, if produced, would meet in one point ; but it may happen that the forces applied to the same body are parallel, and then two cases present themselves—that is, they either act in the same direction, as in the case of two horses drawing a carriage ; or they may act in opposite directions. When a steamer, for instance, ascends the river, the current acts in opposition to the force which urges the steamer. It can be proved that, in the first case, *the resultant of the forces is equal to their sum*, and that, in the second, *it is equal to their difference*.

From the foregoing it is clear that the nature of the resultant force which will arise from a composition of the forces of Religion and Science will depend entirely, both as regards its relative direction and as regards its relative

intensity, upon the inter-relations which exist between the respective forces of Religion and Science. If, for instance, these two forces are parallel forces, acting in the same direction, the composite force will possess an immense accretion of intensity, but will exhibit no change of direction. If, again, the two are nearly, but not quite, parallel, the resultant force will have a direction differing slightly from the direction of either, coupled with an intensity nearly equal to the sum of the intensities of both. But if, on the other hand, the two forces act in contrary directions—if, in other words, they are antagonistic forces—their resultant, while exhibiting no change of direction, will merely display a diminution of intensity—its intensity, in this case, being equal to the *difference* between the force of Religion, on the one hand, and that of Science, on the other. Obviously, from a composition of two such forces, nothing is to be gained. Their fusion produces only a loss.

Now, there is a widespread belief, common to theologians and scientists alike, that the forces of Religion and Science *are* antagonistic. It is almost universally supposed that their natural and necessary inter-relations are relations of antipathy and dislike. Nor are there wanting indications which lend at least an appearance of justification to the existence of this belief. In the endless bickerings between Religion and Science with which modern controversial literature abounds, in the fierceness with which men of science attack theologians, and in the proverbial *odium theologicum* which the latter display in the conduct of their defence, we seem to see evidences of something more than a mere passing misunderstanding between Religion and Science. It looks as if the antagonism, which is so conspicuous on the surface, were deeply ingrained in the constitutions of both.

If these are their true inter-relations, it is vain to expect any aid from a composition of their forces. If Religion and Science are really antagonistic, any attempted fusion would be worse than useless. Resulting, as it would, in

nothing but a diminution of energy, its only product would be a loss. From such a composition we should gain, literally, less than nothing. Obviously, therefore, the solution of the problem before us depends upon our being able to show that the inter-relations of Religion and Science are such that a composition of their forces will result in a gain—a gain in respect either of intensity, or of direction, or of both. It must be demonstrated that such a fusion can be effected as will produce upon our senses an impression which neither force alone is capable of producing. With this object, we must enquire what are the natural inter-relations of Religion and Science; and in this enquiry we must make it our aim to show that these are not, as is commonly supposed, mere relations of antagonism and hostility, but that they are—or at least, that they include—relations of sympathy and mutual dependence.[1]

[1] If it be objected to the foregoing argument that the forces of Religion and Science are psychical, and not physical, forces, and that consequently it is illegitimate to treat them, as I have treated them, as if they were amenable to the laws which govern physical forces, I cannot do better than give the answer which Mr. Herbert Spencer gives to this objection. In his chapter on "The Direction of Motion," in which he applies the laws of Motion to sociological, as well as to physical, phenomena, he justifies his sociological applications of those laws in the following terms :—

"By some it may be said that the term force, as here used, is used metaphorically—that to speak of men as *impelled* in certain directions by certain desires, is a figure of speech and not the statement of a physical fact. The reply is, that the foregoing illustrations are to be interpreted literally, and that the processes described *are* physical ones. The pressure of hunger is an actual force—a sensation implying some state of nervous tension; and the muscular action which the sensation prompts is really a discharge of it in the shape of bodily motion—a discharge which, on analyzing the mental acts involved, will be found to follow lines of least resistance. Hence the motions of a society whose members are impelled by this or any other desire, are actually, and not metaphorically, to be understood in the manner shown."*

Obviously, this answer is as applicable to religious and scientific phenomena as to sociological phenomena. The actions induced in a man by religious motives, or by scientific motives, are just as real, and just as physical, as are the actions induced by the pressure of hunger. And if the physical laws of motion apply to the latter, they must apply with equal force to the two former.

* *First Principles*, p. 244 (5th ed.).

CHAPTER III

THE INTER-RELATIONS OF RELIGION AND SCIENCE

"Science was originally a part of Religion."—HERBERT SPENCER.

WHAT are the natural inter-relations of Religion and Science?

If we were to judge solely from the appearances presented to us at the present day, there is little doubt that we should answer this question by saying that they are relations, certainly of antipathy, perhaps even of positive antagonism. Religion appears to regard Science with distrust and dread. Science appears to delight in attacking and deriding Religion. Upon this point all the leading authorities on either side are agreed. On the one hand, the theologian, by his very attempt at a "reconciliation," demonstrates his conviction that there is a difference which (in his view, at all events) requires to be reconciled. On the other hand, it is a familiar fact that many of the leading scientists have exhausted their ingenuity in their efforts to prove that that difference is one for which no reconciliation—or, at least, no reconciliation which the theologian can accept—is possible.

Now, while this appearance of antagonism must not be too hastily accepted as affording of itself conclusive evidence of the existence of a real antagonism, the general principles of scientific enquiry warn us that the appearance is a phenomenon which may not for a moment be ignored. Every appearance, being produced by some real cause, is evidence of an underlying reality, and, as such, demands investigation. The theologian, therefore, who attempts to

dispose of this inconvenient phenomenon by ignoring it, offends against every canon of scientific procedure. He is bound to account for its existence by formulating some explanation which shall be consistent, not with this appearance only, but with all the appearances exhibited by Religion and Science in their relations with one another.

But, on the other hand, in seeking for this required explanation, we must be careful not to confine our search within any but the widest possible limits. If we would arrive at a reliable solution of the problem before us, we must widen our enquiry so as to cover the most extended area within our reach. In investigating the true inter-relations of Religion and Science, we must take into account not merely the manifestations exhibited at the present day. We must, in our search for additional data upon which to frame our explanation, ransack the most remote epochs of that vast period which is the subject of History, and of those still vaster pre-historic periods which are the subjects of philosophical research. Let us see what additional material such an extended enquiry will yield.

If any unbiassed person were asked what, from the scientific point of view, are the two most conspicuous characteristics of Religion, he would undoubtedly reply, "Persistence and Adaptability." Her persistence is simply phenomenal. Like Matter, she seems to be possessed of an absolute indestructibility. She makes her first appearance among the earliest records of pre-historic times, and from that day to this she has maintained an unbroken continuity of existence. Neither opposition nor indulgence can check her unflagging vitality. As if bearing a charmed life, she is utterly indifferent to every ordeal; she passes unscathed through fire and water.

"Merses profundo, pulchrior evenit.'

The chilling waters of contempt and ridicule are powerless to quench her dauntless energy. Her impenetrability to the

fiery ordeal of persecution has passed into an almost household proverb—"The blood of the martyrs the seed of the Church."

No less remarkable is her capacity for modification. The change from the first rude germs of the religious sentiment, as exhibited by pre-historic records, to the highest and most spiritualized form of modern Christianity is simply immeasurable. Yet throughout the long process of this vast transition she has exhibited at every grade that subtle capacity for change, which has continuously fitted her to meet the changing requirements of an ever-progressing humanity.

That Persistence and Modifiability are also the two leading characteristics of Science is so self-evident a proposition as to require no demonstration. She, too, like Religion, has proved, through an age-long series of trials and temptations, that neither the terrors of persecution, nor the seductions of flattery and indulgence, can diminish her exhaustless energy, or crystallize her ever-juvenile adaptability.

But now, these two characteristics of Persistence and Modifiability, being the factors out of which arise Stability and Progress, are, as was shown in the first chapter, everywhere the inseparable associates of Dependence. In no corner of the Universe to which the human intellect has penetrated has either Stability or Progress ever yet been found, except as an attendant upon Dependence. And further than this, nowhere—as we have seen—do Stability and Progress ever attain to a high standard of development except in connection with Nature's highest and most approved form of Dependence—Interdependence. Unless, therefore, we are prepared to regard Religion and Science as two solitary exceptions to this otherwise universal law, theoretical considerations leave us no choice but to conclude, from the Stability and Progress which they both exhibit to so extraordinary a degree, that either of them must be in a condition, not merely of dependence, but of a close and rigorous interdependence.

There is, it is true, one assumption upon which this conclusion might be avoided. It may be contended that Religion and Science *are* exceptions to the otherwise universal law of interdependence. This assumption, if it could be supported, would undoubtedly vitiate the foregoing theoretical conclusion. But what are the facts? The assumption is negatived at every turn. When we pass from theoretical reasoning to the consideration of actual facts, we find that the conclusion which theory so strongly recommends is positively enforced by the facts. We find, as an actual reality, that Religion and Science are bound together by bonds of interdependence probably closer and more intimate than those which connect any other two phenomena in the Universe.

Perhaps no fact in Nature has been so persistently and so blindly misunderstood as this. Certainly none is of such vital importance to a right understanding of the issues involved in the problem before us. We are told that there is a natural antagonism between Science and Religion—a sort of logical antipathy, which Reason may resent, but cannot resist. We are warned that the two cannot both stand together; that the one must go down before the other. We are asked to believe that Religion is doomed; and that the hand that will lay her low is the hand of Science. And we answer by appealing to the infallible records both of the Past and of the Present. We answer that the existing order of the Universe demonstrates, with an emphasis which it is impossible to gainsay, that the two are so inseparably bound together, that, so far, at all events, as human interests are concerned, the fall of the one must necessarily involve the ruin of the other. We answer that this always has been so, and always will be. Appeal to the past, and Philosophy and History alike declare that there never was a time when Religion and Science were not hand in glove together. Enquire of the present, and Geography replies that there is not a single spot on the whole earth where Religion flourishes without Science, or Science without Religion.

Are we asked to prove these two propositions? Their proof is easy. If we peer back into the pre-historic past, and in so doing extend—as, of course, we then must—the term "Religion" so as to include pre-Christian religious beliefs, Mr. Herbert Spencer has successfully traced to a religious source every branch of scientific energy. The judge, the state minister, the orator, the poet, the actor, the dancer, the biographer, the historian, the man of letters, the fiction writer, the architect, the bridge-builder, the sculptor, the tattooer, the painter, and, finally, the man of science and the philosopher, are, one and all, simply the gradually evolved descendants of—the priest. Religion is the parent of every one of the learned or scientific professions. To her they owe, not merely their vitality, but their very existence.[1]

Of the many passages in the *Synthetic Philosophy* which might be cited in support of this proposition, the following must here suffice. Speaking of the origin of Science, Mr. Spencer writes:—

"Science was originally a part of Religion. Both astronomy and medicine, says Weber, 'received their first impulse from the exigencies of religious worship.' . . . 'The laws of phonetics were investigated, because the wrath of the gods followed the wrong pronunciation of a single letter of the sacrificial formulas; grammar and etymology had the task of securing the right understanding of the holy texts.' . . . 'Geometry was developed in India from the rules for the construction of altars.' . . . All the astronomical knowledge of the Babylonians had as its ends the regulation of religious worship. . . . 'In Egypt the majority of the books relating to Science are sacred works composed and revealed by the gods themselves.'"[2]

Again, speaking of the Egyptians:—

"How intimate was the connection between their science and their religion is proved by the fact that 'in every temple there was an astronomer who had to observe the heavens.'"[3]

Besides proving that this intimacy between Religion and Science did as a fact originally exist, Mr. Spencer has

[1] *Principles of Sociology*, vol. iii. *passim*.
[2] *Ibid.*, pp. 245–7 (1896 ed.).
[3] *Ibid.*, p. 247

further succeeded in showing that the intimacy, so far from being casual or fortuitous, was a necessary intimacy, having its root deep down in the nature of things. It was a *natural* connection. Speaking of the history of Science as exemplified in Rome, he says :—

"The normal course of evolution having been in Rome, still more than in Greece, interrupted by intruding elements, an unbroken genealogy of science and philosophy is still less to be looked for. But it seems as though *the naturalness of the connexion between priestly culture and scientific knowledge led to a re-genesis of it.*"[1]

That is to say, even where the intrusion of abnormal circumstances has broken the natural course of development of Religion and Science, so strong is the natural bond of union between the two, that, as soon as they have succeeded in disentangling themselves from the intruding circumstances, they instantly exhibit once more that union which is their natural starting-point.

Exactly the same thing happened at a later period :—

"During those dark days which followed the fall of the Roman Empire, nothing to be called science existed. But when, along with gradual reorganization, the re-genesis of science began, it began as in earlier instances among the cultured men—the priesthood. It was not, indeed, a re-genesis *de novo*, but one which took its departure from the knowledge, the ideas, and the methods, bequeathed by the older civilizations. From these, long buried, *it was resuscitated, almost exclusively in the monasteries.*"[2]

The two last extracts show that the natural bond of union between Religion and Science not only existed at the earliest stage, but continued in force to a comparatively late period. Indeed, it continued well into the Christian era. Speaking of the time of Charlemagne, eight hundred years after Christ, Mr. Spencer writes :—

"Alike in their nature and in their agency, the philosophy and science of the time diverged in a relatively small degree from the theology—*the differentiation was but incipient.*"[3]

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[1] *Principles of Sociology*, vol. iii. p. 249 (1896 ed.).
[2] *Ibid.*, pp. 250–51.
[3] *Ibid.*, p. 251.

And after detailing the facts bearing upon this point, he thus concludes :—

"Joined with the fact that in mediæval days scarcely any laymen are named as devoted to studies of these kinds [*i.e.*, scientific studies], the facts above given suffice to show that in Christian Europe, as in the pagan East, the man of science and the philosopher were of priestly origin."[1]

From what has been said it is clear that Science owed, not only her origin, but also her sustenance and support, through many ages to Religion. Clearly in these respects she was dependent upon Religion. But now, was there originally any of that dependence on the part of Religion towards Science which would be required in order to constitute their inter-relations relations of interdependence? The answer to this question is very curious, and highly significant as showing how interdependent Religion and Science *naturally* are :—

"In India, in Assyria, and in Egypt, the earliest steps in science were made in subservience to religious needs : their primary purpose was to regulate the times of religious sacrifices so as to avoid offence to the gods. And now, strange to say, mediæval records show that among Christian peoples science was first called in for fixing the date of Easter."[2]

In view of the foregoing illustrations, no one can deny that both at the commencement and during a very considerable period of their joint history there existed a strong natural bond of interdependence between Religion and Science. This moreover holds true whether we extend the term "Religion" so as to include pre-Christian beliefs, or confine it to the Christian Religion. And, finally, this interdependence was even originally a real interdependence—an interdependence, it is true, in which the dependence was principally on the side of Science ; but still an *inter*-dependence, inasmuch as Science was called into existence by Religion in order to subserve religious needs.

If now from the records of the past we turn to the

[1] *Principles of Sociology*, vol iii. p. 253 (1896 ed.)
[2] *Ibid.*, p. 251.

phenomena exhibited by Religion and Science at the present day, we are forced to a similar conclusion. It is not only that, in spite of the interval by which they are now separated from one another, they are still always to be found in each other's company ; it is not only that in no country in the world does the one flourish without the other ; but it is the highly significant fact that, in point of development, everywhere the two always vary proportionately together. Everywhere the higher forms of Science are found to accompany the purer and higher forms of Religion. In no non-Christian country has Science attained her highest development. Take a map of the world, and colour it so as to show by shades of various intensities the comparative purity and enlightment (as judged from the standpoint of the highest form of Religion—Christianity) of the religions which prevail in the different parts of the globe, and you will by so doing have produced an accurate chart of the comparative progress of scientific advance. Show me where on earth I may find the highest and purest forms of Religion, and I will show you where to look for the highest developments of Science.

Thus the past and the present unite in showing manifestations of an ever-present bond of union between Religion and Science. The pre-historic, the historic, the present—philosophy, history, geography—unite in declaring that Religion and Science are bound together by ties of mutual dependence, as testified, not only by the fact that they always and everywhere make their appearance together, but also by the further fact that either of them everywhere varies directly as the other. Always a degraded form of Religion is accompanied by a low development of Science. Always a higher and purer Religion makes its appearance in company with—or, rather, is closely followed by—a higher scientific development.

To one who regards the inter-relations of Religion and Science from this extended area of investigation, no conclusion can appear more irresistible than that Religion and Science

have always been bound together by a close and rigorous interdependence. And yet, side by side with this ubiquitous and persistent appearance of interdependence, we see the strangely contradictory appearance of antipathy which Religion and Science exhibit at the present time. It would almost seem as if one or both were bent upon reversing the existing order of Nature—of putting asunder what God had joined together.

If we examine this appearance of antipathy a little more closely, we shall observe that it differs from the appearances of interdependence in two important respects. In the first place, whilst the interdependence is bilateral, the apparent antipathy is unilateral. Whilst the sympathy is mutual, the antipathy is all on one side. It represents a struggle in which both parties are keenly, even fiercely, engaged ; but a struggle in which either is aiming at a diametrically opposite result. Science is ever seeking to tear herself away from dependence upon Religion. Religion is fighting with might and main to prevent her escape. Science, believing—or fancying—that she can afford to stand alone, longs, with a longing which is none the less keen because it can never be satisfied, to break away and to be free. Religion, recognizing, with a force of which she herself is perhaps scarcely fully conscious, the tremendous truth that disruption must be fatal to her further progress, if not to her stability, expends every effort in the struggle to retain Science in her grasp.

That this is a true description of the apparent antipathy manifested by Science towards Religion—that the seeming antipathy is really unilateral, and exists only on the side of Science—is proved by the eager welcome which Religion has invariably accorded to those numerous reconciliations, or attempted reconciliations, between herself and Science which have periodically made their appearance. Nothing can be more significant of Religion's real attitude towards Science at the present day than the conduct of theologians in the great Religious-Scientific controversy. Every effort

at separation that has been made has invariably come from the side of Science. And every such effort has as invariably been followed by a counter-effort on the part of theologians, not to widen the attempted breach, but to close it. No one can have followed with any care the existing controversial literature upon this subject, without observing how unilateral is the desire for separation. Theology has throughout been nervously, even morbidly, anxious to reconcile. The disruptive tendency has always emanated from the scientist.

And, in the second place, the bilateral attraction and the unilateral repulsion are not of equal antiquity. They differ as regards their respective dates of origin. Originally, and throughout the early stages of their joint history, Religion and Science, as we have seen, were absolutely at one. Their very functions were united. The priest was also the scientist, and the scientist was also the priest. In the words of Mr. Herbert Spencer, describing the early stages in the evolution of Society,

> "the same men officiate in the . . . capacity of priests . . . and doctors. . . . The functions of prophet, physician, . . . priest are united."[1]

And, as we have further seen, the functions of the priest and the scientist remained united in one set of hands far into the Christian period. Until within comparatively recent times the Church was the nursery of Science.

He who contemplates these facts cannot fail to see that originally, and, indeed, down to a comparatively recent period in their joint history, the inter-relations of Religion and Science were relations of attraction only. In the earlier stages no disruptive tendency existed. Only gradually, as the separation of the functions of Religion from those of Science took place, did the unilateral repulsive force, which is now so conspicuous a feature, come into existence.

These, then, are the manifestations from which we are to interpret the inter-relations of Religion and Science: on the

[1] *Principles of Sociology*, vol. iii. p. 37 (1896 ed.).

one hand, a close and inviolable bilateral interdependence, ever tending to draw Religion and Science closer together—an interdependence which has existed from the first, and which, though Religion has always exercised the superior attractive force, as manifested by the fact that Science has always followed her lead, and flourishes only under her smile, is still bilateral, in the sense that Science, while herself subject to the influence of Religion, has also exercised an effective influence on religious beliefs; and on the other hand, a unilateral disruptive force, tending ever to drive Science away from Religion—a disruptive force which emanates, never from Religion, but always from Science, and which is of later origin than the co-existing bilateral attractive force.

How are we to interpret these apparently conflicting manifestations? Where in Nature are we to look for a companion phenomenon? Is there anything in the material Universe which, by illustrating, may help to explain, this strange intermixture of apparently antagonistic inter-relations? It has often been suggested, and is a truth which among philosophers is becoming more clearly recognized every day, that the visible Universe is a working model of the invisible. No writer has contributed so largely to the verification of this belief as Mr. Herbert Spencer, whose *Synthetic Philosophy* is one long illustration of its truth. For in establishing his central proposition—that the law of Evolution, as expounded by him, is a universal law governing all classes of phenomena, inorganic, organic, and super-organic—he has established a doctrine from which it follows, as a necessary corollary, that among phenomena of one class may—and should—be sought explanations and illustrations of corresponding phenomena of another class. If it be true, as Mr. Spencer has conclusively proved, that observed correspondences among phenomena of various classes are due to unity of law, and that the reason why the course which inorganic phenomena invariably pursue corresponds—as he

has shown that it does correspond—with the course which superorganic phenomena invariably pursue, is that those two courses are directed and governed, not by two different laws, but by one and the same law ; then it must needs ensue that when we find among inorganic phenomena some manifestation which we understand, and find among superorganic phenomena some corresponding manifestation which we do not understand, an explanation of the latter manifestation should be sought by comparing it with the former. There is at least a probability that such a comparison will furnish, if not a complete explanation, at all events some addition to our knowledge, of the manifestation sought to be explained.

Availing ourselves of this hint, and adopting this method of investigation, let us now enquire whether the visible Universe furnishes any manifestations corresponding to those which characterize the inter-relations of Religion and Science. What we have to do is to ascertain what phenomena in the material Universe are homologous to Religion and Science respectively in the immaterial Universe. What is the physical homologue of Religion? What is the physical homologue of Science? Having discovered these, we have then to study their inter-relations, with a view to deducing from those inter-relations some explanation of the corresponding inter-relations of Religion and Science.

CHAPTER IV

THE DEPENDENCE OF SCIENCE UPON RELIGION

"Religion and Science are necessary correlatives. . . . They stand respectively for those two antithetical modes of consciousness which cannot exist asunder."—HERBERT SPENCER.

WHEN we examine the relations of Man to the physical Universe, we find that the vast majority of those relations are absorbed by two predominant factors—the Earth and the Sun. Of the myriad components of the material Universe, these two stand out prominently above all the rest, as necessary to the existence of the human race. Not that the other heavenly bodies exert no appreciable influence on the life of man. Undoubtedly the Moon, the planets with their satellites, the meteors, comets, stars and nebulæ, by furnishing objects of admiration to the casual observer, and of vital interest to the astronomer, add something—indeed, a great deal—to the sum total of human activities. Some of them, moreover, are of considerable practical utility to man. The Moon, the planets, and the stars furnish data of great value for the purposes of navigation, as well as for the mensuration of time ; while the Moon, by her tidal influence, has placed in our hands a motive power which has already been utilized for some purposes, and of which, with the increasing scarcity of coal, it is not unlikely that we shall make still greater use in the future. Unquestionably, the influence upon human life of several of these heavenly bodies individually is considerable, and of all in their totality is great. But the influence of all put together sinks into

insignificance when weighed against the influence of the Sun and the Earth. When thus contrasted, their value to mankind is as nothing.

We shall most vividly realize how great is the contrast between the respective values to the human race of these two sets of factors, if we measure the value of either set by considering, not how much good we derive from it, but how we should get on without it. Suppose the sum total of all the heavenly bodies, with the exception of the Earth and the Sun, were swept out of existence. Assuming, of course, that due allowance were made for the readjustment of the Earth's orbit consequent upon the loss of the Moon, it is quite conceivable that life upon our planet might continue to go on very much as it had gone on before. Astronomy, it is true, except Solar Astronomy, would become a lost science. The *Nautical Almanac*, with the exception of the few pages devoted to Solar phenomena, would become a dead letter. But how many of the fifteen hundred million inhabitants of the Earth would trouble their heads over the loss of Sidereal Astronomy, or the frustration of stellar calculations? The navigator, to be sure, would henceforward be obliged to steer his nocturnal course through moonless nights, and under starless skies. But moonless nights and starless skies are conditions already too familiar to him to cause him any great amount of anxiety or inconvenience. The tides, again, except the comparatively feeble Solar tides, would cease to exist. But the absence of Lunar tides is a phenomenon with which we are already familiar in the Mediterranean; and however valuable such tides may be to mankind, whether as furnishing him with an available motive power, or as constituting a gigantic system of natural sanitation, it can scarcely be questioned that the human race could, if necessary, and without suffering any very great inconvenience by the loss, manage to exist without them.

In contrast with the comparatively slight inconveniences which would thus ensue from the loss of all the other heavenly

bodies, see how impossible would be the existence of man, if his relations with either the Earth, or the Sun, were determined. The point to be here emphasized is not the self-evident truism that man, being constituted as he is, must, in order to exist, have the Earth on which to live. But it is the truth, by no means so self-evident at first sight, that he is so constituted as to require for his existence, not one world, but two. Neither the Earth alone, nor the Sun alone, is capable of affording him a home. Either, without the other, is for him an impossible habitat.

What would happen on the Earth if the Sun were suddenly blotted out of existence? In the first place, the enormous volume of water, which is at present dissipated in the air in the form of aqueous vapour, would instantly descend upon the Earth in the form of snow. In a few hours the whole earth would be covered with a gigantic pall of ice. A glacial period, immeasurably more severe than any that has ever yet occurred, would set in. The Earth, rapidly parting with her contained heat, would before long fall to the temperature of space—a temperature which is probably as low as, and may be much lower than, 300 degrees Fahrenheit below zero. Under the rigour of that terrible frost all liquids and all gases would solidify. All life would perish; and all motion of every sort, save only the retained motion of the Earth through space, would cease. Obviously the Earth under conditions such as these would afford no possible habitat for man. Just as surely as he would instantly perish if he were suddenly translated from the Earth to the Sun, so surely would he perish if, while still remaining on the Earth, he were put out of his relations to the Sun.

Now, these facts, familiar as they are to every student of Science, are nevertheless facts of great significance; for they furnish another and an instructive illustration of what we may almost call Nature's passion for interdependence. They show that interdependence is a principle which, so far from being confined to the more simple relations which

exist among phenomena, extends even into their most complex relations—a principle, moreover, which increases in intensity as the more complex relations are reached. In the simple inter-relations of the Sun and the Earth—in their inter-relations, that is to say, as between themselves—interdependence, though an existing ingredient, is not a necessary ingredient. The Sun might exist without the Earth; the Earth might exist without the Sun. But to the highest and most complex of their inter-relations known to us, this interdependence is absolutely essential. In their appointed office of supporting the human race—which is, after all, from the human standpoint, the highest and most complex of all the offices which they perform—neither sphere can accomplish its task without the assistance which it derives from the other. The interdependence here is a necessary ingredient.

These, then, are the two facts to be here observed in connection with man's physical environment: the one, that of all the factors of the material Universe, two only are actually necessary to his physical existence; the other, that for the purpose of supporting that existence not less than two factors are required. In this respect neither factor could perform its office without the assistance of another interdependent factor. Man's physical existence demands, not one world, but two.

Turning now from Man Physical to Man Intellectual, we find that here, too, his relations with his intellectual surroundings are mainly confined to two absorbing factors. Ever since the dawn of the human intellect, Religion and Science have occupied the first and foremost places in his intellectual environment. True, the religious ideas of the primitive man were vastly different from the highest religious ideas of the present day. True, also, his crude explanations of surrounding phenomena were far indeed removed from the grand generalizations of modern science. But ever since the primitive son first testified to his belief in a future life, by

striving to satisfy the supposed needs of his dead father ; ever since the primitive man first observed that the Sun appears to rise in the morning and to set in the evening—and philosophical research has proved beyond all question that beliefs and observations such as these are to be found among the earliest efforts of the human intellect properly so called—there unquestionably have existed a religious sentiment and a scientific faculty which, however unlike their modern representatives, are obviously related to those representatives in the relation of parent to child.

From the fact, clearly established as it is, that a religious sentiment, however rudimentary, and a scientific faculty, however undeveloped, have thus always existed side by side, ever since the human mind first attained to a development deserving the name of Intellect, it might not unnaturally be suspected that there must—or, at all events, may—be some natural and necessary connection between the two. The persistency of the intimacy which they everywhere exhibit affords reasonable ground for the suspicion that that intimacy is "not casual but causal" ; that it is induced by some pre-disposing cause ; that, in some way or other, Religion and Science are *necessary* adjuncts to one another. The suspicion thus recommended by the observed phenomena is, as we have already seen, absolutely confirmed by theoretical considerations.

"Religion and Science are *necessary correlatives*. . . . They stand respectively for those two antithetical modes of consciousness *which cannot exist asunder*. . . . They are the positive and negative poles of thought ; of which neither can gain in intensity without increasing the intensity of the other."[1]

In other words, Religion and Science are *necessary* correlatives in man's intellectual environment. Man Intellectual could not exist without both ; for "they stand respectively for those two antithetical modes of consciousness *which cannot exist asunder*." Just as Man Physical requires for

[1] *First Principles*, pp. 107–8 (5th ed.).

his physical existence both the Sun and the Earth, and must necessarily cease to exist if his relations with *either* were cut off, so Man Intellectual requires for his intellectual existence both Religion and Science. Cut off his relations with *either* of these two factors, and his intellectual existence will instantly come to an end.

What does this mean? It means that we are here in sight of the object of which we are in search. It means that we have here found those "corresponding manifestations" which will enable us to pursue the enquiry indicated at the close of the last chapter. For it means that the Sun and the Earth are the physical homologues of Religion and Science. Whatever the Sun and the Earth respectively are to Man Physical, that Religion and Science respectively are to Man Intellectual. Either of these two sets of factors is homologous to the other. Either in its own sphere corresponds to the other. And with this discovery the problem before us is reduced to its simplest terms. Its solution is now a matter of easy calculation. All that we have to do is to compare the inter-relations of Religion and Science with the corresponding inter-relations of the Sun and the Earth. Whatever is obscure in the one set may be explained in terms of the other.

In order to put the matter as clearly as possible, let us place side by side the homologous factors, thus :—

Man Physical.	Man Intellectual.
The Sun.	Religion.
The Earth.	Science.

The point to be observed is that, either of the factors in man's physical environment being a true homologue of the corresponding factor in his intellectual environment, the inter-relations of any two of the factors mentioned in the one of the above columns are identical with, and may be explained by, the inter-relations of the corresponding factors enumerated in the other column.

Taking first the two physical factors, the Sun and the Earth, on the one hand, and the two intellectual factors, Religion and Science, on the other, we are, first of all, confronted by the significant fact that their respective past histories present an exact parallelism. Accepting the Nebular Hypothesis, which Mr. Herbert Spencer regards as a doctrine which has "passed from the region of hypothesis into the region of established truth,"[1] we see that originally Sun and Earth were not two separate bodies, as at present, but were blended together as one single and indistinguishable entity. It was only at a later stage, and by the slow and gradual process of evolution, that they became separated.

A precisely similar phenomenon is presented by the past history of Religion and Science. Originally the two were blended together in an indistinguishable intermixture. The truth of this assertion has already been sufficiently illustrated in the last chapter. Here we will do no more than recall one of the extracts from the *Synthetic Philosophy* there cited. At an early stage in the evolution of society "the same men," says Mr. Spencer, "officiate in the 'three-fold capacity of priests, magicians, and doctors.' . . . The functions of 'sorcerer, prophet, physician, exorciser, priest, and rain-doctor' are united."[2]

In this quotation observe particularly the words "priests," "doctors," "prophet," "physician." Originally Religion ("priest" and "prophet") and Science ("doctor" and "physician") were amalgamated. It is only at a later stage, and here again by the slow and gradual process of evolution, that the two functions become separated.[3]

The truth, thus enunciated by Science, that originally

[1] *Essays*, vol. i. p. 181 (Library ed., 1891).
[2] *Principles of Sociology*, vol. iii. p. 37 (1896 ed.).
[3] It may possibly at first sight be thought that the homology is somewhat spoilt by the fact that Mr. Spencer speaks not of a *two*-fold capacity (which would exactly correspond with the two factors, the Sun and the Earth), but of a three-fold capacity—that besides Religion ("priest" and "prophet") and Science ("doctor" and "physician") he speaks also of "magician," "sorcerer," "exorciser," and "rain-

Religion and Science were intermingled, is confirmed by the best accredited utterances of Religion. We have but to read the first five books of the Bible to see that, even at the stage therein depicted, Religion and Science were still blended together, or, at best, but very partially differentiated. Not only are the sacred injunctions contained in Leviticus so interlarded with sanitary rules and precepts that it is difficult—or, rather, impossible—to say where the Religion ends and the Science begins, but we see priests and prophets constantly holding the offices, and discharging the functions, of Astronomers, Doctors, and Sanitary Inspectors.

This, then, is the first homology to be here noted, that just as the Sun and the Earth, which are now so far removed from one another, were originally blended together, so Religion and Science, which now display evidences of a wide separation, were originally intermingled together.

From this change from a status of amalgamation to a status of separation, turn now to consider the forces by virtue of which that separation was effected. It will be found that the forces in question were in either case exactly homologous.

Dealing first with Religion and Science, it is evident that if, as is the fact, Religion and Science originally were, and during a very considerable period of their histories remained, intermixed and amalgamated ; and if, as is also the fact, they have subsequently become separated ; some disruptive force, which did not at first exist, has at a later stage come into existence. Such a force is, as we have already seen, manifested in the active antipathy which Science nowadays displays towards Religion ; and this, as we have also seen, is unilateral, emanating from Science to Religion, and never

doctor." In reality, however, these additions increase, instead of diminishing, the exactness of the homology. For originally the matter of the Earth was intermingled, not only with the matter of the Sun, but also with the matter of all the planets, major and minor, including their respective satellites ; and even down to the date of the separation of the Earth from the Sun the matter of the two inferior planets, as well as the matter of the Sun, was included in the united mass.

from Religion to Science. Nay, more—Religion has always done her best to prevent the separation. In addition to the considerations urged in the last chapter in support of this statement, we may here add the following further testimony of Mr. Spencer, who, after pointing out that

"the long-continued identification of the cultivators of philosophy and science with the cultivators of theology is seen in the familiar names of the leading scholastics—William of Champeaux, Abelard, Albertus Magnus, Thomas Aquinas, etc.,"

concludes :—

"to which may be added the notable fact that such independence of theological dogma as was thought to be implied in the doctrine of the Nominalists, was condemned alike by the Pope and by secondary ecclesiastical authorities—*the differentiation was slowly effected under resistance*"—[1]

the differentiation emanating from Science, and the resistance to differentiation emanating from Religion.

Note, then, this colligation of facts in the past histories of Religion and Science: first, a mutual sympathy lasting during a very considerable period of their joint history; secondly, a still-continued sympathy on the part of Religion towards Science, accompanied by a later-born antipathy on the part of Science towards Religion; and, thirdly, as a result of these two conflicting forces, a separation of Science from Religion by a gulf which Science is ever striving to widen, but which Religion is ever struggling to diminish.

Now, every one of these processes in the joint history of Religion and Science is paralleled by an exact counterpart in the joint history of the Sun and the Earth. At the earliest stage, when the nebulous matter of the Earth was intermixed with the nebulous matter of the Sun, the only force which existed between them was that of a mutual attraction. Every unit of the constituent matter was attracted towards the common centre of gravity, and, in obedience to that attraction, commenced to move towards that centre—or, rather, in a "curve directed, not to the centre of gravity, but

[1] *Principles of Sociology*, vol. iii. pp. 251–2 (1896 ed.).

towards one side of it."[1] But from this motion there resulted, by the composition of forces, a rotatory motion of the whole mass; and from this rotatory motion, again, there arose that centrifugal force which eventually separated the matter which now constitutes the Earth from the matter which now constitutes the Sun, and which, at the present moment, would carry the Earth away from the Sun, were it not neutralized by the Sun's tractive force. Thus, exactly as in the case of Religion and Science, the joint history of the Sun and the Earth displays, first, a mutual attraction, accompanied by no disruptive force; later, a continuance of the Sun's tractive force, accompanied by a disruptive force, of later origin, and emanating only from the Earth towards the Sun; and, finally, a separation of the Earth from the Sun by a gulf which the Earth, by virtue of her centrifugal force, is ever struggling to widen, but which the Sun, by virtue of his tractive force, is ever striving to diminish.

And here observe that the homology under discussion throws a new light, amounting almost to a revelation, upon the question as to what is the real nature of the apparent antagonism of Science to Religion. For it shows that that apparent antagonism, though a real antagonism, is an accidental, rather than an essential, reality. It is simply a separative tendency necessarily accompanying the actual separation of the functions of Science from those of Religion —a disruptive force induced by the changed conditions. It does not reduce by one iota—though it for a time counterbalances—the natural and intrinsic tractive forces which bind Religion and Science together in an everlasting fellowship. It is solely due to extrinsic causes. It is an antagonism of circumstance, not an antagonism of constitution.

And, now, what are its functions? Is its influence beneficial or malign? Is it a thing to be accepted with gratitude, or a thing to be lamented and deplored? In order

[1] *First Principles*, p. 228 (5th ed.).

to answer these questions let us ask, What are the effects of the Earth's centrifugal force upon the Sun? At his immense distance we see little, or nothing, directly of these effects. But we know that they must be similar in kind, however inferior in degree, to the effects produced upon the Earth by the centrifugal force of the Moon. Let us, therefore, turn to the latter phenomenon for the required explanation.

Every one knows that the effect of the Moon's centrifugal force is to so far counteract the force of gravity as to keep her at her appointed distance from the Earth. And every one knows, too, that it is to this separation of the Moon from the Earth that the lunar tides are due. Without this centrifugal force, no separation; and without that separation, no lunar tides. Hence, it is to the Moon's centrifugal force that we owe the lunar tides.

What, then, are the functions of these tides? Benevolent or malign? We answer that they subserve the highest ends. On the one hand they furnish a motive power which may be utilized for the purposes of innumerable activities; and, on the other, they constitute the great natural sewage system of the world.

Just so with Religion and Science. The apparent antagonism of Science to Religion is in reality the influence which produces those periodic tides of religious thought which, on the one hand, stimulate its natural inertness into activity, and which, on the other hand, carry away the impurities and errors which would otherwise lead to putrefaction and decay. That it is an agency for good there can be no manner of doubt. And if the theologian has not hitherto availed himself to the full of its beneficent influence, it is because he has failed to appreciate the trend of its active functions, and the value of the services to Religion which, when properly directed, it is capable of performing.

How different, as thus interpreted, do the inter-relations of Religion and Science appear to the eye of the casual observer, and to the eye of Science! The former sees only one relation

—a relation of bitter hostility. The latter sees several relations, of which all, save one, are self-evidently relations of sympathy and alliance ; while the one remaining relation, in spite of its external appearance of hostility, is found on examination to be in reality a benign influence, whose functions are to quicken and to cleanse.

From the foregoing homologies, which deal with the inorganic inter-relations of the Sun and the Earth, pass now to their organic inter-relations. The first of the homologies to be traced in this connection is one which, like the foregoing homologies, has already been partially foreshadowed in the last chapter.

That all the vital activity, both vegetable and animal, which the Earth displays is due to the light and heat which the Earth derives from the Sun, is a familiar fact. All animal life is dependent, either mediately or immediately, on vegetable life ; and all vegetable life is directly dependent upon two agents—the one, light ; and the other, heat. In the words of Mr. Herbert Spencer :—

"Though light is the agent which effects those molecular changes causing vegetal growth, yet we see that in the absence of heat, such changes are not effected : in winter there is enough light, but the heat being insufficient, plant-life is suspended. That this is the sole cause of the suspension, is proved by the fact that at the same season, plants contained in hot-houses, where they receive even a smaller amount of light, go on producing leaves and flowers."[1]

Now, as all the light and heat which the Earth receives, with the exception of that comparatively insignificant amount which she receives from the other heavenly bodies, is derived from the Sun, it follows necessarily from the foregoing considerations that the Earth is dependent upon the Sun for all her vitality, both vegetable and animal. Precisely the same phenomenon is found in the intellectual sphere.

To realise the truth of this assertion we have but to recall the facts, mentioned in the last chapter, that not only has

[1] *First Principles*, pp. 303–4 (5th ed.).

Science always and everywhere followed in the footsteps of Religion, but that everywhere she is found to vary in point of growth and development in proportion to the development of the Religion with which at any given place she is associated. For if it be true, as we have seen to be the fact, that Science originally derived all her vitality from Religion, a fact proved not only by the circumstance that always and everywhere Science has made her first appearance as the offspring of Religion, but still more by the significant fact that when, as in Roman, and again in post-Roman, times, owing to intruding circumstances Science became for a while torpid, her resuscitation on each occasion was effected by the influence of Religion ; and if it be the fact that everywhere a more enlightened Religion is invariably followed by a higher scientific vitality ; and, further, that everywhere Religion has always preceded Science, and never Science Religion ; and, finally, that at the present day the highest development of Science is invariably found in those countries where the purest and highest Religion is also to be found ; are we not forced to the conclusion that the vitalizing influence which Religion is admitted to have exercised on Science, not only at the incipient stage, but also at the periods of her resuscitation, and during a long-continued period of their joint history, is a vitalizing influence which Religion still exercises on the Science of to-day ? Is it conceivable that the sociability as regards geographical juxtaposition, which at the present time is everywhere exhibited between an enlightened Religion and a highly evolved Science on the one hand, and between a more debased Religion and a lower development of Science on the other, is due to some cause other than the known cause of the corresponding sociability which the whole of their past history proclaims ? True, Science has in the process of evolution become *distinct* from Religion. So has the Earth in the course of evolution become distinct from the Sun. But, in spite of her separation from the Sun, the continuance of

the Earth's dependence upon him for all her vitality is proved by the fact that she is fruitful and displays vital activity only where, and in proportion as, he stimulates her with his vitalizing rays.

And Science furnishes just the same proofs of her continued dependence upon Religion. In spite of her separation from Religion, she continues now, as ever, to dwell where Religion dwells: she *lives* only under Religion's smile. Or, by a slight change of metaphor, which however is in reality not a metaphor at all, but an actual and literal truth, we may say, in the most literal sense of the words, that just as all life and motion on the Earth are the direct or indirect products of sunshine, so Science is dependent, directly or indirectly, for all her vitality and activity upon the sunlight of Religion. In the physical sphere we find that life and activity follow the sunlight. While the polar regions of the Earth, excluded from the Sun's more direct rays, are comparatively barren and lifeless, the tropics, exposed to a more brilliant light and a more genial heat, exhibit a higher vital activity. And we find a corresponding phenomenon also in the psychical sphere. Those portions of the Earth upon which the brightest sunlight of Religion falls, produce to-day—as they have produced in the past—the highest and most advanced scientific activity.

It will have been observed that in the foregoing homologies, confined principally to the simpler inter-relations of the Sun and the Earth—that is to say, their inter-relations as simply affecting one another—the chief point that has been illustrated has been the dependence of Science upon Religion. We have now to consider those higher homologies which are presented by the more complex inter-relations of the Sun and the Earth—that is to say, their inter-relations as affecting mankind. In tracing these higher homologies we shall find the position reversed. The main point that will here be illustrated will be the obligations of Religion to

Science. In discussing them we shall discover in what sense and to what extent, Religion is dependent upon Science.

Involved in this discovery will be found the ultimate object of which we are in search—namely, the means by which to combine the forces of Religion and Science in such a way as to produce a composite force capable of being directed towards the solution of the problem of Eternal Life. It will be found that the homologies now to be presented afford an explanation of how this composition may be effected, and of the immense consequent obligations under which Religion lies to Science.

CHAPTER V

THE DEPENDENCE OF RELIGION UPON SCIENCE

"The beliefs which Science has forced upon Religion, have been intrinsically more religious than those which they have supplanted." —HERBERT SPENCER.

THE first and most obvious distinction between the Sun and the Earth, so far as relates to their respective influence upon mankind, is that, while the Sun is situated at an almost immeasurable distance, the Earth is his home. In it he lives and moves, and by his industry and toil he shapes it in what way he will. He sows and reaps. He examines and explores. He rears noble edifices; he sinks priceless mines. But the Sun is something altogether beyond his reach. The treasures of light and heat which it continually pours down upon him come to him as a pure gift, which he can neither alter nor control. His toil cannot increase, his neglect cannot minish them. He may bask in their beams, or hide himself from them. He may by his industry so cultivate the Earth as to profit by their all-vitalizing influence; or he may suffer them to pass by him unheeded and unused. But there they are, always ready to his hand whenever he chooses to profit by them, neither augmented nor decreased by any action of his.

Just so is it with Science and Religion. Science, like the Earth, is man's intellectual home. It is the nursery of his mental faculties; and by his industry and toil he shapes it in what way he will. Of its materials he has built up the noble edifices of the Arts and Industries; and he mines deep

into its entrails for the precious ores of Knowledge and Truth. But Religion, like the Sun, is something altogether beyond his grasp. Its influence is an energy poured down upon him from a source beyond his reach—a force which has its origin somewhere outside his control. Of all facts this may be regarded as most certain, for it is a truth upon which Religion and Science are both agreed. In the language of Science, Religion is "from above." In the language of Religion, she is "from heaven."

To prove formally that Religion claims for herself a supernatural origin is scarcely necessary. It must be admitted on all hands. So far as regards Christianity, (which is the only form of Religion with which we are here concerned,) this claim is made, either expressly or impliedly, on every page of the New Testament. She professes, moreover, that her rewards are like the sunshine—given, not earned. While the products of Science are obviously the rewards of human efforts and human toil, it is one of Religion's favourite doctrines that the prize which she has to offer comes to us as a "free gift."[1]

That Science acquiesces in this claim on the part of Religion to a supernatural source of origin is a proposition which at first sight may appear paradoxical. But it is true nevertheless. Here is its proof.

After showing that all knowledge is relative, Mr. Spencer concludes that "in the very assertion that all our knowledge, properly so-called, is Relative, there is involved the assertion that there exists a Non-relative."[2] The actual existence of this "real Non-relative or Absolute"[3] Mr. Spencer regards as the most certain of all facts. It is a "conclusion which objective science illustrates, and subjective science shows to be unavoidable."[4]

"Though the Absolute cannot in any manner or degree be known, in the strict sense of knowing, yet we find that its positive existence is a

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[1] Rom. v. 15.
[2] *First Principles*, p. 96 (5th ed.).
[3] *Ibid.*
[4] *Ibid.*, p. 98.

necessary datum of consciousness ; that so long as consciousness continues, we cannot for an instant rid it of this datum ; and that thus the belief which this datum constitutes, has a higher warrant than any other whatever." [1]

Now this "real Non-relative or Absolute" is the Unknown Cause which lies behind all phenomena. "We are obliged to regard every phenomenon as a manifestation of it." [2] We know two facts about it—the one, that it really exists ; and the other, that it is utterly incomprehensible.[3] But this "real Incomprehensible Absolute" is identical with that which Religion calls "God." "This consciousness of an Incomprehensible Power is just that consciousness on which Religion dwells." [4] And this, according to Mr. Spencer, is the true function of Religion—the recognition of the actual existence of this Incomprehensible Power. In fact, the distinction between her true functions and those of Science lies in the fact that, while the latter deals with comprehensible phenomena, Religion treats of the existence of this Incomprehensible ; while Science deals with natural phenomena, Religion deals with the "Supernatural." [5]

Observe here the two words "Incomprehensible" and "Supernatural." Both are philosophic terms, and either of them possesses a profound philosophic significance. What does "Incomprehensible" mean? A glance at a Latin dictionary will satisfy us that *comprehendo* means "to grasp"—either with the hand, or with the mind. The Incomprehensible is that which we cannot grasp—that which, as we say, lies beyond our grasp. When, therefore, Mr. Spencer tells us that the belief in the actual existence of this "Incomprehensible Power" "has a higher warrant than any other whatever," he, in effect, tells us that

[1] *First Principles*, p. 98 (5th ed.).
[2] *Ibid.*, p. 99.
[3] *Ibid.* : "The criticisms of Science teach us that this Power is Incomprehensible."
[4] *Ibid.*
[5] *Ibid.*, p. 105 ; *Principles of Sociology*, vol. iii. pp. 159, 160–162, 169, etc. (1896 ed.).

the most certain of all facts is the actual existence of a Power which lies beyond our grasp. And when he adds that "this consciousness of an Incomprehensible Power . . . is just that consciousness on which Religion dwells," and, further, that "unlike ordinary consciousness, the religious consciousness is concerned with that *which lies beyond the sphere of sense*,"[1] he, in effect, asserts that the religious consciousness in man is a sensation aroused by a Force which emanates from an actually existing Reality—a Reality which man cannot grasp, not because it is in any sense imaginary or unreal—for its existence is the most certain of all facts—but simply because, being "Incomprehensible," it lies, like the Sun, beyond his grasp—"beyond the sphere of sense."

The establishment and correct understanding of the homology now under discussion are of such importance, as leading up to the final homology to be immediately presented, that we must, before leaving it, consider what further support and illustration it receives from the term "Supernatural." This term is of comparatively recent origin; it was not coined until after Science had attained to a considerable development.

> "The supernatural pre-supposes the natural; and until there has been reached that idea of orderly causation which we call natural, [and which constitutes the subject-matter of Science,] there can exist no such idea as we imply by supernatural."[2]

Having thus been invented at a date when men's ideas as to the province of Science had acquired a tolerable degree of definiteness, the term is entitled to be regarded with a certain respect. It carries with it some degree of scientific authority, as being likely to be a correct expression of a truth.

Now while the term "Incomprehensible" implies that the subject-matter of Religion lies beyond our grasp, the term "Supernatural" indicates the direction in which it lies. It is

[1] *Principles of Sociology*, vol. iii. p. 159 (1896 ed.).
[2] *Ibid.*, vol. i. p. 215 (1893 ed.).

above the Natural ; and from the standpoint of Science—man's intellectual world—the force which emanates from it is, like the Sun's forces of light and heat when regarded from the standpoint of the Earth, a force which comes *from above*. This is the literal and actual meaning of the term "*Super*-natural." And thus is justified our assertion that in the language of Science Religion is "from above."

Thus it becomes clear that the terms "Incomprehensible" and "Supernatural" are not mere random metaphors, employed or rejected by Science as the whim of the moment may decide. Like all other scientific terms, they are exact expressions of eternal truths having their roots deep down in the constitution of Things.

Here, then, we reach the final homology towards which the homologies which we have thus far traced out have all been tending. If, while the subject-matter of Science lies—like the Earth—within our reach, the subject-matter of Religion is—like the Sun—for ever beyond our grasp, is it possible to find any means of communication between these two separate spheres? On this side lies the Comprehensible ; on that the Incomprehensible. Can Science lend us wings on which to cross the bridgeless gulf that lies between? Or, if this be impossible, may we hope to reverse the process, and to bring near that which is far off? Here is Science, our intellectual world; there Religion, our intellectual Sun. Can this world of ours be made to act upon that distant Sun in such a way as to bring it within our intellectual grasp? Let us see what answer to these questions a contemplation of the physical Universe will suggest.

Of all branches of Science, the oldest, the grandest, and the most sublime is the Science of Astronomy. This science has done more than any other to emphasize to man at once his littleness and his greatness—his littleness, as compared with that vast Universe around him which the telescope

discloses in an ever-extending circle; his greatness, as measured by his god-like capacity for surmounting the barriers of Space and Time. This science, moreover, possesses for Religion a peculiar interest from the fact that from the first it has, of all the sciences, always been the most closely connected with Religion. Alike in pagan and in Christian times, Astronomy, as we have seen, was at first called in to regulate the performance of religious rites. Religion for her own purposes initiated and sedulously cultivated Astronomy; and Astronomy, in return, subserved the purposes of Religion. If any one branch of Science more forcibly than another illustrates the interdependence which exists between Religion and Science, that branch is Astronomy. And, finally, Astronomy is distinguished among the sciences by the unsurpassed, if not unrivalled, vitality which it displays. In spite of its enormous antiquity, it exhibits at the opening of this twentieth century a capacity for development at least equal to that displayed by even the youngest members of the family of the sciences.

To take a familiar instance of this wonderful faculty, consider the recent additions which Astronomy has contributed to our knowledge of the Sun. The difference between the knowledge of the Sun possessed by primitive astronomers, and that possessed by the astronomers of the twentieth century, is immeasurable. To the former he was practically an unknown quantity; to the latter he is a familiar friend. His distance, his size, his weight, his shape, the position of his axis, the direction and rate of his rotation, his journey through space, both as regards its direction and its rate—all these facts, utterly unknown to early observers, are now familiar facts known to every student of Astronomy. Nor does our present knowledge of the Sun by any means end here. We know his actual constitution; his photosphere and chromosphere, his corona, his spots and faculæ; nay, we know the very ingredients of which he is composed. In spite of the ninety-three millions of miles which separate us

from him, we have detected his sodium and his iron, his calcium, magnesium, and nickel ; and we know that these and other chemical substances are present in his orb, just as surely as we know that they are ingredients of our planet.

Now what is the cause of this wonderful growth of knowledge? We have certainly not sharper eyes, perhaps not even acuter intellects, than those possessed by early astronomers. Whence, then, this immense increase of knowledge? Mark the answer to this question. It is entirely due to terrestrial materials which we have taken from our planet. We obtain from the Earth a little silicate of soda and lime, a little silicate of lead and potassium, some silver, some brass, and some iron ; and of these terrestrial ingredients we construct a telescope and a spectroscope. All the marvellous knowledge, that divides by such an immeasurable gulf the new Astronomy from the old, is simply the product of this terrestrial mechanism. The only difference between the modern astronomer and the ancient lies in the fact that the former has called in the Earth to his aid, and has made use of the materials which she supplies, to assist him in his study of the Sun. Without these aids to his vision, the twentieth-century astronomer would be just as ignorant of the nature and conditions of the Sun as were his Chaldæan predecessors.

Now, exactly the same holds true of Religion and Science. In the intellectual universe, as in the physical, there are, it is true, depths into which man's intellectual vision can never penetrate. To his finite understanding the Incomprehensible must ultimately remain unknown. But while we are thus compelled to recognize a limit to the capacity of intellectual vision, it is possible, by means of certain artificial aids, to increase the range of intellectual sight. Observe how close is the parallelism when interpreted in the light of the homology now under consideration.

He who gazes at the Sun with the naked eye receives no true impression of its orb. His eye, blinded with excess of

light, refuses to transmit to his brain any picture beyond a discoloured and distorted image. He sees but little of the Sun's shape, and nothing of the Sun's detail. But he who examines the Sun with the aid of certain materials, selected from the Earth and adjusted into the form of a telescope, not only conceives a truer picture of the Sun as a whole, but also discovers in the Sun's disc detailed phenomena of which before he had no conception. Much that had previously been wholly invisible now stands out definite and distinct. He has acquired a knowledge of the Sun which his own unaided senses could by no possibility have imparted. So the man who contemplates the Incomprehensible with the naked eye of his understanding acquires nothing but false and distorted ideas. Baffled and bewildered by the intensity of the mystery which it is contemplating, his mind can frame only a dim and delusive image. Witness the grotesque and monstrous myths under which Paganism has invariably distorted the Truth which, while recognizing, it has vainly attempted to depict. Witness also the gross superstitions which at times have obscured even Christian beliefs. But he who examines the Incomprehensible with the assistance of materials furnished by Science, not only conceives ideas, which, however inadequate, from the absolute point of view, are yet, from the relative point of view, closer approximations to the truth ; but he also discovers that much, which before had seemed incomprehensible, becomes now intelligible and clear. Recognizing, indeed, more clearly than ever that the Comprehensible is bounded by an ultimate Incomprehensible beyond, he nevertheless perceives that the boundary line between these two regions lies further off than he had supposed. In the light of his extended vision he can examine in detail what before he could not discern even in outline ; and from this examination he discovers comprehensible phenomena, where before he saw nothing but mystery.

What is our warrant for this assertion, that Science can thus help us to a clearer view of the divine? Does it rest

for its support upon the authority of Religion, or upon the experience of Science? We answer that it carries with it the highest of all credentials—that it comes to us with a warrant which places it beyond the reach of criticism. For it is an assertion to the truth of which both Religion and Science have set their seals. It is, however, curious to observe that the unanimity which Religion and Science now display upon this transcendent question is only of recent origin; not because of any previous disagreement upon the point, but simply because the fact, though long ago recognized by Religion, has only been appreciated by Science within the last few years. Here, from the lips of Science, is the tardy confession of her nineteenth-century recognition of a truth which Religion proclaimed among the first utterances of Christianity:—

"All along, the agent which has effected the purification [of religious beliefs] has been Science. We habitually overlook the fact that this has been one of its functions. Religion ignores its immense debt to Science; and Science is scarcely at all conscious how much Religion owes it. Yet it is demonstrable that every step by which Religion has progressed from its first low conception to the comparatively high one it has now reached, Science has helped it, or rather forced it, to take; and that even now, Science is urging further steps in the same direction. . . . And so is justified the assertion, that the beliefs which Science has forced upon Religion, have been intrinsically more religious than those which they supplanted."[1]

This candid confession of the tardiness which Science has exhibited in the recognition of the highest of all her functions possesses a special significance. For it exhibits with a peculiar emphasis the closeness, because the *naturalness*, of the tie which binds Religion and Science together. If throughout the whole of their joint history Science has all along been exercising upon Religion her purifying function, in utter unconsciousness that she was exercising any such function at all, is it not clear beyond all doubt that this function must be one conferred upon her by Nature herself? Not of set purpose, not even knowingly, has Science opened

[1] *First Principles*, pp. 102 and 104 (5th ed.).

our eyes to the reception of religious truth. All unwittingly, and all unconsciously, has she been performing a task which she has not chosen for herself, but to which she was ordained. She has performed it simply because she could not help performing it—because it was her nature to perform it. She could no more refuse to the theologian those aids to his intellectual sight which it is her natural province to supply, than could the Earth refuse to yield up to the astronomer the materials which she furnishes for the construction of his astronomical instruments.

And now observe that the truth, thus tardily discovered by Science in the nineteenth century, is a truth upon which Christianity insisted from the very first. True though it may be that modern theologians, for their own short-sighted purposes, "ignore the immense debt which Religion owes to Science," it is not true that Religion ignores it. However long it may have taken Science to discover the fact, and however imperfectly she may even now appreciate it, Christianity saw at the first glance the immense services which Science was capable of rendering her, and by the right which attaches to parenthood she instantly claimed those services as her own. Whoever examines the methods which Christ employed cannot fail to appreciate the force of these words. The most cursory glance at His sayings must satisfy us that He regarded Science simply as the minister of Religion. It is not merely that, with that noble breadth of thought which characterized His every utterance, He from first to last treated Religion and Science as inseparable. It is not merely that the idea that there could be any disastrous antagonism between the two, seems never to have crossed His mind. But it is that He recognized from the first the exact nature of the service which Science was capable of rendering to Religion, and that, recognizing this, He at once, with that effortless power which distinguishes the touch of the Master-hand, assigned to Science exactly that function which, on Mr. Spencer's own showing, she has ever since

been performing, in unconscious obedience to His command. Understanding, as had never been understood before, the grandeur of the part which Science was destined to play in the work of leading—or, if Mr. Spencer so prefers it, of forcing—the human intellect forward in the direction of the divine, He pressed her into the sublime service without an instant's hesitation. He knew how unintelligible, if standing alone, must be a religion so spiritual as that which He taught. He saw that such a religion, without Science to explain it, must to the human intellect be simply an insoluble paradox—a riddle without a key. And He at once commissioned Science to solve the problem. He placed the key in her hands, and bade her unlock the closed door. He did this, not once, nor twice, but always and everywhere. It was His invariable method—the leading feature in His system. It is scarcely going too far to say that He never propounded any single religious doctrine, without adding a scientific explanation. Whatever modern controversialists may say, or think, it is certain that to Christ Religion and Science were inseparable. He ransacked every corner of the Universe for scientific illustrations of His spiritual doctrines. To Him every branch of Philosophy was simply a storehouse for theological parable. The inorganic, the organic, the superorganic—one and all were pressed into the sublime service of spiritual instruction. "I am the *light* of the world"—truths of physics; "the kingdom of heaven is like unto *leaven*"—truths of chemistry; "the kingdom of heaven is like to a *grain of mustard seed*"—truths of biology; "and this is life eternal, that they might *know* Thee"—truths of psychology; "a certain man *made a great supper*"—truths of sociology; "it is more blessed to give than to receive"—*altruism* versus *egoism*—truths of ethics. Physics, chemistry, biology, psychology, sociology, ethics—every one of the branches of Philosophy yielded to Christ's teaching its quota of illustration. To Him Religion and Science were colleagues and allies. Whatever separation and antagonism may have

since arisen between Science and the Religion of Christ, is entirely alien to Christ's teaching. Strange indeed is it to be told that the champions of Christianity are seeking to divorce Religion from a union sanctioned and sanctified by almost every utterance of Christ! Here, if anywhere, one would have supposed, Religion is bound to insist upon the inviolability of the divinely cemented union.

It will be seen at once that this is no mere juggling with words. It is of the very essence of the case. The very basis of all Christ's teaching is the confederacy of Religion and Science. This is the first and greatest "Holy Alliance." Consider for a moment any one of the foregoing sayings of Christ. Take, for instance, His dictum that "the kingdom of heaven is like unto leaven." What does this mean? Dismissing for the moment the question of its *truth*, and confining ourselves solely to the question of its *meaning*, it is obvious that the very first requisite to an answer to this question is an accurate knowledge of the nature of leaven. What is leaven? What are its attributes? How does it behave? Under what conditions does it act? Until these questions have been answered accurately, the proposition itself is either meaningless or misleading. But these are all questions of Chemistry. None but the Chemist can give us any answer to them. Clearly, if we would attach any meaning to Christ's words, the first necessity is to study the science of Chemistry; and, equally clearly, the fulness and the accuracy of the meaning which we shall assign to the proposition, will vary in accordance with the completeness and exactness of our knowledge of that science.[1]

So is it in the case of Chemistry, and so is it in the case of every other branch of Science. Religion requires and makes use of them all. The boast of Science that it is one of her

[1] Doubtless the discovery that fermentation is due to the action of minute vegetable cells, has shown that the phenomenon to this extent falls within the domain of biology. But it is still properly classed as chemical in respect of the chemical changes which are induced by these cells.

functions to assist our vision of religious truth is more than endorsed by Religion. For it was Religion herself who first assigned her that function. Mr. Spencer's assertion that Science has *forced* certain religious beliefs upon us is undoubtedly true. But if we go a step further back, we find that Science is the *proximate cause* only of those beliefs. The *predisposing cause* was Religion herself. For it was Religion who, by pressing Science into the service, forced Science to force those beliefs upon us.

Here, then, we reach the object of our enquiry. In order to combine the forces of Religion and Science in such a way as to produce a composite force which will assist us in the solution of the problem of Eternal Life, we must pursue the method initiated by Christ Himself. And in doing this, we must borrow a hint from the astronomer's art. Selecting those materials which it is the function of Science to supply, and adjusting them into due prismatic form, we must utilize their refractive power. We must allow the sunlight of Religion to fall on the lens of Science, and must suffer the refracted rays to enter the eye of our intellectual vision. Thus, and thus only, shall we see the all that is to be seen in Christ's words ; for thus only shall we fulfil the conditions, prescribed by Christ, and endorsed by Science. When we come to think of it, there can be no other method, for this is the only method that carries with it the two-fold warrant—the warrant of Religion and the warrant of Science. For authority, it rests on the example of Christ ; for explanation, it rests on the example of Astronomy. In pursuing it we shall, from the religious point of view, be doing in the twentieth century exactly what Christ did in the first century ; from the scientific point of view, we shall be doing in the psychical sphere exactly what the astronomer does in the physical sphere.

It remains, therefore, to apply this method of investigation to the problem before us. But before proceeding to do so, it will be worth while, in closing this chapter, to glance briefly

at one or two corollaries which seem almost necessarily to follow from the homologies discussed in the foregoing pages.

In the first place, we can scarcely fail to perceive in those homologies some explanation of that mysterious *Conflict of Truth*, which we habitually contemplate with so much surprise, and so much uneasiness. We cannot help seeing that Religion and Science never coalesce. We recognize, however unwillingly, that there is always a gulf between them. And we come to regard this mysterious separation as something strange and unnatural—as an indication of some sort of weakness on the part of Religion. Why, we are often asked, if Religion and Science are both true, do they thus always hold each other at arm's length? Why do they not amalgamate their forces, and unite in a mutual embrace? As well might we be asked why the Earth does not rush into the Sun!

And here, too, do we not see almost forced upon us an inevitable conclusion as to what will be the end of this mysterious conflict? We watch with bated breath what we vainly imagine to be the life-and-death struggle between the scientist and the theologian. We see Philosophy ever panting to free herself from the control of Religion. We see Theology ever toiling to retain her hold upon Science. And we come to fancy that before long there will be a total disruption between the two—a complete and final alienation.

But those who have duly considered the lessons which Nature is ever more ready to teach than we to learn, will probably conclude that all misgivings on this head are groundless. The hopes of the scientist, and the fears of the theologian, appear to be here alike misplaced. For a peep into Nature's lesson-book would seem to show that it is probable that Science will succeed in escaping from her dependence upon Religion, at about the same date that the Earth succeeds in escaping from the controlling influence of the Sun.

Once more. Do not the foregoing homologies afford a

simple and natural explanation of another objection, which has not infrequently been advanced by sceptics? It is said that Religion stands discredited by the fact that she is rejected by the most powerful intellects of the day. If the greatest thinkers were ranged on the side of Religion in the controversy—if they were even anything like evenly divided, for and against—the position, it is urged, of Religion might still be impregnable. But when we see arrayed against her a mighty phalanx of scientists and philosophers, the most learned, the most thoughtful, the most profound, must we not consider it a matter for serious comment that her claims to our acceptance stand rejected by the vast majority of those who, if gauged by their intellectual attainments, must be deemed the best able to judge?

To this objection the homologies which we have been tracing furnish an obvious reply. We need to remember that, though the sunlight of Religion is a free gift to all who will take advantage of it, it shines only on those who choose to place themselves in its beams. We need to remember, too, that the most profound philosophers and scientists are—as the very word "profound" necessarily implies—just the persons who spend their lives in searching deepest into the secret mines of Philosophy and Science, in pursuit of the treasures of knowledge which there lie hid. If then, like terrestrial miners, they choose to spend their sunless days in the deepest and darkest mines of scientific research, can they be heard to complain that the sunlight of Religion fails to warm them with its vitalizing beams? As well might the diamond-digger, at the bottom of his deepest shaft, complain that he is unable to see the Sun!

And, lastly, the same homologies may perhaps be said to furnish us also with a not unnatural explanation of a converse objection. Scientific controversialists are apt to sneer at the intellectual blindness, which the theologian not infrequently exhibits, in his disregard of scientific beliefs. This inability to see—or, rather, this ability not to see—certain inconvenient

conclusions, which the scientist rightly regards as established truths, is, it must be confessed, a conspicuous trait in a certain section of the theological school; and it is often classed by the scientist as a species of voluntary blindness, disingenuous, if not actually dishonest.

But a glance at the foregoing pages should satisfy us that the reverse is really the case; that the blindness is actual, not assumed. The theologian really does not see these things, not because he will not, but because he cannot see them. There is nothing disingenuous, nothing even strange or unnatural, in his profession of his inability to see. Read in the light of the foregoing homologies, it becomes the most natural thing in the world. To understand it we have but to notice the effect upon our eyes of gazing at the Sun. If a glance at the Solar orb has the effect of blinding us for a time to surrounding earthly objects, what must we expect will be the natural effect upon the theologian's intellectual vision of continuously riveting his gaze upon the dazzling beams of the Sun of Righteousness?

There is nothing new in this explanation. It is as old as the philosophy of Christ. For it is Christ Himself who first warned us of this necessary consequence of the cultivation of spiritual sight: "The children of this world are in their generation *wiser than the children of Light*." Indeed, the phenomenon is not without value as furnishing some positive, if indirect, evidence of the truth of the theologian's belief. If he exhibited no unusual blindness, we might well enquire whether this circumstance did not of itself discredit the authority of his assertions as to those things which he professes to see. We might well ask whether that could indeed be a real Sun, upon which he could gaze without suffering any disturbance of his visual powers. The fact is that the very existence of the ensuing blindness has an intrinsic significance of its own; for it furnishes some evidence of the reality—yes, and of the intensity—of those blinding rays, which are at once its cause, and its explanation.

CHAPTER VI

RECAPITULATION AND PRELIMINARY STATEMENT OF THE ARGUMENT

HERE let us pause for a moment to review the ground which we have thus far traversed, in order to realize exactly what is the position in which we now stand, and what must be the direction of the argument upon which we are entering.

In the first chapter it was shown that dependence, in its highest form of interdependence, is a necessary ingredient in the conditions of stability and progress. Wherever, throughout the Universe, stability and progress are to be found, there also interdependence is invariably found in close attendance.

In the second chapter, after pointing out that the transcendent problem of Eternal Life is one which neither Religion nor Science can separately solve, we adduced reasons which suggested at least a possibility that Nature's great law of interdependence may here be successfully invoked to our aid. By a reference to the laws of the Composition of Forces it was demonstrated, that the respective forces of Religion and Science must be capable of entering into combination together, and that the nature of their resultant will depend upon the nature of their inter-relations. For this purpose it was shown to be absolutely essential that we should be able to prove that their forces are not antagonistic—or, at all events, not solely antagonistic; for if they are, their composition would produce nothing but a loss. Seeing, therefore, that there is a widespread popular belief that

these two forces are solely antagonistic, we applied ourselves to show that this popular belief is erroneous.

Accordingly, in the third chapter we proceeded to enquire, What are the natural inter-relations of Science and Religion? And we found that theoretical reasoning, on the one hand, and the facts deducible from philosophical, historical, and geographical considerations, on the other, unite in forcing upon us the conclusion that the inter-relations of Science and Religion are, and always have been, relations of mutual attraction and interdependence, coupled, at the present time, with a unilateral antagonism, of comparatively recent growth, and emanating solely from Science towards Religion. For an explanation of these strangely conflicting inter-relations we turned to the physical Universe.

And here (in the fourth chapter) we found that the Sun and the Earth are to man physical exactly what Religion and Science are to man intellectual. In its own sphere, either set of factors is a true homologue of the other.

We traced this homology in the fact that Religion and Science are necessary correlatives in man's intellectual environment, just as the Sun and the Earth are necessary correlatives in man's physical environment. Just as man physical requires for his physical existence, not one world, but two—the Sun and the Earth; so man intellectual requires for his intellectual existence, not one factor, but two—Religion and Science. We traced it in the fact that the past history of Religion and Science is exactly homologous with the past history of the Sun and the Earth—homologous, in that, in either case, the two factors were at their early stage indistinguishably blended together, and were at a later stage gradually separated by the slow processes of evolution; and in the further fact that, in either case, the forces which effected the separation were identical.

We traced this homology, moreover, in the fact that Religion exercises the same vitalizing influence upon Science as that which the Sun exercises upon the Earth. Philosophy,

History, and Geography unite in proving that Science owes all her vital activity to Religion, just as the Earth owes all her vital activity to the Sun. Scientific vitality has invariably followed the sunlight of Religion.

Turning from the foregoing simple inter-relations of Religion and Science to their more complex inter-relations, as specially affecting mankind, we, in the fifth chapter, further traced the same homology in the fact that, while Science is man's intellectual world, lying near at hand, Religion, like the Sun, lies far away, beyond his grasp. We found it to be a truth claimed by Religion, and admitted by Science, that the force of Religion—like the Sunlight—is a force emanating from a source beyond human reach, and coming down to us from above.

In thus tracing out the homology in question, we observed that, although in most respects Science is dependent upon Religion, there is one all-important relation in respect of which Religion is dependent upon Science. We saw that the astronomer is entirely dependent upon terrestrial materials supplied by the Earth for all his more advanced knowledge of the Sun. And, duly considering this fact, we found that every additional step in the homology which we were tracing out, did but lead up to this final and all-important homology—that man must be correspondingly dependent upon scientific materials for all his deepest and most advanced knowledge of the subject of Religion. This conclusion, almost forced upon us, as it was, by the homologies of the case, we found to be absolutely confirmed by the united verdict of Science and Religion. We saw that the increase and purification of religious knowledge is a function which Science, on her own showing, has been unconsciously performing from the very first. We saw, too, that it is a function expressly assigned to her by Religion among the earliest utterances of Christianity.

And in this final homology we discovered the object of our search. For, from it we perceived how it is possible

to produce an effective composition of the forces of Science and Religion. If we desire a nearer and clearer view of the divine, we must supplement our intellectual vision by scientific aids. In order to effect the required proof of the reality of Religion's alleged spiritual life, we must study Religion through the lens of Science. Borrowing a hint from the astronomer's art, we must put into practice a species of spiritual astronomy.

That the conclusions thus arrived at constitute the true, and only tenable, interpretation of the inter-relations of Religion and Science, may be inferred with all confidence from the fact that they are recommended by every test that can be applied. By furnishing an adequate—in fact, the only adequate—explanation of the extraordinary persistence and adaptability, which both Religion and Science so conspicuously display, they satisfy the requirements of theoretical reasoning ; while, by harmonizing with the facts disclosed by the records both of the past and of the present, they comply with the precepts of practical science. Resting, as they do, upon the homologies which have been traced out, they bring the phenomena of the psychical sphere into line with the phenomena of the physical sphere. And, in doing this, they afford simple and rational explanations of certain observed phenomena, which it would be difficult to explain on any other basis.

We may, therefore, unreservedly accept them with the utmost certainty of conviction. The interdependence of Religion and Science we may regard as entitled to rank among the most firmly established of truths. We may rest assured that Science has not the power—even if she have the will—to dissolve her life-long partnership with Religion. And we may reject, as monstrous, the notion that Religion has anything to fear from the closest intimacy with Science.

Regarded in this aspect, the problem before us assumes an altogether new character. The term "reconciliation" disappears from our vocabulary ; and the term "fusion" takes its place. The question at issue is no longer how to reconcile

the conflicting forces of Religion and Science; but, how to fuse those forces into a compound force, which shall solve for us the problem of eternal life.

How is this to be done? By means of the *Conflict of Truth.* The one element in the inter-relations of Religion and Science which is capable of effecting the required fusion of their respective forces, is the element of conflict. Let us explain.

The physical astronomer who examines the Moon through a plane glass, derives from such examination no accretion of his visual powers. It is only when he makes his observation through a lens, that he acquires that strange intensification of sight which the telescope effects. And this intensification is the product of the conflict between the force which impels the light-rays in parallel straight lines, and the refracting force of the lens, which dragging them from their natural straight paths into artificial, distorted paths, brings them to a focus at a single point where the observer's eye can receive them; and so enables the pupil of the observer's eye to admit innumerable rays, which it could not have admitted but for the distorting action of the lens.

Just so with Religion and Science. If we would intensify our spiritual sight, it is not enough to observe Religion's phenomena through the plane glass of Science. We must fashion that glass into the most searching prismatic form; and then, with its aid, examine, with all possible minuteness, the phenomena which we desire to interpret. Every detail of those phenomena must be intently explored, with the utmost magnifying power that Science can supply. And by these means—and these alone—we shall find in the seemingly most commonplace utterances of Religion intensities and depths of meaning which, by a casual observer, are as unsuspected as they are unperceived.

We shall doubtless be told that, in pursuing this process, we shall be reading into the Bible meanings and statements which never were there at all. To such a criticism we reply by a question. Does the astronomer believe that the lunar

craters and walled plains which he sees are figments manufactured by the refractor by which they are disclosed? Does he disbelieve his eyes, because some sceptic may choose to assure him that, in distorting the rays of light, he is distorting the truth? Does he not, rather, reply that, in refracting the light-rays, he is intensifying the truth, by enabling himself to see clearly what otherwise he could never have perceived at all?

There is, it is true, one danger against which he must be on his guard. He must be careful to avoid the false image, technically known as a "phantom," which any defect, whether of construction or adjustment, in his instrument is liable to produce. So, too, with the spiritual astronomer. Undoubtedly, if our syllogisms are faultily constructed, or wrongly adjusted, we shall be liable to distort, instead of magnifying, the truth. But if these are correct, we may accept with the utmost confidence whatever intensification of spiritual sight they may effect.

And thus we perceive how all-important is the part to be played by the *Conflict of Truth* in solving the problem of Eternal Life. It was, as we have seen, the conflict of truth that brought about the severance of Science from Religion; and now it is the conflict of truth that must bring about their reunion. By means of this conflict it is possible to compound a force which will affect us quite differently from the manner in which we are affected by either solitary Science, or solitary Religion. For this compound force will effect a gain in respect both of direction and of intensity. The forces of Religion and Science, as thus applied, are not parallel forces acting in the same direction. Neither are they parallel forces acting in opposite directions. But they are what Science terms *concurrent* forces—forces which are capable of being made to meet at a point; and which, by the change of direction which their mutual conflict thus produces (in a manner exactly analogous to the change of direction effected by a lens on a pencil of light) may

effect an intensification of spiritual sight, in a manner exactly homologous to the intensification of physical sight effected by the telescope.

The term "spiritual astronomy" is a new term; and, as such, will doubtless be received by Science in that spirit of scepticism in which she (quite rightly) approaches all new ideas. But, however novel the term may be to Science, the idea which it expresses is by no means new to Religion. What is the telescope but an ingenious device by which the astronomer admits into the pupil of his eye more rays of light than it can naturally receive? It is a mechanism, by the action of which all the rays which are caught by the relatively large aperture of the object-glass are transmitted, in a concentrated form, into the immeasurably smaller pupil of the eye; or, to express the same thing in another way, it is a contrivance by which the astronomer artificially enlarges his eye—a means of *opening his eye* as wide as the aperture of his telescope. All the wonderful sights which his telescope reveals are produced by this artificial opening of his eye. And this being so, it is neither uninteresting, nor uninstructive, to observe that this far from obvious process is exactly the process prescribed by Religion, some thousands of years ago, in her familiar prayer, "*Open Thou mine eyes that I may behold wondrous things out of Thy law.*"

Here, then, let us at once proceed to the practical solution of the problem before us. From what has been stated in the Preliminary Chapter it will already have been gathered that the materials to be used for this purpose are the Bible—or, rather, certain selected portions of the Bible—on the one hand, and Mr. Herbert Spencer's *Synthetic Philosophy*[1] on the other. And, in examining these materials, we shall find that the data furnished by Religion divide them-

[1] It will be found that I occasionally go outside the *Synthetic Philosophy* for my scientific materials, though always confining myself to works of recognized scientific authority. My argument is, however, on the scientific side, principally based upon that work.

selves into two grand classes, the one relating to the physical Universe, which is the common property of both Religion and Science ; the other to that alleged spiritual Universe, which is the peculiar possession of Religion.

Of these two classes we have first to consider that which relates to physical phenomena ; and although, as will be shown hereafter, phenomena of this class indirectly play an important part in connection with the question of Spiritual Life, it will be found that their bearing upon the solution of that problem is indirect only.

For this reason it will be convenient to proceed at once with our examination of physical phenomena, postponing to a later chapter the consideration of their exact bearing upon the ultimate problem before us. During the next fourteen chapters, therefore, which treat of the physical Universe, the reader will be asked to bear in mind that the observations to which his attention will be drawn have an ulterior object in connection with the proof of Eternal Life, in addition to the primary conclusions to which they directly give rise. We will then, after having considered the physical Universe, give a detailed statement of the exact nature of the argument by which we shall endeavour to establish the reality of Eternal Life ; and finally, with the assistance of such fresh light as may have been thrown upon the subject in the course of our discussion of physical phenomena, we shall proceed to give practical effect to our argument by applying it to the phenomena of the spiritual Universe. First, then, let us consider the physical Universe.

Part II

THE PHYSICAL

CHAPTER VII

THE CLASSIFICATION OF RELIGION

"The classification of relations must go on *pari passu* with the classification of the related things."—HERBERT SPENCER.

THE classical poets, under a picturesque, if somewhat fanciful, figure, pretended that the portal to the unseen land of the dead was guarded by a lake which they called Avernus,[1] and which exhaled vapours of such malignant potency that they proved fatal to any bird that should attempt to fly over its dismal waters.

> "Quam super haud ullæ poterant impune volantes
> Tendere iter pennis: talis sese halitus atris
> Faucibus effundens supera ad convexa ferebat:
> Unde locum Graii dixerunt nomine Avernum."[2]

Whatever may have been the origin of this fable, its meaning is not difficult to see. Between the relations of a bird to the physical world, and the relations of thought to the intellectual sphere, an actual, or supposed, analogy has often been drawn. In swiftness of movement, in tracklessness of course, in apparent illimitability of range, a certain correspondence, or, rather, set of correspondences, can be

[1] *I.e.*, birdless.

[2] Virgil, *Æneid*, vi. ll. 239–242.

> "O'er that dread space no flying thing
> Unjeoparded could ply its wing;
> Such noisome exhalations rise
> From out its darkness to the skies."
>
> Conington's Translation, p. 183 (3rd ed.).

distinctly traced. And in these and other respects the least imaginative of minds can scarcely fail to detect a real, or fancied, similarity between the flight of a bird and the flight of a thought.

What, then, is the meaning of the fable? Obviously, the "birdless lake" of the poet was intended to signify the impenetrability of the mystery of death. Those Avernian waters were designed to represent the impassable barrier which shuts off the living from the dead—that barrier which neither thought can penetrate, nor reason cross; and before which even the soaring wing of imagination herself falls paralyzed and unnerved.

What the poet thus fabled for the purpose of emphasizing a mystery, let us convert to the nobler purpose of helping to solve that mystery. Let us impress the poet's allegory from the service of Nescience into the service of Science. For this purpose let us suppose that in some unexplored region of the Earth there really existed a birdless lake, such as that which the poet has described. And let us suppose that in the most distant recesses of its Avernian waters, far out of sight of land, there existed an island, to which no bird had ever penetrated, and to whose inhabitants a bird was an unknown thing. And, lastly, let us suppose that one of these inhabitants were suddenly to have his attention drawn to a feather from a pheasant's wing. Observe what impression this object would produce on his mind.

He would detect in its structure, its form, and its colouring much that would arouse his curiosity and surprise. A symmetry which is partially unsymmetrical; a form which is neither a perfect straight line nor a perfect curve; a colouring which, though not without beauty, is neither strikingly brilliant nor strikingly refined; a consistency which is neither extremely supple nor extremely rigid; possessing attributes such as these, the object would naturally fill him with amazement; and the principal impression which it would

produce in his mind would be one of vague wonder, as to what possible purpose it could have been designed to fulfil.

But now observe that whatever actual beauty, or potential utility, he might discover in the feather as thus imperfectly understood, is as nothing to the beauty and utility which he would perceive in it, when he came to study it in respect of its relations to the bird of which it is a part. He would then perceive, what he could by no possibility have understood before, that its *structure* is admirably contrived so as to combine a maximum of strength with a minimum of weight, for the purpose of facilitating flight; that its *shape* is so constructed as to exactly fit the adjoining feathers, over the surfaces of which it slides in such a way as to offer a broad superficies to the air when the wing is expanded, while affording a compact and warm covering for the bird when the wing is folded; and that in point of *colouring* it is designed to imitate, for the purpose of concealment, the colours of the leaves and twigs among which the pheasant makes its home, and thus afford an important means of protection from enemies. All these facts, obvious as they become when the feather is studied in its relations to its parent bird, are utterly undiscoverable from the feather regarded as an isolated phenomenon. The fullest possible knowledge which we can acquire concerning it, if we regard it as an independent whole, is infinitesimal in comparison with the knowledge which we may acquire concerning it by studying it as a subordinate part.

What is the general truth which this particular truth illustrates? It is this: that, in order to acquire the fullest possible knowledge of any *part* of any aggregate, it is necessary to study it, not only as an isolated entity, but also in respect of its relations to the whole of which it is a part. As long as we regard it as an independent whole, we shall be able to learn very little of its true nature. Only when we come to recognize its subordination to its whole do we obtain

any real measure of its beauty, or any true gauge of its functional capacity.

Turn now to contemplate a cognate truth having implications nearly allied to the foregoing.

In the roof of the third ventricle of the vertebrate brain there is to be found a gland-like body known as the *epiphysis* or *pineal gland*. This mysterious body was long a puzzle to anatomists. Performing no known function, and possessing no apparent utility, it was ranked among those rare organs for which neither use nor reason could be assigned. And thus it came to be regarded as a sort of anatomical paradox—a freak of Nature, of which both the origin and the purpose seemed hidden in impenetrable mystery.[1]

In due course, however, the theory of Evolution furnished the clue to the solution of the problem. By the evolutionist the pineal gland was regarded as a relic, in an atrophied form, of what had once been an active and useful organ. It was possible, therefore, that some animal might be found in which the organ existed in a more highly developed, and therefore more intelligible, form. And, accordingly, anatomists set to work in search of an animal so endowed.

The first successful step in this enquiry was made by Von Henri W. de Graaf, who, in a paper published in the *Zoologischer Anzeiger* for March 29, 1886, described briefly the development of the epiphysis, and the structure of this part in the adult animal in certain amphibia and reptiles ;[2] and he especially drew attention to the case of the *Anguis Fragilis*, or slow-worm, in which the mysterious organ exhibited a higher development than in any other case which he had been able to find.

The solution suggested by Von Graaf's researches is

[1] So late as the year 1881 Professor Huxley speaks of the pineal body as "a curious appendage to the upper side of the brain, *the function of which, if it have any, is wholly unknown*" (*Science and Culture*, p. 212, 1881 ed.).

[2] See W. Baldwin Spencer's paper, in *Nature*, vol. xxxiv. p. 34 (May 13, 1886), on "The Parietal Eye of Hatteria."

certainly very remarkable. He came to the almost startling conclusion that the gland-like body is the relic of a defunct eye.

"The epiphysis apparently arises as a hollow outgrowth from the roof of the third ventricle (region of thalamencephalon), and in both amphibia and reptilia becomes divided into two parts—a proximal one remaining in connection with the brain, and a distal bladder-shaped structure—the two becoming in most cases completely separated from each other. In *Anguis Fragilis* Von Graaf finds that the distal part loses all connection with the brain, and develops into a structure resembling a highly organized invertebrate eye with, however, the important and curious exception that no nerve is present."[1]

Here, then, was a discovery which strongly suggested a possible solution of the problem. In the *Anguis Fragilis* the proximal epiphysis, immediately connected with the brain, was closely associated, in point of situation, with a distal structure having an unmistakably eye-like appearance. It was, therefore, not unreasonable to conclude that the two parts had at one time been physically connected together; that the proximal gland represented the optic nerve of the distal visual organ. And if so, the discovery afforded an explanation of the pineal gland as found in those higher vertebrates in which the eye-like structure did not appear. Here, too, it was simply the atrophied remains of an optic nerve—the optic nerve of a vanished eye.

But in the chain of reasoning which led to this conclusion one very important link was missing. The argument assumed a physical connection between the proximal and distal parts, of which the *Anguis Fragilis*, though suggesting a probability, furnished no positive proof. To supply this missing link, to produce an animal which actually exhibited the two parts of the epiphysis physically connected together, became, therefore, a pressing need, in order to complete the suggested explanation.

In what direction was such an animal to be sought? By what loadstone was the anatomist to steer his course in his

[1] See W. Baldwin Spencer's paper in *Nature*, vol. xxxiv. p. 34 (May 13, 1886), on "The Parietal Eye of Hatteria."

search for this missing link? How, out of the myriads of vertebrate animals which lay open to his inspection, was he to select that particular corner of the vast sub-kingdom of Vertebrata, in which the required clue was likely to be found? The answer to these questions affords such a remarkable vindication of the theory of Evolution that it will be worth while to trace it out with some little particularity.

It must, of course, be recollected that the pineal gland, having no apparent use or function, is regarded by the advocates of the Evolution-hypothesis as an instance of atrophy—of inverted development. In the eyes of the evolutionist its very uselessness to-day carries with it the pledge of a past usefulness. It is the modern representative of an organ which, whatever may have been its function, was most certainly once in a condition of activity, and therefore of high development. There must, at one time, have been a fully developed pineal organ. There must, at some period in the remote past, have been an animal which possessed and used such an organ.

But unfortunately, the lapse of ages forbids the possibility of examining such an animal. The very extent to which the atrophy has been carried conclusively indicates the enormous gulf of time by which the shrunken gland of to-day is separated from its active progenitor of the past. Even if we were fortunate enough to light upon the fossil remains of the very animal of which we are in search, it would still be worse than useless to expect that those remains would retain any trace of the missing organ.

Does Evolution, then, invite our curiosity only to disappoint it? Not so. Already in the foregoing considerations is contained the germ of thought which, if followed out, will supply the required clue. We cannot, it is true, with any hope of success pursue the enquiry in that branch of the animal kingdom where its solution was once most certainly to be found. But we can do the next best thing that Evolution can suggest. We can pursue it among those

orders of Vertebrates which are most closely allied, in point of structure, to the fossilized representatives of the vanished past.

Now it so happens that there is an Australian lizard, known as *Sphenodon* or *Hatteria*, which, in anatomical character, differs widely from all other lizards existing at the present time. For it is the only living representative of the order *Rhynchocephala*, of which many mesozoic fossil species are known. The order of *Rhynchocephala* is one of immense antiquity, some of its fossil genera being among the earliest reptiles; and consequently the Hatteria, by virtue of its direct descent from these primeval ancestors, possessed just those qualifications which recommended it to the anatomist as a promising subject for examination. The strong family likeness, which it had so persistently preserved, to its Rhynchocephalic progenitors was likely to extend from its other organs to its pineal organ. The immense length of its pedigree, carrying with it a certain guarantee of persistence of type, rendered it probable that the present condition of its pineal gland would be much what it had been in mesozoic days. Here, if anywhere, one might expect to find this organ in its least atrophied form.

Accordingly, Mr. W. Baldwin Spencer directed his attention to Hatteria; and in a paper contributed by him to *Nature* in May, 1886, from which a quotation has already been made, he described the results of his investigations. He found in Hatteria what Von Graaf had found in Anguis, that the organ divides itself into two parts, a proximal and a distal. He found, too, that, as in Anguis, so in Hatteria, the distal part is modified to form an eye. But he found in Hatteria what was wanting in Anguis, that the distal eye is provided with a well-marked nerve.[1]

Thus the science of Comparative Anatomy, guided by the theory of Evolution, succeeded in solving the paradox. The

[1] See Mr. Baldwin Spencer's paper in *Nature*, vol. xxxiv. pp. 33–35 (May 13, 1886).

atrophied, and therefore unintelligible, organ in the human brain was rendered intelligible by a comparison of its structure with the homologous, and comparatively unatrophied, organ in Hatteria. By means of this comparison it became possible to read the riddle of the atrophied organ, by assigning to it, beyond the possibility of doubt or contradiction, both its original form and its original function.

And now, once again, what is the general truth illustrated by the incident of the pineal gland? Once more it is a truth connected with the study of parts. It is the value of Comparative Anatomy. Whenever in any phenomenon which we are examining we find a part which is unintelligible, because exercising no apparent function, we shall do well to turn from it, in order to enquire whether it be possible to discover another phenomenon which possesses an homologous part in full vigour and activity. If such a companion phenomenon can be found, it will possess the highest possible value for the purposes of our enquiry; for its active part will furnish us with a complete, or at all events a partial, explanation of the unintelligible part which we seek to explain.

Nor is the pineal gland by any means a solitary illustration of this truth. Another, and this time a familiar, instance is furnished by the mammæ possessed by all male mammals. These organs, if we studied the male mammal as an isolated phenomenon, would be utterly unintelligible. No explanation could possibly be given of an organ which is in a rudimentary condition, and which performs no function whatever. But when we extend our study from the male to the female, in whose body an homologous organ is found in a fully developed condition, and actively performing its appropriate function, the rudimentary organ, as it appears in the male, becomes perfectly intelligible.

The importance, thus illustrated, of studying the interrelations of whole and part in order to the acquisition of a complete knowledge of either, is moreover conspicuous

throughout all possible permutations and combinations of the two. Thus the study of the isolated parts is necessary in order to acquire the fullest attainable knowledge of the whole. Witness the enormous debt which our knowledge of the human body, as a whole, owes to that study of its parts which is the province of the science of Anatomy. On the other hand, if we confine our study to the parts, without considering their relations to one another and to the whole, our conception of the whole will necessarily be vague and indistinct. How imperfect, for instance, would be our geographical conception of England, if we had studied only separate maps of the various counties, and had never seen a complete map of the entire country! By these and a hundred other instances might be illustrated the truth that, in order to understand to the fullest possible extent any compound phenomenon, it is necessary to study such phenomenon both as a whole, and also in respect of its constituent parts.

It is a remarkable incident in the history of Thought that these truths, trite and commonplace as they are in all other branches of study, have hitherto been entirely ignored in dealing with the highest of all the problems by which the human intellect is confronted. Throughout the weary length of the conflict between the professed truths of Religion and the gradually-accepted truths of Philosophy no systematic attempt has ever been made to compare together the respective schemes of Religion and Philosophy *as wholes*. There have, it is true, been plenty of comparisons drawn, and discrepancies alleged, between isolated doctrines of Religion, on the one hand, and isolated theories of Philosophy, on the other. But no one has ever yet attempted to assist in solving the momentous problem, by placing the two systems in their entireties side by side, so as to observe at what points they agree and at what they differ.

Yet such a step is just as necessary in this as in any other case. The question presented by the problem involves

the purely scientific question, How are we to classify Religion? Is she to be classed in the order of Truth, or in the order of Error? And this scientific question must be conducted on the lines which the life-long experience of Science has invariably approved. Here, as elsewhere, we are dealing with two compound phenomena. There are primary truths of Religion, and there are primary truths of Science. There are also derivative truths of Religion, and derivative truths of Science. Any comparison, therefore, of Religion and Philosophy must be made only in respect of those of their respective truths which are homologous to one another. And until we have compared the two together as wholes, how are we to know which of their respective parts are homologous, or, indeed, whether they have any homologous parts at all? Clearly, he who attempts to draw any conclusion as to the proper classification of Religion, without first obtaining an answer to these fundamental questions, may arrive at a conclusion just as fallacious, and just as absurd, as if a naturalist were to relegate two identical insects to different species, because he found that the wings of the one differed from the legs of the other.

Still stranger, if possible, than the fact that no comparison has yet been attempted between the two schemes as wholes, is the fact that until within the last few years the very materials for such a comparison did not exist. Yet so it is. The first complete system of Philosophy that the world has ever seen is not yet fifty years old. No fact in the great Religious-Scientific controversy is more conspicuous than the contrast presented by the fixity of the system of Religion, on the one hand, and the indeterminateness of the system of Philosophy, on the other. At least fifteen centuries ago Religion gave to the world her complete and unalterable code; and from that day to this she has neither varied, nor added, a word. Every volume that has since been written, every sermon that has since been preached, every lecture that has since been given, is, from Religion's point of view,

valuable only as a commentary upon her eternally stereotyped text; and is to be regarded as true, or untrue, according as it conforms to, or departs from, the authoritative doctrines of the Bible.

Philosophy, on the other hand, has pursued exactly the opposite course. Recognizing no test but that of experiment, and no authority but that of reason, she has been continually adding to her store of knowledge by fresh experiments, and correcting her old theories by the application of more rational explanations. Thus the very conditions of her existence have been such as to preclude any fixity in her ever-growing and ever-changing scheme. The formulating of any definite code of Philosophy has, therefore, been hindered by a two-fold cause—the constant *change* to which she has always been subject, owing to the elimination of old errors, coupled with the continuous and enormous *growth* of her ideas, by fresh acquisitions of knowledge.

Not unnaturally the votaries of Science have followed the course which the requirements of their task rendered all but inevitable. Absorbed in the engrossing pursuit of correcting old mistakes, or adding new discoveries, each scientist has become a specialist in his own particular branch of study; and by thus riveting his attention on the part, he has overlooked the relations which it bears to the whole. Astronomy has been studied as something wholly independent of Sociology; no connection has been found, or even looked for, between the truths of Chemistry and the truths of Ethics. Looking upon the various branches of Science as co-ordinate wholes, scientists have forgotten to enquire what are their respective functions in relation to that greater Whole—that "Science of Science"—of which they are in reality subordinate parts. And thus the great question of the true classification of Religion has remained, from the scientific point of view, unsolved; not from any default on the part of Religion, but because Philosophy has failed to contribute her share of the materials necessary for the scientific solution of the problem.

At last the missing factor has been supplied. In Mr. Herbert Spencer's *Synthetic Philosophy* Science has in the nineteenth century furnished the theologian with all that is required to complete the scientific classification of Religion. Here is a system of Philosophy which purports to give a systematic account of the whole Universe in its totality—a complete scheme which, comprehending all branches of that "partially unified knowledge" which is Science, builds them as a whole into that synthesis of "completely unified knowledge" which is Philosophy. Here, then, we have just such a scheme as we require. By the aid of this system we can study the "comparative anatomy" of Religion and Philosophy. We can place the two systems side by side, and ascertain, with a precision hitherto unattainable, what are their mutual relations as wholes, and what are the relations of their respective parts.

Further than this, judging from the instances already cited, we may expect that, by comparing together the two schemes of Religion and Philosophy as wholes, we shall not only succeed in effecting a reliable classification of Religion as a whole, but shall also add materially to our knowledge of her constituent parts. If in that scheme we find any part which has no apparent *raison d'être*, and performs no apparent function ; and if we discover that there is in the scheme of Philosophy an homologous part, which is in a fully developed condition, and actively performing an appropriate function ; such a discovery can scarcely fail to throw fresh light upon the constitution and function of the corresponding apparently functionless part in the scheme of Religion. Just as the comparison of the pineal gland of the Hatteria furnished a complete explanation of the otherwise unintelligible pineal body in the human brain ; just as the comparison of the male mammæ with the female mammæ furnished a complete explanation of the otherwise inexplicable mammæ of the male ; so we may expect that a comparison of the schemes of Religion and Philosophy will furnish an explanation

of any apparently rudimentary part in the scheme of Religion.

How little Religion has realized the immense benefits which, for the reasons just discussed, she is likely to derive from a comparison of her scheme with that of Philosophy is sufficiently attested by the attitude of indifference—if not aversion—towards the *Synthetic Philosophy* which she has hitherto maintained. For it is a noteworthy fact that, though the outlines of the *Synthetic Philosophy* have now been before the world for the best part of forty years, Religion has not even yet submitted herself to the ordeal of that comparison which it is, in reality, both her most imperative duty, and her highest privilege, to undergo. The truth is, that her champions are still suffering from that irrational distrust of Science which they have inherited from a certain narrow school of Theology, now rapidly dying out, but which has exercised an immense influence in the past, and still at times raises a querulous, though vain, protest against the progress of scientific knowledge. Accepting as final an arbitrary (and, in reality, untenable) interpretation of certain passages in the Bible, this school has persisted in preaching a doctrine of unquestioning non-resistance towards itself; towards Science an attitude of uncompromising intolerance, enforceable, if need be, by the penalty of intellectual suicide. As often as any of the proved facts of Science are found to be irreconcilable with the prescribed scriptural interpretation, then reason must sacrifice herself upon the altar of credulity. If faith and fact are inconsistent, then fact must die that faith may live. To borrow the words of Lord Macaulay, written in a different connection, "The devout worshipper [of this school] . . . is proof against all evidence and all argument. His idol is matter of faith; and the province of faith is not to be invaded by reason."

In the hands of these custodians the fate of Religion recalls the story of *The Golden Legend*. It is as if Religion were suffering from some terrible malady, and the physicians,

gathered around the dying bed, had declared with one voice that the case was that of Prince Henry in the tale :—

> "Not to be cured, yet not incurable!
> The only remedy that remains
> Is the blood that flows from a maiden's veins,
> Who of her own free will shall die,
> And give her life as the price of yours."

In these dire straits, Reason, like the love-lorn maiden of the legend, steps forth to offer the suicidal gift ; and with a noble—no, an ignoble—fortitude bares her throat to the sacrificial knife, determined by a supreme act of self-immolation to purchase a life which, rendered worthless by the very sacrifice by which it is preserved, she nevertheless persists in holding dearer than Truth itself.

If that is the only remedy, then Religion, farewell ! If faith can be kept alive only by the sacrifice of fact, then is the cure worse than the disease. Better the utter darkness of confessed agnosticism than the baleful light of those idolatrous altar-fires, from which, when men cast in the pure gold of enquiry, there comes out the golden calf of self-deception !

But there *is* another remedy : and that remedy is Science ; and to Science, whether she will or no, Religion will sooner or later be obliged to submit her credentials. It is impossible for her, if she is to retain her hold upon mankind, any longer to maintain her traditional attitude of intellectual apathy. Indeed, the theologian who preaches that the proper treatment of Science is to ignore her, seems to have overlooked one-half of the whole duty of man. There are intellectual sins of omission as well as intellectual sins of commission ; and these, like all other sins, carry with them their own rewards. If Religion to-day stands to any extent discredited in the eyes of the intellectual world, it is because, in her self-imposed ignorance of Science, she has fallen a prey to the impostures of Pseudo-science. If she persists in refusing to conduct her own enquiries

for herself, she may rest assured that the pseudo-scientist will not fail to conduct them for her. And with this variation—that, instead of bringing his conclusions to the test of the pure light of Truth, he will cajole his audience by exercising the conjurer's privilege of concealing his deceptions by exhibiting them in an artificial light of his own manufacture.

There is an ancient pastime known by the name of "Dead men's faces." A plate of common salt, steeped in spirits, is ignited in a darkened room; and the amusement consists in watching the effect of the livid flame upon the hands and faces of the spectators. To one who witnesses the spectacle for the first time the transformation is little less than astounding. With that grand impartiality which characterizes all the operations of Nature, and which spares neither age nor sex, all present are compelled to share in the enforced metachrosis. The flush of health and beauty fades into a death-like pallor; and the softest of cheeks and rosiest of lips assume the ashy semblance of a corpse.

Such is the treatment which Pseudo-science is ever seeking to foist upon Religion. Like a second Prometheus, she steals from Religion's altar-fires the sacred flame of Truth. And having fed it with salts, dug from the secret mines of human frailty or sacerdotal imposture, and steeped in essences distilled from the follies of credulity or the errors of misguided zeal, she summons her beautiful Rival into the baleful light of these inquisitorial fires. And then, as the fair face and enchanting lips assume the livid hues of death, she points in derision at the spectre she herself has raised, and cries—how vainly!—that the Goddess of our worship is a corpse.

Under such treatment Religion has but one course open to her. In order to prove her vitality, all that is necessary is that she step out of the artificial and cadaverizing glare of Pseudo-science into the natural rays of the sunlight of Truth. Under that genial and potent influence the all in

her that is living and real will flourish and grow, attaining a new vigour and a healthier tone; while all that is noxious and unsound will rapidly exhale away. Who that has the true interests of Religion at heart could desire for her a better fate, or a more glorious privilege, than to be subjected to those searching conditions which will constitute at once her proof and her purification?

Here, then, laying aside metaphor, let us proceed with the practical problem of the scientific classification of Religion. Availing ourselves of the hitherto missing factor which Mr. Herbert Spencer has supplied, let us place the old time-honoured scheme of Religion side by side with the new scheme of Philosophy, and compare the two together in their entireties, and in respect of their homologous parts.

CHAPTER VIII

THE TWO SCHEMES

"In the actions and reactions of force and matter, an unlikeness in either of the factors necessitates an unlikeness in the effects; and in the absence of unlikeness in either of the factors the effects must be alike."—HERBERT SPENCER.

IN the course of the *Synthetic Philosophy*, Mr. Herbert Spencer, in treating of the subject of "Segregation," deduces from the primordial law of the Persistence of Force a derivative law which may be stated thus: A given Force, acting upon like units, produces like results; a given Force, acting upon unlike units, produces unlike results; and the unlikenesses of these unlike results are proportionate to the unlikenesses of the units.

Of the numerous illustrations which he cites in support of this law, probably the most familiar is that furnished by the separation of sand from shingle, which is conspicuous on every part of the seashore:—

"Those geologic changes usually classed as aqueous, display under numerous forms the segregation of unlike units by a uniform incident force. On seashores, the waves are ever sorting out and separating the mixed materials against which they break. From each mass of fallen cliff, the rising and ebbing tide carries away all those particles which are so small as to remain long suspended in the water; and, at some distance from shore, deposits them in the shape of fine sediment. Large particles, sinking with comparative rapidity, are accumulated into beds of sand near low water-mark. The coarse grit and small pebbles collect together on the incline up which the breakers rush. And on the top lie the larger stones and boulders. . . . Trace the history of each geologic deposit, and we are quickly led down to the fact, that mixed fragments of matter, differing in their sizes or weights, are, when exposed to the momentum and friction of water, joined with

the attraction of the Earth, selected from each other, and united into groups of comparatively like fragments. And we see that, other things equal, the separation is definite in proportion as the differences of the units are marked."[1]

It is a corollary from the law which Mr. Spencer thus illustrates that, where we find like segregations, we may, other things being equal, infer that they have been produced by like forces. If, for instance, we find that on two or more parts of the coast the sand, the small pebbles, and the larger pebbles have been separated from one another and deposited in corresponding relative positions—the sand nearest the sea, the small pebbles above the sand, and the larger pebbles, again, above the small pebbles—we may properly conclude that the cause which has produced this particular mode of segregation in the one place is like the cause which has effected the similar segregation in the other place.

From these familiar facts turn now to consider the respective schemes of Religion and Philosophy.

The scheme of Religion contained in the Bible commences with a discussion of the most material of all phenomena—a cosmogony. And, by a noteworthy transition, her closing utterances are devoted to a phenomenon so immaterial that materialists deny its very existence. Her first words relate the genesis of "the heaven and the earth"; her last deal with the doctrine of spiritual life.

This alleged spiritual life is something altogether peculiar to Religion. None but she has anything at all like it to offer to mankind. It is her own unique possession—a thing quite unknown to Science. With a cosmogony, on the other hand, the position is exactly reversed. Not only is it not confined to Religion, but it is so closely related to Science that, at first sight, it is a little difficult to see why it should belong to Theology at all. What has a Religion, whose essential phenomena are the relations of spiritual man to a spiritual

[1] *First Principles*, p. 468 (5th ed.).

God, to do with a phenomenon so exclusively material as the natural history of the Earth or the stars? That the last words of the Bible should be of the "pure river of the water of life" was natural enough. But why should Religion's scheme commence with a cosmogony?[1]

At a time when the first chapter of Genesis is being attacked so fiercely, and (it must be confessed) defended so feebly, that not a few theologians are more than half inclined

[1] Were it not for a criticism, emanating from a high authority, which has been actually passed upon this part of my argument, I should have thought it unnecessary to point out that the argument does not in the least require—or even assume—the first chapter of Genesis to be the oldest, or the last chapter of the Revelation to be the latest, portion of the Bible, as regards date of composition. Neither does it rely upon the circumstance—which may, perhaps, be regarded as more or less fortuitous—of the first chapter of Genesis being the opening chapter, and the last chapter of the Revelation being the closing chapter, of the Bible. My point is that, by virtue of its subject-matter, and independently altogether of its date of composition, or the position which it happens to occupy in the Bible, the cosmogony contained in the opening verses of Genesis is the starting-point, while the doctrine of spiritual life mentioned in the last chapter of the Revelation is the close, of the scheme of Religion. Such a question, therefore, as that of the comparative antiquity of Genesis i.–ii. 4, as compared with that of the Book of Job, does not affect my argument in the least.

That this is so, can be made quite clear by an illustration. Mr. Herbert Spencer, in explaining the scheme of his *Philosophy* and the method of its composition, says that of the three kinds of Evolution, "the first kind, Inorganic Evolution, which, had it been dealt with, would have occupied two volumes, one dealing with Astrogeny and the other with Geogeny, was passed over because it seemed undesirable to postpone the more important applications of the doctrine for the purpose of elaborating those less important applications which logically precede them."*

If Mr. Spencer were now, after completing the remainder of his *Philosophy*, to set to work and write the two missing volumes on Astrogeny and Geogeny, would my critic contend that, because these two volumes happened to be written last in point of date, therefore, they could not be correctly described as the commencement of the *Philosophy*?

Once again. Most students know that Hume's *History of England* was written backwards. Will it be contended that, for this reason, the first volume ought to be called the last?

If it were not for the criticism above mentioned, I should have considered this explanation almost an insult to my Reader's intelligence.

* *Principles of Sociology*, vol. i. p. 3 (1893 ed.).

to abandon its defence altogether, it is not a little remarkable that it should apparently never have occurred to any one to enquire whether there is any special reason why the opening utterances of Religion should have been devoted to this particular subject ; whether this part of her scheme performs any special function in relation to the whole, and, if so, what that function is. It is universally taken for granted that, as Religion's account of herself had to begin somewhere, it was natural that she should have chosen to begin with that which must be supposed to have happened first in point of date ; and the requirements of historical completeness are usually accepted as a sufficient explanation of the fact.

But the more we reflect upon this explanation the less satisfying will it appear. It is not that it is necessarily wrong, but that it is inadequate. Undoubtedly the doctrine that God is the Author of the Universe is one of the fundamental tenets of Religion ; and it is, therefore, intelligible enough that her scheme should commence by asserting this doctrine. But the opening verses of Genesis do a great deal more than this. They purport to give a more or less detailed account of the manner in which the material Universe was constructed. They plunge at once into the purely scientific question of the mode and history of the development of the inorganic and organic kingdoms. And it is at first sight by no means obvious in what way these questions—of immense interest as they are to Science—are at all interesting to Religion. Indeed, if we had nothing but the scheme of Religion to guide us, it is by no means improbable that we should have failed altogether to perceive what is the function of this part of her scheme.

But the considerations discussed in the last chapter should warn us that we have here just the sort of case in which we may usefully call the science of Comparative Anatomy to our aid. For have we not here an apparently atrophied part of the scheme of Religion, seemingly rudimentary in condition, and performing no very obvious function in relation to the whole ? If, then, on examining the scheme of Philosophy,

we should find that that scheme possesses an homologous part, and further that such homologous part exhibits a very important functional activity towards its whole, will not such a discovery be likely to throw a new light upon the functions which this seemingly lifeless part of Religion's scheme is designed to perform in relation to its whole? Let us see how the case stands with the scheme of Philosophy. Has the scheme of Philosophy a part which is homologous to Religion's cosmogony?

With a view to answering this question, let us fix clearly in our minds the conclusions at which we have arrived with reference to the scheme of Religion. We have found that the scheme of Religion is composed of units which divide themselves into two distinct classes—the one relating to material phenomena, and the other to immaterial phenomena. We have found, too, that these unlike units are segregated together in this order—the material units come first; the immaterial last. And, finally, we have found that the particular part of Religion's scheme which treats of material phenomena is of such a nature that it is not immediately obvious what is the nature of its functions towards that portion of the scheme which deals with immaterial phenomena.

When from the scheme of Religion we turn to the scheme of Philosophy, we are confronted by a similar division of its component parts. Broadly speaking, the underlying principle of the whole of Mr. Herbert Spencer's *Synthetic Philosophy* is the demonstration of the fact that all cognizable phenomena, material and immaterial alike, are subject to the universal law of Evolution. And of Evolution, Mr. Spencer tells us, there are "three broadly distinguished kinds." The first is Inorganic Evolution, the subject-matter of which is "Astrogeny" and "Geogeny." The second is Organic Evolution, dealing with the less material phenomena of Biology and Psychology. And the third and highest kind is Super-organic Evolution, treating of the still more immaterial phenomena of Sociology and Ethics.

We see, therefore, that the scheme of Philosophy, like the scheme of Religion, is constructed of unlike units, some relating to the Material and others to the Immaterial. In whatever other respects the two schemes differ, they are alike, at least, in this. The grand division between the Material and the Immaterial is common to both. And the mode of segregation of these unlike units is here again the same as before: the scheme of Philosophy, like the scheme of Religion, opens with the Material, and closes with the Immaterial. The Material comes first, the Immaterial last.

Observe, then, this parallelism. Just as Philosophy, whose scheme concludes with the immaterial phenomena of Sociology and Ethics, opens her scheme with the study of the material phenomena which form the subjects of "Astrogeny" and "Geogeny," so Religion introduces her immaterial spiritual doctrines by discussing "the genesis of the heaven and the earth."[1]

Is there not here a coincidence deserving attention? When, side by side, we see these two great parallel facts—that, on the one hand, Religion, the most immaterial of all systems, opens her pages with a discussion of the most material of all phenomena; and that, on the other hand, Philosophy grounds her highest and most immaterial truths upon a similarly material basis—may we not justly suspect that there is in this unforced and independent unanimity of method a great underlying truth? May we not—must we not—infer that the cause which has effected these like segregations of corresponding units is one and the same? And is not the conclusion almost forced upon us that, alike to Religion and to Philosophy, material phenomena are in some way necessary interpreters of immaterial phenomena?

[1] *Principles of Sociology*, vol. i. p. 3. It is noteworthy that in the terms "Astro*geny*" and "Geo*geny*" Philosophy employs the very word "Genesis" which had long previously been appropriated by Religion. Here, as in so many other cases to be presently pointed out, the identity between the truths of Religion and the truths of Science extends even to minute details of terminology.

That this *a priori* conclusion is confirmed by *a posteriori* considerations will be seen from a single illustration.

If we ask Science to explain to us the nature of vegetable growth, she will tell us that vegetable growth is effected by the action of light upon the molecules of which vegetable matter is composed, and that consequently she can teach us little or nothing about it until we have first learnt something about light. If, then, we call for her explanation of light, she will again reply that, in order to understand light, we must first understand something of the nature and properties of the substance called "ether." Thus, according to Science, the study of ether is a necessary preliminary to the study of vegetable growth.

But even here we have not reached the bottom. Science cannot begin her lesson upon growth even at this point. Before we can understand the phenomena of ether we must, she will tell us, first learn something of the universal constitution of Matter; something, too, of the general laws of Motion. Thus step by step we descend from the higher and more specialized branches of knowledge to the lower and more general, until the lowest and widest is reached. Each inferior grade is a necessary introduction to the grade just above it; and the superior grades are intelligible only when reduced into terms of the lower grades, and ultimately into terms of the lowest.

So is it with Science; and so is it also with Religion. Her mode of explaining her supernatural phenomena is to reduce them into terms of natural phenomena. We ask her for an explanation of spiritual growth, and she answers us in terms of vegetable growth: "the kingdom of God," she tells us, "is as if a man should cast seed upon the Earth . . . and the seed should spring up and grow." Thus, in order that we may understand the phenomena of spiritual growth, Religion refers us to the phenomena of vegetable growth. And from this explanation the same chain of gradations as before ensues; and we pass through the stages of light and ether down to the ultimate stage of Matter and Motion, to find

once more that a knowledge of the laws of these elementary constituents is a necessary preliminary to the study of the phenomena of spiritual growth.

Here, then, we come in sight of the answer to our question. We see at once what is the nature of the interest which material phenomena have for Religion. However necessary a cosmogony may be to Religion as her chronological starting-point, it is also, and much more, necessary as her scientific starting-point. To Religion, no less than to Science, the Material is a necessary interpreter of the Immaterial. This is the function which the material portion of her scheme performs towards the immaterial. In order to explain her highest truths, she must necessarily begin by explaining her simplest truths. Just as the science of Mathematics must of necessity commence with the rudimentary science of Notation ; just as the science of Geometry must begin with her fundamental axioms and postulates ; so must Religion begin with her fundamental truths. And any critical study of Religion must necessarily commence with the examination of her fundamental truths. Until these have been mastered, we clearly are not in a position either to fully understand her higher derivative truths, or to determine scientifically her true classification.

Thus, in comparing together the two schemes as wholes, we have already stumbled upon a fact of consummate importance. By studying the comparative anatomy of Religion and Philosophy we have discovered the function (hitherto almost universally overlooked) which Religion's physical department performs towards her spiritual department. And with this discovery our conception of the value to Religion of the opening verses of Genesis will undergo a complete transformation. No longer regarding them as mere co-ordinate and independent appendages to Religion, we shall now look upon them as the interpreters by means of which we are to decipher the mysteries of her higher truths. We shall study them less for their own sake than for the sake of all that

depends upon them. Their true interpretation we shall regard, not as an end, but as a means to a further end. From the cosmogony itself we shall turn to that more sublime mechanism, of which the physical Universe is but a working model. Thus, and thus only, shall we come to recognize the grandeur and the completeness of the scheme of Religion as a whole—a scheme so lofty, that in it the highest truths of Philosophy and Science take but a subordinate rank, as models and interpreters of spiritual phenomena ; so comprehensive, that it reaches down from the sublime heights of the spiritual sphere to the humblest truths of Astrogeny and Geogeny, and, raising them with its ennobling touch, lifts them above the dead level of the physical Universe, to serve as stepping-stones to the divine.

Recognizing these facts, let us now pursue our enquiry on the lines already indicated. Having seen that the material department of Religion's scheme, and the material department of the scheme of Philosophy, are homologous, not only in respect of the identity of their respective subject-matter, but also in respect of the identity of their respective functions towards the whole, we have now to compare together in detail these two homologous parts, in order to ascertain how far they harmonize with, or differ from, one another. And we will then, with the aid of such fresh light as this comparison may throw on the subject, examine the spiritual part of Religion's scheme, and enquire whether the study of Religion, as thus conducted through the medium of Science, has any fresh evidence to offer as to the truth, or untruth, of Religion's doctrines relative to her alleged spiritual life. We shall find not only that the material part of Religion's scheme is identical, down to the most minute details of terminology, with the material part of the scheme of Philosophy, but that the comparison of these homologous parts furnishes the materials for an entirely new proof of the truth of Religion's doctrines as to spiritual life. First, then, let us compare together the two homologous material parts.

CHAPTER IX

FUNDAMENTAL TRUTHS

"All reasoned-out conclusions whatever must rest on some postulate. . . . We cannot go on merging derivative truths in those wider and wider truths from which they are derived, without reaching at last a widest truth which can be merged in no other, or derived from no other. And whoever contemplates the relation in which it stands to the truths of Science in general, will see that this truth transcending demonstration is the Persistence of Force."—HERBERT SPENCER.

"I am Alpha and Omega, the beginning and the ending, saith the Lord, which is, and which was, and which is to come, the Almighty."—THE AUTHOR OF THE REVELATION.

FROM the considerations discussed in the last chapter one consequence of supreme importance must obviously ensue. In whatever other respects Religion and Science may differ from each other, their starting-point must necessarily be the same. If, as is the fact, Religion's method is to explain her spiritual truths in terms of natural science; and if, as is also the fact, the higher truths of natural science can themselves only be explained by the lower, and, ultimately, by the lowest, truths of natural science; it follows that the fundamental truths of Science must also be the fundamental truths of Religion. That at an early stage Religion's treatment of those truths would diverge widely from the treatment employed by Science, and that hence there might sooner or later arise apparent discrepancies between the doctrines of Religion and the theories of Science, was a result which might naturally be expected to flow from the different objects which Religion and Science respectively have in view. But at the earliest stage of all it is not so.

If Theology and Philosophy are both based upon truth, their underlying data must of necessity be identical.

We have already seen that, as regards the general subject-matter with which her scheme commences, Religion has exactly complied with this requirement. Philosophy opens with the study of "Astrogeny" and "Geogeny"; Religion commences with an account of "the genesis of the heaven and the earth." We have now to enquire more specifically whether, in treating of this primordial subject-matter, the conclusions arrived at by Religion tally with those of Philosophy. Are the fundamental truths of Religion identical with the fundamental truths of Science? And, first, what are the fundamental truths of Science?

In opening the *Synthetic Philosophy*, Mr. Spencer naturally finds it necessary to discuss the nature and scope of Philosophy. After drawing his primary division between "the Unknowable" and "the Knowable" (with the latter of which alone Philosophy is concerned), he gives us his definitions of the terms "Philosophy" and "Science." Philosophy is "completely unified knowledge," Science (which is a branch of Philosophy) is "partially unified knowledge." What, then, he enquires, is the starting-point or foundation of completely unified knowledge? What, in other words, is the widest of all truths—the ultimate postulate from which all philosophic (including all scientific) conclusions are deduced?

"All reasoned-out conclusions whatever must rest on some postulate. . . . We cannot go on merging derivative truths in those wider and wider truths from which they are derived, without reaching at last a widest truth which can be merged in no other, or derived from no other. And whoever contemplates the relation in which it stands to the truths of Science in general, will see that this truth transcending demonstration is the Persistence of Force. But now, what is the force of which we predicate persistence? It is not the force we are immediately conscious of in our own muscular efforts; for this does not persist. . . . By the Persistence of Force, we really mean the persistence of some Cause which transcends our knowledge and conception. In asserting it we assert an Unconditional Reality, without beginning or end. Thus, quite unexpectedly, we come down once more to that ultimate truth in which, as we saw, Religion and Science coalesce.

On examining the data underlying a rational Theory of Things, we find them all at last resolvable into that datum without which consciousness was shown to be impossible—the continued existence of an Unknowable as the necessary correlative of the Knowable. The sole truth which transcends experience by underlying it, is thus the Persistence of Force."[1]

Turn now to the opening utterances of Religion, and observe how far she endorses the views of Philosophy as to the fundamental factors out of which all phenomena have been produced. Her opening words are as follows :—

"In the beginning God created the heaven and the earth. And the earth was without form,[2] and void ; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters."

Merely premising that the commencement, "In the beginning God created," clearly complies with Mr. Spencer's requirement that "an entire history of anything must include its appearance out of the imperceptible ;" and further, that by the omission of any attempted explanation of the process of "Creation," the Religion of the Bible escapes the charge which Mr. Spencer prefers against Religion (as defined by himself) of falling into the unscientific error of endeavouring to explain that which is unknowable ; we have first to note that Religion is in exact accord with Philosophy in thus tracing the origin of all phenomena to God. Clearly we have here a primary point of identity between Religion and Science. For while the Bible deduces the origin of all existing phenomena from "God," Mr. Spencer traces that origin back to "Force" ; and he himself completes the

[1] *First Principles*, pp. 192[c], 192[d] (5th ed.).

[2] It will be observed that I adhere to the Authorized Version. I have been unable to discover any ground for preferring the vague term "waste," by which the Revised Version translates *tohu*, to the Authorized rendering, "without form." I think that the authors of the Revised Version, in seeking to escape any danger which might attach to the definite translation "without form," by taking refuge in the vaguer, and, therefore, safer, rendering "waste," have missed a very important, and curiously exact, point of coincidence between Religion and Science. It will be remembered that Milton had the courage of his convictions :—

"Won from the *void and formless* infinite."

identification of the two conclusions when he tells us that by "Force" he means "that Ultimate Truth in which Religion and Science coalesce"—that Ultimate Truth which Religion calls "God."

But a little closer examination of the facts will show that the identity is much more exact than might up to this point be supposed. We have just heard Mr. Spencer's views upon the "Persistent Force" which, according to Science, is the substratum of all phenomena. Let us now consider a little in detail what Religion has to say about that God who, in her view, is the Author of the Universe.

It is well known to biblical students that an acrimonious controversy has for many years raged round the fact that one name is given to God in the first chapter of Genesis, and another in the second. In the first chapter and the first three verses of the second chapter, He is invariably called אֱלֹהִים (*Elohim*); while in the remainder of the second chapter He is as invariably called יְהוָה (*Jehovah*). For this and other reasons a different authorship has been assigned to the two passages, which are respectively distinguished as "Elohistic" and "Jehovistic." What, now, are the meanings of these two titles?

"Elohim" is the plural of "Eloah," which word means primarily and simply "might," "power." The plural is used to express intensity. Hence "Elohim" means "the *All*-mighty," "the All-powerful One."

Now, it is obvious that the main difference between the two terms "Elohim" and "Force" lies in the fact that the former, as understood by Religion, describes a personal Being, while the latter expresses an impersonal Entity. In other respects the two terms are identical. It is therefore curious to observe that, if we read on into the 2nd verse, we find even this difference swept away. We are there met by a very remarkable change of expression. In the 1st verse we read that "God created"; in the 2nd verse we read, not of "God," but of רוּחַ (*ruach*), "the Spirit of God."

What is the meaning of this change? What is the difference between "Elohim" and "the Spirit of Elohim"? Surely it is this. If Elohim is "the Almighty One," "the Force-essential Being;" then "the Spirit of Elohim" must be that which is the essence of this Force-essential Being, namely "Force." "The Spirit of God" is, in fact, simply the expression in theological terminology of that which Science terms "Force." Either term is an exact translation of the other.

It is not here for a moment suggested that the term "Force" would afford an adequate translation of the corresponding theological expression. "The Spirit of Elohim," doubtless means to Religion far more than "Force" means to Science. All that we contend is that, if words mean anything, the theological term, whatever else it may contain, contains also all that is connoted by the term "Force."

But the identity of the two terms by no means ends here. When we turn to enquire the meaning of God's second title, Jehovah, we find that that identity becomes still more curiously complete. It will be recollected that in the passage which we have just quoted Mr. Spencer alleges that the ultimate of ultimates is the "*Persistence* of Force." He distinguishes the Force of which he is there speaking from all other forces by the fact that it *persists*. The one and only attribute which he predicates of it is the attribute of being a *Persistent* Force. Now, Jehovah is probably (though scholars are not unanimous as to its etymology) derived from the verb הָיָה or הָוָה (*hayah* or *havah*), which means "to be"; and since the word contains all the forms of the past, present, and future tenses, Jehovah means "that which was, is, and will be," "Everlasting," "Persistent." Hence the title "Jehovah Elohim" may be accurately rendered "the Persistent Force-essential Being." The passage from Revelation, cited at the head of this chapter, is simply a translation of the title "Jehovah Elohim"—"the Lord, which is, and which was, and which is to come, the Almighty." And as

"Jehovah" is in the 4th verse of the second chapter identified with the Elohim of the first chapter, it follows that "the Spirit of Jehovah Elohim" is an exact translation of the term "Persistent Force."

Admitting the foregoing considerations, it cannot be denied that Religion, in tracing the origin of all phenomena to "Jehovah Elohim" and to "the Spirit of Jehovah Elohim," was exactly forestalling, some thousands of years ago, the scientific conclusions of the nineteenth century. The ultimate datum of Religion is "Jehovah Elohim"; the ultimate datum of Philosophy is "Persistent Force"; and either of these two terms is a literal translation of the other. In other words, Religion and Science are exactly agreed upon this fundamental point, that the Ultimate Truth which lies behind all phenomena is the existence of an Entity, of whom two, and only two, attributes can be predicated; the one "Force" ("Elohim"), the other "Persistence" ("Jehovah").

Passing on now from this primary point of coincidence, we have next to observe than in שָׁמַיִם (*shamayim*), "the heaven," and אֶרֶץ (*erets*), "the earth," we have the theological equivalents of what Science calls "Space" and "Matter." The correspondence of the term "the heaven" with the term "Space" scarcely requires any demonstration. We have only to compare the "heaven" of the 1st verse with the "heaven" of the 8th verse,

> "And God called the expanse heaven,"

to see at once that the former expression has a wider meaning than the latter: it means not merely the space immediately contiguous to our planet (which is its meaning in the 8th verse), but space generally. Clearly it means what Science calls "Space"; no other meaning is assignable to it.

That "the earth" of the first verse means not merely our planet, but "Matter" generally, though not so immediately obvious as the identity of "the heaven" with "Space," is

nevertheless a proposition which can be clearly demonstrated. Let us briefly state the chain of reasoning which leads to this conclusion.

Note first the radical distinction, which can never be too strongly emphasized, but which by theologians and scientists alike is habitually ignored, between "to create" and "to make." By "create" (בָּרָא, *bara*) is meant the inconceivable process of *producing something out of nothing*; to "make" (עָשָׂה, *asah*), on the other hand, means to *construct out of some pre-existing material.*

Bearing this radical distinction carefully in mind, it is next to be observed that the first chapter of Genesis is divided into two separate and distinct parts, which, though they cannot be too widely distinguished, are by the majority of readers habitually confused together. The first part, which is comprised in the first two verses, relates the origin and primordial condition of the factors out of which the material Universe, including the material parts of the vegetable and animal inhabitants of our planet, were subsequently formed; the second part, which comprises the remainder of the chapter, narrates the mode and chronological order in which out of those factors the formation of the Universe was effected. In other words, the first two verses relate "the Creation"; the last twenty-nine verses narrate "the Formation."

It must be admitted that a proposition so persistently ignored—and, indeed, by the majority of readers so little suspected—requires some justification; but that it can be fully justified will become clear upon a moment's reflection. For in the whole of the first chapter of Genesis, which purports to give an account of the origin, not only of our planet, but of the whole Universe—Sun, Moon, and Stars included—so far as the material part of the Universe is concerned, one and only one act of creation is related—that, namely, contained in the 1st verse:

"In the beginning God created . . . the earth."

It is true that the word "create" occurs twice again in the chapter, namely, in the 21st verse:

"And God *created* great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind";

and again in the 27th verse:

"So" (Revised Version, "And") "God *created* man";

but that the acts of creation mentioned in these two passages do not relate to the *material* parts of the organisms referred to may be inferred from the fact that the 19th verse of the second chapter represents that the "moving creature," so far as its material body is concerned, was not created, but *formed* out of a then already existing material:

"And *out of the ground* the Lord God *formed* every beast of the field, and every fowl of the air";

while, similarly, the 7th verse of the second chapter states that man's material part had a similar origin:

"And the Lord God *formed* man *of the dust of the ground.*"

It will be found that this inference is confirmed by other considerations to be adduced immediately.

We will consider hereafter, when we come to deal specifically with the Bible account of the origin of man, what was the attribute in the respective organisms that was the subject of each of these two acts of creation; at present we would merely point out (which is all that our immediate argument requires) that they have no relation to any *material* subject-matter; whence it follows that, so far as "Matter" is concerned, one, and only one, act of Creation is recorded—that, namely, contained in the 1st verse. And from this fact it further follows that, so far as Matter is concerned, the first two verses relate "the Creation"; and the subsequent verses relate "the Formation" of that Matter into the various existing material phenomena, organic and inorganic.

But if this be so, then it appears almost necessarily to

follow that "the Earth" of the 1st verse means not merely our planet, but "Matter" generally. As has just been remarked, the chapter purports to relate the origin, not only of our world, but of the whole Universe, the Sun, Moon and Stars included. Now, we have just seen that if we compare the "heaven" of the 1st verse with the "heaven" of the 8th verse—

"And God called the expanse Heaven,"

the former expression has a wider meaning than the latter, that it means not merely the space immediately contiguous to our planet (which is its meaning in the 8th verse), but Space generally. Similarly, if we compare the "earth" of the 1st verse with the "Earth" of the 10th verse—

"And God called the dry, Earth,"

we find that the former expression has a correspondingly wider signification than the latter. If, then, bearing these facts in mind, and also recollecting the distinction, to which we have already alluded, between the two parts of the chapter—the "Creation" and the "Formation"—we further reflect that the first part, in giving the origin of the materials out of which the subsequent Formation was effected, states those materials to have been "the heaven" and "the earth," both of which terms we find are used in an extended sense, and one of which ("the heaven") is evidently the equivalent of what Science calls "Space," we can scarcely avoid the conclusion that the other term, which seems clearly intended to represent the other half of the picture, is meant to express the counterpart of Space—that, namely, which Science calls Matter.[1]

We find this conclusion still further confirmed when we

[1] This conclusion is very generally admitted, even by hostile critics. "It is usually assumed that 'the heaven and the earth' means the material substance of the Universe."—Huxley, *Essays on Controverted Questions*, p. 118 (1892 ed.).

turn to the description of the Formation of the Sun, Moon, and Stars contained in the 16th verse :

"And God *made* two great lights . . . the stars also."

Here the word *made*, necessarily implying, as it does, that they were formed *out of some then existing material*, strongly confirms the interpretation for which we contend ; for the origin of that material is nowhere recorded if it is excluded from "the Earth" of the 1st verse. If such an exclusion had been in accordance with the author's meaning, it is almost inconceivable that he would not either have given a special account of the origin of this particular material (so as to avoid a palpable omission), or else have substituted the term "created" for "made" in his account of the origin of the Sun, Moon, and Stars.

We are thus drawn to the conclusion that in the expression "the heaven and the earth," as used in the 1st verse, we have the exact theological equivalents of what Science calls "Space and Matter." As regards "the heaven," the correspondence is self-evident. As regards "the earth," we shall find the correspondence, which we have thus established by weighty considerations, still further confirmed, when we come to consider the phenomenon which we shall hereafter distinguish as "the expanse."

Turn now to consider the next factor of the Universe according to the respective cosmogonies of Religion and Science.

From the statement of the Creation of "the heaven and the earth," and a few added words of description to which we will return immediately, the narrative proceeds in language of unexampled sublimity : "And the Spirit of God moved upon the face of the waters." No one can read these words without profound admiration ; but the point to which we wish now to draw attention is not their sublimity, but their strangeness. There is something which we do not expect in the word "moved" ; we read it with

surprise. In a narrative in which nothing is commonplace, this term is, perhaps, the least commonplace of all. That Religion's first words would be of God was, possibly, a foregone conclusion ; there may be nothing surprising in that. That at an early stage she would speak of "the heaven and the earth" was a supposition rendered highly probable by the prominent position which these two factors occupy in the Universe. In that, again, there is nothing surprising. But with the term "moved," the case is entirely different. There is no obvious connection between the creation of the heaven and the earth, on the one hand, and the statement that "the Spirit of God moved," on the other. On the contrary, there is an originality in the transition of thought which must strike with surprise even the most unobservant of readers. Let us, then, fix clearly in our minds this remarkable transition, from the account of the creation of "the heaven and the earth," to the statement that "the Spirit of God *moved*."

Turn now to the cosmogony of Science. In formulating the essentials of a complete history of anything Mr. Spencer shows that—

> "Science, tracing back the genealogies of various objects, finds their components were once in diffused states, and pursuing their histories forwards, finds diffused states will be again assumed by them" ;[1]

from which fact he establishes (by proofs which are too long for insertion here, but which must be acknowledged to be entirely conclusive) the proposition that the history of every aggregate comprises

> "The change from a diffused, imperceptible state, to a concentrated, perceptible state . . . and the change from a concentrated, perceptible state, to a diffused, imperceptible state."[2]

Now these two reverse processes are respectively known as "Evolution" and "Dissolution." Evolution, with which

[1] *First Principles*, pp. 280-1 (5th ed.).
[2] *Ibid.*, p. 281.

alone we are at present concerned, "under its simplest and most general aspect is the integration of matter and concomitant dissipation of motion."

In this primary definition of evolution we have two expressions—"Matter" and "Motion"—which require a moment's notice. We have seen that the ultimate of ultimates is Force; and that the ultimate postulate upon which all scientific calculations are based is the Persistence of Force. Now this Persistent Force manifests itself primarily in two ways: first, by resistance to effort, which is the manifestation which Science calls "Matter"; and, secondly, by change of position, which is the manifestation which Science calls "Motion." These two modes, which are two primary manifestations of that Persistent Force, which is the ultimate basis of all phenomena, may be said to be the primary elements into which all phenomena are resolvable. Hence it follows that, if the starting-point of Religion is really scientific, she must trace back phenomena to their primordial and simplest condition, in which they were manifested by simple unintegrated Matter, accompanied by undissipated Motion—in other words, these two modes of Matter and Motion, as primary manifestations of Persistent Force, are the elements into which all existing phenomena are resolvable. Any complete theory of things, therefore, which pursues the inductive method, must resolve the phenomena which constitute its subject-matter back to its primordial condition, in which they were manifested in their naked elements of Matter and Motion; and from this primordial condition any complete history, which pursues the deductive method, must start.

Such being the scientific view of the subject, how far does the Bible fulfil the required conditions? The question answers itself. If the author of the first two verses of Genesis had had Mr. Herbert Spencer's *First Principles* before him when he wrote, he could scarcely have complied more closely than he has with the principles there laid down.

We have already identified "the Spirit of Jehovah Elohim" with Mr. Spencer's "Persistent Force." We have also identified "the earth" with what Science calls "Matter." And here we have the third factor, "Motion"—"the Spirit of God *moved*."

Pass on now to the remaining constituent factors of phenomena. We have just seen that, so far as the material Universe is concerned, the two primary factors, both according to Religion and also according to Science, were Matter and Motion, as manifestations of Persistent Force. But these are not the only constituent factors of phenomena. They are not the only modes by which the ultimate Persistent Force is manifested. Besides these two modes, we think of phenomena also in relation to their *sequences* and in relation to their *co-existences*. The former of these two modes we call "Time," and the latter "Space." Mr. Herbert Spencer devotes a chapter to the consideration of what he calls "the most general forms into which the manifestations of the Unknowable are re-divisible;" and these forms he finds to be these five: Space, Time, Matter, Motion, Force.

Now, if the starting-point of Religion is really scientific, it must follow that these five forms, which are the factors of all phenomena, ought to make their appearance at an early stage in her scheme. We shall not, of course, expect to find them expressed in the terminology of Science, but shall look for their theological equivalents. Is this expectation realized? We answer that in the first two verses we find all five. They are these:—

In the *beginning*	=	Time,
God created *the heaven*	=	Space,
and *the earth*	=	Matter,
and *the Spirit of Elohim*	=	Force,
moved.	=	Motion.

Having thus found in the opening verses of Genesis the equivalents of the five factors of Philosophy, it remains to

enquire whether the Bible account of what was the primordial condition of those factors tallies with the corresponding theories of Science.

With regard to "Force," this question has been already discussed and answered. We have seen that Religion and Science agree in predicating Persistence as its only known and knowable attribute. Of the four remaining factors, two—Time and Space—obviously do not admit of being conditioned at all. Hence the question now confines itself to the remaining two factors, Matter and Motion. And first we will consider it with reference to Matter.

Religion's description of the primordial condition of Matter is as follows:

> "And the earth was without form and void."

How far does this description agree with the corresponding theory of Science?

We have seen that, in Mr. Herbert Spencer's view, an entire history of any aggregate "must include its appearance out of the imperceptible," and that the first part of the history of every aggregate will be found to consist of "the change from a diffused imperceptible state to a concentrated perceptible state," which process, as we have already mentioned, is known as "Evolution." We have also seen that Mr. Spencer's primary definition of Evolution is as follows:—

> "Evolution under its simplest and most general aspect is the integration of Matter and concomitant dissipation of Motion."

This definition is, however, too vague and general for practical purposes, and Mr. Spencer discusses in four consecutive chapters the law of Evolution, in order to arrive at an ultimate formula expressing the process in terms as definite as possible. His final definition of Evolution is as follows:—

> "Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent

homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." [1]

It is to be feared that those who have not studied the subject of Evolution will not at present be able to attach any very definite meaning to this definition ; but the only terms in it with which we are immediately concerned are perfectly intelligible. They are those which describe the primordial condition from which the Matter must pass—namely, "an indefinite, incoherent homogeneity." This, according to Science, is the primordial condition of Matter. And, this being so, the question which we have now to consider is, How far do the first two verses of Genesis endorse this view?—in other words, How far do the terms תֹּהוּ (*tohu*), "without form," and בֹּהוּ (*bohu*), "void," express an "indefinite, incoherent homogeneity"?

It sounds almost a truism to say that form must be definite ; the very term "form" implies metes and bounds. It follows, therefore, as a corollary, that it will be one attribute of anything that is absolutely "without form" that it will have absolutely no metes and bounds capable of being defined—in other words, it will be "indefinite." Will it also be incoherent?

If we consider the difference between water and ice, we find that the most noticeable unlikeness between the two lies in the fact that the one is solid and rigid, while the other is fluid and unstable. Ice always assumes a markedly more constant shape, a more persistent form, than water.

If, by the application of heat, we convert water into aqueous vapour, we find that the comparatively unstable form of water becomes still more unstable when vaporized. Aqueous vapour is still less capable of assuming a constant shape, or form, than water. What is the explanation of this change? Why is water less stable in form than ice? And why, again, is aqueous vapour less stable in form than

[1] *First Principles*, p. 396 (5th ed.).

water? To each of these questions the answer is obviously the same—because of greater incoherency. Water is less stable than ice because it is more incoherent; aqueous vapour, again, is less stable than water because it is more incoherent. What, then, must it be inferred will be one of the properties of that which is absolutely formless? There is no escape from the conclusion that, whatever other qualities Matter in such a condition may possess, it will certainly be characterized by an extreme incoherency—in other words, the quality "incoherent" is one of the qualities connoted by the term "without form."

We see, then, that the term "without form" necessarily expresses, or implies, the qualities "indefinite and incoherent." Does the term "void" similarly connote the term "homogeneous"?

By the assertion that Matter was at any time "void" we understand the assertion of a state of things in which Matter contained absolutely nothing beyond itself. It is, in fact, an assertion of the simplest and most elementary condition of Matter. The meaning of this statement, which is fairly self-evident as it stands, will be still more clearly appreciated if we consider the condition of our planet at the present day. In her present condition the Earth obviously contains many aggregates sufficiently differentiated from their parent-earth to possess different individualities distinct from hers. Thus she contains such aggregates as metals and minerals, and such natural features as rocks, mountains, lakes, rivers, etc., all of which have, by the process of Evolution, become differentiated from their mother-earth, and have consequently received separate individualities and separate names. So, too, the Earth now contains all her living inhabitants, which together constitute the animal and vegetable kingdoms. No one can, without a very obvious inaccuracy, assert that the Earth at the present time is void.

But eliminate the whole of the animal kingdom; resolve

the whole of that kingdom into the elements of which it is composed ; and by depopulating the Earth to that extent we empty it ; the Earth is then more void than it was before. Similarly, resolve into its elements the whole of the vegetable kingdom, and by so doing we still further empty the Earth ; there is then a still nearer approach to the void condition. Deal similarly with lakes, rivers, mountains, rocks, minerals, metals ; with every feature, in fact, which has become so differentiated as to be capable of being distinguished as possessing a separate individuality from the universal parent, and the work of rendering the Earth void is carried still further ; until, if the process be carried to its extreme theoretical limit, we shall eventually arrive at a condition in which the Earth, with all its contents, is at last resolved into a single primordial element, or, at all events, into a few simple elements.

Now the process thus suggested (though possible only in theory) is not merely fanciful, or illusory. It is simply a reversal of the process which evolutionists maintain has most certainly taken place in the past. Nor are we pushing the process beyond its legitimate limits. Mr. Herbert Spencer, in a note to his essay on the Nebular Hypothesis, has shown that there are strong reasons for believing that even the so-called elements are themselves compound substances; and that, under suitable conditions of heat and pressure, they would be resolvable into simpler and fewer substances. And it is manifest that, as the more complex substances which the Earth now contains are resolved into their simpler elements, the Earth will contain fewer and fewer classes of substances. As each class of substances disappears, there will be a correspondingly nearer approach to the void condition ; until, when all compound substances have been reduced into their simplest elements, or element, the void condition may be said to have been actually reached.

In pursuing this imaginary process, what have we been doing ? In reversing the process of Evolution we have simply

been reducing the Earth from its present differentiated condition back again to its primordial, undifferentiated condition. We have been resolving the heterogeneous back again into the homogeneous. When we have rendered the Earth "void," we have thereby rendered her "homogeneous"; and in so doing we have found the required point of identity. The two terms "void" and "homogeneous" are interchangeable. "Void," in fact, expresses the objective aspect of that condition which is subjectively termed "homogeneous."

Thus we find on examination that the description "without form and void" is the exact equivalent of "indefinite, incoherent, homogeneous." The doctrine of Religion as to the primordial condition of Matter precisely coincides with the corresponding theory of Science.

From the contemplation of Matter we pass now to the contemplation of Motion, and enquire what are the respective views of Religion and Science as to the primordial condition of this factor. At first sight it appears as if, in the absence of any qualifying expression, Religion had pronounced no opinion upon this subject. Such, however, is not the case. It will be found that here again, by an unconscious and almost imperceptible touch of truth, the unanimity between Religion and Science is exact.

Science knows two distinct forms of motion—the one molar; the other molecular. Molar motion is the sensible motion of any aggregate of matter, as, for instance, of a cannon-ball, travelling through space. Molecular motion is the insensible motion of the molecules of which every material aggregate is composed. It is now generally admitted that every aggregate of matter is made up of innumerable, almost infinitely small, particles, termed molecules; and, further, that these molecules are in a state of constant vibration or oscillation. These oscillations, when violent, are manifested in the forms of heat and light; and as they diminish in briskness so does the heat of the mass which they compose correspondingly decrease.

The most noticeable distinction between molar and molecular

motion lies in the fact that, while the former is *progressive*, the latter is *vibratory*, each molecule being in a condition, not of progression, but of vibration or oscillation, like the pendulum of a clock. And though Motion, like Matter, is uncreatable and indestructible—can never be increased, or diminished, in quantity—yet it can be converted from either of these two forms into the other. Thus molar motion may be transformed into molecular motion, as when the molar motion of a cannon-ball, on being arrested by the target, is transformed into an equivalent amount of molecular motion, manifested by heat, sometimes accompanied by a flash of light. Or molecular motion may be converted into molar motion, as in the familiar case of the steam engine, in which the molecular motion of heated water is converted into the molar motion of the engine.

Now, Science assumes in the Nebular Hypothesis, which Mr. Spencer regards as a "practically demonstrated" and "established truth,"[1] that, in the earliest condition of the Universe, the contained motion was wholly molecular. Originally in the history of the material Universe there was no molar motion at all. All motion at that stage consisted entirely of that violent vibratory motion of molecules which constitutes intense heat. Hence we may say that, according to the scientific view, the primordial condition of Matter was a condition of violent vibratory motion; and thus the earliest form of Motion in the history of the Universe was solely *vibratory*.

Turning now to the text, we find that Religion, too, knows two distinct forms of Motion. The Hebrew word רָחַף (*rachaph*), which in the 2nd verse is translated "moved," is a different word from שֶׁרֶץ (*sherets*), which is employed in the 20th verse ("the *moving* creature that hath life"), and from רָמַשׂ (*ramas*), which occurs in the 21st and 28th verses ("every living creature that *moveth*"). The two latter words express

[1] *Essays, Scientific, Political, and Speculative*, vol. i. p. 181 (Library ed.).

progression, and correspond with what Science terms molar motion. Does the former express molecular motion?

The answer to this question does not admit of a moment's doubt. The word is only used twice elsewhere in the Bible; first, in Deuteronomy xxxii. 11:

"As an eagle . . . *fluttereth* over her young;"

and, secondly, in Jeremiah xxiii. 9:

"All my bones *shake*."

Obviously, in both these passages the mode of motion expressed is not progressive, but vibratory or oscillatory. Hence we see that the opening utterances of Religion exactly agree with the theories of Science, not only in asserting that the primordial factors of all phenomena were Time, Space, Matter, Motion, and Persistent Force; not only in asserting that the earliest condition of Matter was an indefinite, incoherent homogeneity, ("without form and void,") but further, in expressly stating that the earliest form of Motion was not progressive, but vibratory; was not molar, but molecular.

That the distinction which we are here drawing with regard to Motion is neither fanciful, nor arbitrary, will become sufficiently self-evident on a moment's reflection; for it is not our distinction, but Religion's. Directly Religion desires to express molar motion, she uses the appropriate word. Had the "moved" of the 2nd verse stood alone, the value of the coincidence might perhaps have been called in question. But as the text stands, any such critical scepticism is impossible. It is the *change* from the one word to the others which stamps the unanimity of Science and Religion upon this point as complete. Nay, we have not even yet done the coincidence complete justice. As already remarked, the word which in the 2nd verse is translated "moved" is used only twice elsewhere in the Bible—it is, in fact, to Religion at least, a rare word. Hence we may fairly say

that, in expressing so simple an idea as that of "Motion," Religion has actually gone out of her way to make use of what is to her a rare word, in order to express a special mode of motion—a mode which, from the scientific point of view, strictly and rigidly accurate, must in its full scientific significance have been wholly unintelligible to contemporary readers.

Thus we find our expectation fully realized. The necessity under which Religion labours of explaining her spiritual phenomena in terms of natural science, coupled with the necessity which lies upon Science of explaining her higher truths in terms of her lower truths, and ultimately of her lowest truth, necessitated that the starting-point of Science must also be the starting-point of Religion. That Religion has from the very commencement recognized this necessity is attested by the fact that she commences with the fundamental problem of "the genesis of the heaven and the earth." And that this is, from the scientific point of view, her proper starting-point is proved by the fact that Science herself commences with the study of "Astrogeny" and "Geogeny."

Recognizing in this commencement a scientific, even more than an historical, necessity, we naturally came to search in Religion's cosmogony for those fundamental truths which are the foundations of all knowledge, both religious and scientific. And we found that Religion's starting-point is exactly the starting-point of Science. In the opening verses of Genesis we found clearly enumerated those five fundamental truths which are the "ultimate truths" of Science. We found all phenomena deduced from a Being of whom two, and only two, attributes are predicated: the one, Force; the other, Persistence. We found, further, in the first two verses of Genesis, which narrate the Creation (as opposed to the Formation related in the remainder of the chapter), each of those four ultimate factors into which Philosophy resolves all phenomena—namely, Time, Space, Matter, and Motion. And of these four factors we found that the only two which are capable of being

conditioned at all, are stated to have been in exactly those conditions which Science predicates as their primordial conditions ; for we found Matter stated to have been indefinite and incoherent (" without form ") and homogeneous (" void "). And finally, we saw that the Motion there mentioned is expressly described as having been precisely that form of Motion which Science alleges—vibratory, as opposed to progressive ; molecular, as opposed to molar.

Is it possible to exaggerate the debt which Religion here owes to Mr. Spencer? The first step towards fusing the forces of Science and Religion must, for the reasons already discussed, be to identify their respective starting-points. And for such an identification Mr. Spencer has furnished us with exactly the materials we require. If the *Synthetic Philosophy* can carry us no further than this, it has at least enabled us to prove, beyond the possibility of contradiction, this all-embracing fact—that the fundamental truths of Religion are the fundamental truths of Science.

CHAPTER X

THE NEBULAR HYPOTHESIS

"Practically demonstrated as this process now is, we may say that the doctrine of nebular genesis passes from the region of hypothesis into the region of established truth."—HERBERT SPENCER.

IT was pointed out in a former chapter that the first chapter of Genesis divides itself into two separate and distinct parts, of which the one, comprising only the first two verses, relates the "Creation," and the primordial condition of the constituent factors out of which the material Universe was subsequently formed; while the latter, comprising the remainder of the chapter and the first three verses of the second chapter, records the "Making" of these constituent factors into the various phenomena now existing.

We have seen that the former of these two parts is precisely scientific, not only in giving, as the primordial factors of Religion's cosmogony, the exact theological equivalents of the five factors which Science knows as Time, Space, Matter, Motion, and Persistent Force, but also in stating that the only two of these factors which are capable of being conditioned—namely, Matter and Motion—were originally in those conditions in which Science believes them to have been—that is to say, that the primordial condition of Matter was an indefinite, incoherent, homogeneous condition; and that the primordial condition of Motion was not molar, but molecular.

We have now to consider the latter portion, which relates the "Making"; and to enquire whether Religion's treatment

of this portion of her subject is similarly scientific. Does Religion's account of the mode in which the various phenomena now in existence have been made, out of the primordial factors, agree with the accepted theories of Science upon the same subject? In order that we may be able to arrive at a reliable answer to this question, it is necessary in the first place to have a clear idea, at least in general outline, of the scientific theory as to the mode in which our planet and the other heavenly bodies have acquired their present forms and conditions. We shall, therefore, in this chapter very briefly consider the now accepted theory of Science as to the formation of the material Universe; and we will then, in the ensuing chapters, examine by the light of that theory the scientific accuracy of the Bible account of the Formation.

The now accepted theory as to the mode in which the heavenly bodies have acquired their present forms and conditions is known by the name of "the Nebular Hypothesis": and although high authorities on Astronomy are careful to remind us that this theory has never been, and possibly never can be, proved, in the strict sense of the word, and must therefore be regarded as nothing more than an hypothesis, yet it is an hypothesis of such extreme probability, and supported by so many considerations, that for practical purposes it must be regarded as established. At all events, Mr. Herbert Spencer, whose well-known essay on the Nebular Hypothesis is at present the leading authority on the subject, treats it as so far proved that he not only regards it as "practically demonstrated," but makes frequent use of it in support of his contentions upon the subject of Evolution. For the purposes, therefore, of the ensuing argument, which accepts as scientific truth all that Mr. Spencer accepts, we are clearly both entitled and bound to treat the Nebular Hypothesis as an accepted theory of Science; and it becomes, therefore, requisite to consider this famous Hypothesis somewhat in detail.

In order to understand the Hypothesis we must in the

first place recall a few of the most elementary facts relating to Matter and Motion—facts which are to be found in any science text-book, and which, for the sake of brevity, have been here extracted almost *verbatim* from Ganot's *Popular Natural Philosophy*.

Material bodies are not formed, as they seem to be, of continuous and compact matter, but are agglomerations of excessively small material particles called molecules, which again consist of clusters of atoms. The molecules composing a body, no matter how apparently solid that body may be, do not touch, but are simply juxtaposed, being separated from each other by extremely small intervals, termed *spores* or *intermolecular spaces*. The questions at once arise, How is it that bodies do not spontaneously fall into powder? What gives them solidity and hardness? What is the invisible force that binds together atoms and molecules?

The answer to these questions is that it is an inherent, though inexplicable, property of matter that every molecule possesses an attraction for every other molecule. This attraction is of two kinds: the force which holds together particles of the same kind of matter is called *molecular attraction*; the force which holds together particles of different kinds of matter is called *chemical attraction*, or *affinity*. For our present purposes we may include both these two kinds of force under the term "molecular attraction."

If molecular attraction were the only force acting upon the infinitesimal particles of which bodies are composed, the result would be that the particles would come into complete contact, so that there would be no intermolecular spaces at all. But this is never the case. All bodies are also under the influence of another force called "heat," in virtue of which their molecules are in a constant state of vibratory motion and are continually struggling to separate themselves from each other. Thus every body is always under the influence of two antagonistic forces—the concentrating force of molecular attraction; and the diffusing force of heat;

and, other things being equal, the comparative size and coherence of a body depend upon the extent to which it is at the time influenced by either of these two antagonistic forces.

Thus, whenever a body is heated, its volume increases, because the act of making an addition to the diffusing force disturbs the balance between the two antagonistic forces, and the molecules are driven further apart ; but when, on the other hand, it is cooled, some of the diffusing force is thereby lost, with the result that the concentrating force of molecular attraction gains a corresponding preponderance, and the molecules are consequently drawn closer together.

In obedience to this preponderance, all substances assume one of three conditions—solid, liquid, or gaseous. In the solid state the molecular attraction preponderates over the repulsion. In the liquid condition the attractive and repellent forces are balanced, so that the molecules can freely glide over each other. In the gaseous state the force of heat preponderates over the molecular attraction, so that bodies in this condition are perpetually tending to occupy a larger space—a property known as the *expansibility* of gases. In practice, many bodies—as, for instance, water—are known to exist in all these three forms, according to the intensity of the heat to which they are subjected.

The attraction which two bodies possess for one another consists of the sum of the molecular attractions of the molecules of which the bodies are composed. This aggregate attraction, in the case of the Earth, is called *gravity*, and it attracts all bodies towards the centre of the Earth, that being the point around which the greatest number of molecules —and, consequently, the greatest number of attractions—are congregated. This force acts upon bodies proportionally to their mass, and inversely as the square of the distance by which they are separated from one another.

All bodies are continually losing heat through radiation. This is effected by means of *ether*, an extremely subtle, elastic medium, by which all bodies, as well as the celestial

spaces, are permeated. The molecular oscillations, which, as we have seen, constitute heat, agitate the surrounding ether into spherical waves, which transmit the vibratory motion in all directions into surrounding space. Hence all bodies are continually losing heat and falling in temperature, and would rapidly become intensely cold, were it not that they are continually receiving fresh heat by radiation from neighbouring bodies.

Turning now from heat, let us remind ourselves of a few of the properties of light.

Light, like heat, is a mode of motion. The luminosity of a body is due to an almost infinitely rapid vibratory motion of its molecules, which, when communicated to the surrounding luminiferous ether, is propagated in all directions in the form of spherical waves ; and this vibratory motion, being thus transmitted to the retina of the eye, calls forth the sensation of vision.

This sensation of vision is subject to the following restrictions : The molecules of which the retina of the eye is composed are capable of affecting the optic nerve with the sensation known as sight when agitated by vibrations of various rapidities. But there are definite limits to this capacity. In order to arouse the sensation of vision, the rates of the vibrations affecting the retina must fall within the following range—they must not be slower than four hundred and fifty-eight billions[1] per second, nor faster than seven hundred and twenty-seven billions per second. The slower of these two rates calls forth the sensation which we call red light ; the more rapid produces violet light. All the other colours of the spectrum are produced by vibrations, the respective rapidities of which lie somewhere between these two extreme limits to the visual capacity of the human eye.

[1] "Billion" is here used according to the English method of numeration, as being a million millions. Thus, the rates of vibration per second are as follows :—

For red light	458,000,000,000,000.
For violet light	727,000,000,000,000.

Light is produced by heat, and bodies begin to be luminous in the dark at a temperature of 500° to 600°. The reason why a body is non-luminous when its temperature is below 500° is that its molecules then vibrate at a rate of rapidity which is less than the required minimum of four hundred and fifty-eight billions per second, and consequently they fail to arouse the sensation of sight in the human eye. When the temperature of a body is raised above 600°, the light which it emits is brighter in proportion as the temperature is higher. But if sufficient heat were added to a body to reduce it to a gas of the most extreme possible tenuity, it would finally become invisible, and would cease to be luminous ; but would again become luminous if, through loss of heat, it should re-condense ; once more losing its luminosity as it sunk below the temperature of 500°.

The loss of luminosity consequent upon extreme heat is due to both, or one, of the following causes: In the first place, the intensity of the heat induces a rate of molecular vibration exceeding the visual maximum of seven hundred and twenty-seven billion vibrations per second, and thus fails to excite vision in the human eye. And in the second place, there is reason to believe that the extreme rarity of the matter, consequent upon the relatively large inter-molecular spaces induced by the diffusing force of the intense heat, renders the body invisible, and therefore non-luminous. That matter in an intensely calorific condition is invisible and non-luminous is well attested by Astronomy. The three or four thousand nebulæ which are at present known to us exhibit specimens of all classes, from the bright nebulous stars up to the almost imperceptible nebulæ, so faintly luminous as to be scarcely visible even in the most powerful telescopes. Speaking of these last-mentioned objects, Sir Robert Ball writes :—

"This is the simplest type of nebula ; it is characterized by extreme faintness, and seems composed of matter of the utmost tenuity." [1]

[1] *Story of the Heavens*, p. 502 (1893 ed.).

The astronomer believes—and he has the best possible grounds for his belief—that each of these faint nebulæ is losing heat, and as a consequence is condensing and acquiring a greater luminosity, until it will at length become a star of dazzling brightness. But he also, and on equally good grounds, holds the converse belief, that the faint nebula has been losing heat, and thereby acquiring luminosity, in the past; so that there must have been a time when it was less luminous than now—a time, even, when it was altogether non-luminous.

Let us now, by way of illustrating these preliminary remarks, examine the effect of heat upon a piece of iron.

Suppose that we have before us a mass of cast iron in the condition which is called cold. While in this condition, its most noticeable characteristic consists of a hardness so rigid and coherent, that even a severe blow from a heavy hammer makes little or no impression upon it.

Imagine now that we apply heat to this mass of iron, and observe what follows. As the mass becomes warm it undergoes two noticeable changes. In the first place it expands in bulk; and, in the second place, it simultaneously gradually loses its coherency. A blow from a hammer which, in its cold state, would not have perceptibly altered its shape, will now effect a marked impression upon it.

What is the cause of these two changes? How does the application of heat produce them? The answers to these two questions form the subject of very elementary knowledge; but as it is necessary that they should be clearly apprehended before the Nebular Hypothesis can be understood, we must briefly notice them here.

We have already seen that the mass of iron consists of numerous very minute molecules which are very close to, but do not actually touch, one another. Now it is obvious that the size of the mass, consisting, as it does, of a fixed and unalterable number of molecules, will depend upon the comparative closeness with which those molecules are packed

together. Equally clear is it that its coherency will depend upon the strength of the attractions which draw those molecules towards one another. Now we have seen that heat is a violent vibratory motion of the molecules, opposed to the concentrating force of molecular attraction, and tending to tear the molecules away from each other. Consequently, in proportion as we add to this diffusing force, we thereby proportionately counteract the concentrating force, and the molecules will accordingly, to a corresponding extent, be forced to occupy situations more distant from each other; and thus every addition of heat causes the apparent bulk of the piece of iron to increase in size.

And this increase of size necessarily induces a rapid decrease in coherency. It has already been mentioned that the force of molecular attraction between two molecules varies inversely as the square of the distance which separates those molecules. Hence, as we increase the bulk of the mass, and, in so doing, increase the intermolecular spaces between its molecules, we thereby decrease their attractive force, not merely in the proportion of the increased molecular distances, but in the proportion of the squares of those increased distances. And thus, as the piece of iron increases in bulk, its coherency very rapidly diminishes.

Proceeding now with our experiment, we add still further heat; and as we do so, the mass still further expands and becomes still more incoherent, and at length, when it reaches a temperature of some 600°, it bursts into a ruddy glow. It becomes luminous, emitting light, at first red, but passing, with further increases of heat, through the various colours of the spectrum, to white heat. And as still further heat is poured in, the mass loses its coherence so completely that it at length, at a heat of 1150°, fuses, and assumes a liquid condition.

If yet further heat be added, the same process continues. The liquid metal becomes still further diffused, and still further incoherent; and passes finally, when the highest

conceivable calorific intensity is reached, into a non-luminous and invisible gas.

If, now, the process which we have thus imagined be reversed, the mass of iron will once more gradually resume its original solid condition. If the heat which we have thus applied be allowed to escape, the first noticeable change that will take place will be that the non-luminous, invisible gas will once more become luminous. Gradually it will concentrate and liquefy ; and will finally once more solidify. Its luminosity will pass from white, through the various colours of the spectrum, down to red. Thence, with still further loss of heat, it will become once more non-luminous ; and ultimately the piece of iron will again assume its original condition of hard and rigid coherence.

Now, the imaginary experiment, which we have thus sketched, illustrates a very considerable portion of the natural history of the Universe. Science insists that, as a matter of fact, all Matter has gone through the cooling process just described. The Nebular Hypothesis assumes that the primordial condition of the material Universe was one in which all the Matter of which it is composed was in a homogeneous gaseous state ; and that the change from that universal gaseous condition to its present heterogeneous condition is due to one single and simple cause—namely, the loss of heat. The theory, of course, applies to the whole of the material Universe ; but, for the sake of simplicity it will be convenient to confine our consideration of it to our own Solar System.

Starting, then, at the point when the Matter, which now composes the Sun, and the Planets and Planetoids which revolve round the Sun, from Mercury to Neptune, was in a gaseous condition, filling the space from what is now the centre of the Sun to beyond the orbit of Neptune, we have first to observe that Matter in the condition supposed must have exhibited two marked characteristics. In the first place, it must have been in a condition of the most intense

heat; and, in the second place, it must have been so extremely attenuated as to have been, in all probability, entirely invisible and non-luminous. The earliest condition, therefore, according to the Nebular Hypothesis was a condition of darkness.

We have next to note that the matter, while in this condition, was, as we have seen, subjected to the action of two conflicting forces—the concentrating force of molecular attraction, which was ever tending to draw its molecules closer together; and the diffusing force of heat, which was continually struggling to force the molecules further asunder.

Now, the struggle between these two forces was not waged on equal terms. While, on the one hand, the concentrating force continued undiminished, the diffusing force, on the other hand, was constantly diminishing through radiation. The continuous loss of heat, which was thus ever going on, yielded an ever-increasing preponderance to the force of molecular attraction. Inasmuch as every unit of the diffusing force, that was abstracted from the mass, left behind a corresponding advantage to the concentrating force, the latter began to steadily gain ground. Little by little the molecules began to take up positions closer and closer to one another; and, consequently, the mass began to continuously shrink to smaller and smaller dimensions.

But meanwhile another change was taking place, which is thus described by Mr. Herbert Spencer:—

"If we assume the first stage in nebular condensation to be the precipitation into flocculi of denser matter previously diffused through a rarer medium, (a supposition both physically justified, and in harmony with certain astronomical observations,) we shall find that nebular motion is interpretable in pursuance of the above general laws. Each portion of such vapour-like matter must begin to move towards the common centre of gravity. The tractive forces which would of themselves carry it in a straight line to the centre of gravity, are opposed by the resistant forces of the medium through which it is drawn. The direction of movement must be the resultant of these—a resultant which, in consequence of the unsymmetrical form of the flocculus, must be a curve directed, not to the centre of gravity, but towards

one side of it. And it may be readily shown that in an aggregation of such flocculi, severally thus moving, there must, by composition of forces, eventually result a rotation of the whole nebula in one direction."[1]

This rotation of the nebula, which, at first extremely slow, must have gradually increased in rapidity until the maximum velocity which the forces at work were capable of imparting had been reached, brought into play the action of a third force, the properties of which—so far as they are material to our present purpose—may be best described by means of two very simple experiments.

Suppose we take a string with a weight attached to one end, and holding it at the length of, say, one yard, swing it round in a circle at a given rate of rotation, say three revolutions per second. Whilst the weight is revolving at this rate we suddenly release the string, and instantly the weight, instead of continuing to revolve in the circle in which it was previously moving, will fly off at a tangent to that circle. The force which is responsible for this result is called the *centrifugal force*. Observe the distance to which the weight is carried by this force before it reaches the ground, and then repeat the experiment under the same conditions, except that the rate of rotation is increased from three to six per second. It will then be found that the centrifugal force carries the weight to a greater distance than it did at the lower rate of rotation. In other words, we have by this experiment illustrated the law that, other things equal, centrifugal force increases with increased rapidity of rotation.

Next, hold the string at the length of two yards, instead of one yard, and again cause the weight to rotate at the same rate of rotation as in the first instance—namely, three per second. It will be found, on releasing the string, that the weight is carried further than in the first case, when the length of the string was one yard. In other words, we have by our second experiment illustrated the law that, in a body

[1] *First Principles*, pp. 227–8 (5th ed.).

rotating at a uniform rate of rotation throughout its mass, the centrifugal force increases with increase of distance from the axis of rotation, and diminishes as the axis of rotation is approached.

Now it follows from these two laws, and it can be easily proved by actual experiment by means of a mechanical apparatus constructed for the purpose, that as the rate of rotation of the nebula increased, it must have soon assumed the form of an oblate spheroid; and it is obvious that as soon as this form had been acquired, the centrifugal force operating on each portion of its mass must, other things equal, have varied according to the relative distance of each portion from the common axis; being greatest at the equatorial portion (that portion being furthest from the axis of rotation), and gradually diminishing with each approach towards the axis; and finally finding its vanishing point at the poles.

Observe now what happened from the combined action of the forces which we have discussed, upon the now contracting and rotating spheroid. While the force of gravity must (subject to a slight increase due to shrinkage of the mass) have remained constant, the centrifuga orce was, on the contrary, constantly increasing with the ncreasing rapidity of the rotation of the mass. Hence, if this condition of things were continued long enough, the time must at length have come when the perpetually increasing centrifugal force must, in point of strength, overtake the concentrating force (the strength of which remained comparatively constant); and thereupon the two, becoming equal, would exactly balance one another. And it is clear that this must have happened first at the equatorial portion, that portion being least strongly affected by the force of gravity, and most strongly affected by the centrifugal force. As soon as this point was reached, the equatorial portion would cease to contract towards the common centre; while the remainder of the mass, being still under the dominant influence of the force of gravity, would continue to contract,

leaving the now perfectly balanced equatorial portion behind in the form of a ring, revolving with its already acquired momentum round the retreating nucleus. This process is described by Mr. Herbert Spencer as follows :—

"In the formation and detachment of the nebulous rings which, according to this Hypothesis, from time to time took place, we have instances of progressive equilibration ending in the establishment of a complete moving equilibrium. For the genesis of each such ring, implies a perfect balancing of that aggregative force which the whole spheroid exercises on its equatorial portion, by that centrifugal force which the equatorial portion has acquired during previous concentration : so long as these two forces are not equal, the equatorial portion follows the contracting mass ; but as soon as the second force has increased up to an equality with the first, the equatorial portion can follow no further, and remains behind."[1]

What, now, will be the fate of such a ring, when formed and detached from the parent mass? To this question Mr. Herbert Spencer gives the following reply :—

"Consisting of gaseous matter, such a ring, even if absolutely uniform at the time of its detachment, cannot continue so. To maintain its equilibrium there must be an almost perfect uniformity in the action of all external forces upon it (almost, we must say, because the cohesion, even of extremely attenuated matter, might suffice to neutralize very minute disturbances) ; and against this the probabilities are immense. In the absence of equality among the forces, internal and external, acting on such a ring, there must be a point or points at which the cohesion of its parts is less than elsewhere—a point or points at which rupture will therefore take place. Laplace assumed that the ring would rupture at one place only ; and would then collapse on itself. But this is a more than questionable assumption—such at least I know to be the opinion of an authority second to none among those now living. So vast a ring, consisting of matter having such feeble cohesion, must break up into many parts. Nevertheless, it is still inferable from the instability of the homogeneous, that the ultimate result which Laplace predicted would take place. For even supposing the masses of nebulous matter into which such a ring separated, were so equal in their sizes and distances as to attract each other with exactly equal forces (which is infinitely improbable) ; yet the unequal action of external disturbing forces would inevitably disturb their equilibrium—there would be one or more points at which adjacent masses would begin to part company. Separation once commenced, would with ever-accelerating speed lead to a grouping of the masses. And obviously a like result would inevitably take place with the groups thus formed, until they at length aggregated into a single mass."[2]

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[1] *First Principles*, p. 490 (5th ed.).
[2] *Ibid.*, pp. 408-9.

The last-mentioned mass would, of course, still retain its orbital motion round the now retreating mass of which it once formed the equatorial portion, which motion it at first acquired whilst it was still attached to the parent mass. As regards itself, the same forces which had been at work in the parent mass will at once come into operation in the detached mass. It will at once acquire an independent centre of gravity of its own, and will be subject to the same molecular influences as those which affected the parent mass. Hence it, again, will acquire an independent rotatory motion, with a consequent centrifugal force ; and will assume the form of an oblate spheroid, together with a tendency to cast off rings of its own.

We say a tendency, because so long as it remains in a condition sufficiently diffused, and therefore incoherent, and attains sufficient velocity of rotation round its own axis, and is of sufficient size to enable the centrifugal force in operation at its equatorial portion to attain to an equilibrium with its force of gravitation at that part, it will leave behind it rings similar to that out of which it was itself formed. But as soon as any of the above-mentioned requirements fails—if the mass has by cooling acquired too great a condensation and consequent cohesion, or has become so small, or succeeds in acquiring only so small a rotatory velocity, that the attraction of gravity at its equator remains more powerful than the centrifugal force in operation there—then the mass will cease to detach any further rings, and will continue to concentrate as a whole towards its own centre.

Such, according to the Nebular Hypothesis, is the origin of our Earth and her Moon. Taking up the history o the Solar System at the point when Neptune, Uranus, Saturn, Jupiter, and (omitting the Asteroids) Mars had, in the manner just described, successively acquired separate individualities ; and when the diffused matter of the Sun extended from the Sun's centre to somewhat beyond the

present orbit of our Earth, the forces above described caused a nebulous ring to be formed and detached from the concentrating nucleus. This ring, having ruptured and collapsed on itself in the manner above explained, became a single mass extending from the present centre of our Earth to beyond the orbit of the Moon. This last-mentioned mass, which has since contracted to the present dimensions of our Earth, similarly detached and left behind it an equatorial ring, which has since similarly ruptured, collapsed, and concentrated into the present dimensions of the Moon. But there the process has stopped. The forces of cohesion have prevailed. And for some one or more of the reasons above indicated no further nebulous ring has been detached from the equatorial portion of the Earth ; and no nebulous ring from the equatorial portion of the Moon.

Meanwhile the original central nucleus has continued to contract, in consequence of its continued loss of heat, until, after detaching other nebulous rings, which have since evolved into the planets Venus and Mercury, it has shrunk into the present dimensions and conditions of the Sun, leaving an intermediate expanse between the Earth and itself of some ninety-three million miles. During this process, the Earth, too, through continuous loss of heat, has similarly continued to contract, and has acquired a solid crust, though still retaining a molten and incandescent interior.

Such, then, in briefest outline, and leaving out of consideration such details as variations in the respective angular velocities of different portions of the rotating masses, are the main features of the famous Nebular Hypothesis. If we ask how far we may trust to this hypothesis, how far we may be sure that it represents reliable facts, we must, of course, admit that, in the nature of things, it has not yet been, and possibly never will be, in the strict sense of the word, proved. But we must also recollect that, as far as observation and calculation have at present been carried, it is supported by an overwhelming probability. Mr. Herbert

Spencer, at the close of his essay on the Hypothesis, after intimating that recent photographs illustrative of nebular evolution, while strongly confirming the general principle of the theory, seem to indicate that its process is less uniform than is generally supposed, concludes with these words :—

"Be this as it may, however, and be the dimensions of the incipient systems what they may (and it would seem to be a necessary implication that they are vastly larger than our Solar System), the process remains essentially the same. Practically demonstrated as this process now is, we may say that the doctrine of nebular genesis passes from the region of hypothesis into the region of established truth." [1]

With such an expression of opinion we may well rest content. We may safely conclude that any modifications, which the Theory may hereafter receive, may, indeed, affect its details, but will, in all probability, leave its main principles untouched. And this being so, we are clearly not only entitled, but bound, for the purposes of the ensuing argument, to accept the so-called Hypothesis for what Mr. Spencer declares it to be—"a doctrine which has passed from the region of hypothesis into the region of established truth."

[1] *Essays*, vol. i. p. 181 (Library ed.).

CHAPTER XI

THE SIX DAYS OF THE FORMATION

"By the word of the Lord were the heavens made; and all the host of them by the breath of His mouth."—THE AUTHOR OF THE THIRTY-THIRD PSALM.

A GLANCE at the rough outline sketch of the Nebular Hypothesis contained in the last chapter, will be sufficient to bring into marked prominence two points of fatal inconsistency between that Hypothesis and the interpretation usually put upon the narrative of the six days of Formation, contained in the first two chapters of Genesis. The cosmogony of Religion, as thus interpreted, clashes with the cosmogony of Science, first in point of *Time*, and secondly in point of *Manner*.

As regards the former of these two inconsistencies, it is clear that the Hypothesis, attributing the whole process of the Formation of the Material Universe to one solitary cause —the loss of heat—requires for that process a period of time which must be measured, not by years, but by ages. It is true that at the early stages the cooling process must have been vastly more rapid than at the later stages, when the condensing masses of the various bodies began by their solidifying crusts to materially retard the escape of their contained heat. But even making the most ample allowance for this variation, and confining our view to our own Solar System, it must be conceded that millions, if not billions, of years must have elapsed between the first appearance of that System in the condition of a luminous gas, and the date

when our planet, having become separated from the body of the Sun, and having thrown off the Moon, had sufficiently cooled to admit of the division of the seas from the dry land, and to give birth to the vegetable kingdom.

Now these are events which, according to the usually accepted interpretation of Genesis, were separated from one another by but two days. Light, according to this interpretation, was produced on the first day ; dry land, grass, and trees appeared on the third. Here, then, is at once an obvious inconsistency. If we give to the word "day" the only meaning which Science gives to it, and the meaning which Genesis expressly assigns to it—that, namely, of a day consisting of an evening and a morning—it is impossible, on the one hand, to compress the events which, according to the Hypothesis, took place between the first appearance of light and the first appearance of vegetable growth, into three days ; and it is, on the other hand, equally impossible, upon the usually accepted interpretation of Genesis, to expand those events beyond the three days. Clearly, then, one or other of the two doctrines must be at fault. Either we must conclude that the Hypothesis is wrong—a conclusion which our argument forbids us to adopt; or else, if the Bible narrative is to stand, we must look in it for some other than the usually accepted interpretation. This enquiry, then, is of the first importance : What, as regards Time, is the true meaning of the narrative of the Six Days?

And the second inconsistency is scarcely less pronounced than the first. Mr. Spencer, in discussing what he calls "Ultimate Religious Ideas," alleges that Religion attempts to explain creation by the analogy of manufacture.

> "Alike in the rudest creeds and in the cosmogony long current among ourselves, it is assumed that the genesis of the Heavens and the Earth is effected somewhat after the manner in which a workman shapes a piece of furniture."[1]

Now, although upon a due recognition of the division of the

[1] *First Principles*, p. 33 (5th ed.).

first chapter of Genesis into its two component parts of the "Creation" and the "Formation," it at once becomes clear that this accusation cannot be sustained as regards the "Creation," yet it is certain that it is the firm impression of the great bulk of readers of the Bible, that the "Formation" *is* stated to have been effected by some sort of mechanical efforts on the part of the Deity. That this is a very general opinion amongst men of science is shown by the name, "the Carpenter-theory of Creation," with which, in contra-distinction to their own theory of Evolution, they have dubbed the Bible narrative. That it is a very general belief amongst theologians is clearly attested by the violence —not to say virulence—with which they oppose the scientific theory of Evolution. Inherently, there is nothing irreligious in that theory ; on the contrary, in many respects it presents a far grander and nobler view of the Formation than its rival, the "Special Creation" hypothesis. It is not on its own account that its advocates have been denounced as Heretics, and branded as Atheists. All the hatred and intolerance which it has provoked, are due solely to the firmly ingrained belief that it is opposed to the Bible narrative.

Here, then, is our second point of inconsistency. Leaving out of consideration the question of the unknown origin of Life, Science avers that all material objects with which we are acquainted owe their present condition simply to loss of heat; that, without any mechanical interference on the part of any Creator, their present forms have been produced by the simplest and most natural of processes ; that they are simply the resultant of the internal resistance inherent in each individual body to the external forces impressed upon it by its environment. Given nebulous matter diffused in space, and subjected to gradual, but continuous, loss of heat ; given also the introduction at appropriate intervals of that unknown quantity termed "life"; and everything else has followed, not by carpenter-like acts of special creation, or of

special formation, but by the simple operation of inherent Law.

To this theory theologians take exception, on the ground that it contradicts the first chapter of Genesis; and the question which we have now to discuss is whether the objection is well founded. Does the Genesis narrative really negative Evolution? Is the "Carpenter-theory" of Formation really the theory put forward by the Bible?

These two objections—of time and manner—are obviously of such vital importance to the problem which we are now endeavouring to solve, that it will be worth while to consider them carefully, before proceeding to examine the remainder of the text in detail. If the Bible really states that an interval of only two days intervened between the first appearance of light, and the first appearance upon our planet of vegetable growth, and if it really advocates the "Carpenter-theory" of Formation, it will be scarcely worth while to pursue any further an argument which is based upon the acceptance of the Nebular Hypothesis. Perplexed theologians may continue their vain efforts to support the Bible by discrediting Science; but any attempt to show that the cosmogony of Science is in harmony with the cosmogony of Religion will obviously fail at the outset. We will, therefore, at once proceed with this enquiry; and it will be found that, in examining the one difficulty, we shall be simultaneously solving the other. One examination will dispose of both these apparent discrepancies.

The history contained in the last thirty-nine verses of the first chapter of Genesis is divided, as is well known, into six days, in each one of which certain events are represented to have taken place. What are those events? The reply which the religious world has given to this question has in all ages been almost unanimous. In the six days God made heaven and earth, the sea, and all that in them is. Starting with nothing—or, rather, with the raw material described in the first two verses—within the space of the

" six days " the Universe stood complete—practically as complete as it is at the present time.

That this is the meaning of the text has scarcely ever been seriously questioned ; and for centuries the " six days " were undoubtingly accepted as representing six days of one morning and one evening each. But as scientific research and knowledge increased, a suspicion at length dawned upon scientists that this interpretation was untenable. In course of time the study of the earth's crust first suggested the suspicion, and finally enforced the conviction, that the six days had, as a matter of fact, been largely exceeded. The question, of course, was not, What could the Deity have done ? but, What, as a matter of fact, had He done ? And Geology insisted, with an ever-increasing vehemence, that the structure of our planet afforded unmistakable indications that the earth had been in existence for ages before the first appearance of human life. Vainly did Theology attempt to stem the torrent of this insidious heresy. The voice of Science grew daily louder, and was not to be gainsaid ; until at length it became necessary to face what could be no longer suppressed.

Religion met the difficulty by a somewhat clumsy subterfuge. If six days were too short a space of time, for " days " substitute " periods " ; let the six days represent six periods, each of indefinite duration, and every difficulty would vanish.

We may dismiss this expedient with a passing notice. Even if it be admissible at all—which is, perhaps, more than doubtful—and even if, by its means, we can succeed in getting rid of the difficulty as regards time, it helps us not one iota to solve the second difficulty—the difficulty of manner ; and any interpretation of the text which leaves us stranded on that difficulty is worthless. We have, therefore, still to face the problem of how to reconcile the Bible narrative with the Nebular Hypothesis. We have still to bring into harmony the two cosmogonies in the two respects of Time and Manner.

The principal methods by which Religion has sought to

avoid the difficulties just enumerated, in order to bring the Genesis narrative into harmony with Science, have been succinctly summarized by Canon Driver in an article which appeared in the *Expositor*[1] a few years ago; and as the learned Canon's treatment of the subject is sufficiently exhaustive to render it unnecessary to go over the same ground again, it will be sufficient for present purposes to enumerate here the three methods to which he alludes. These methods are as follows :—

The first, which was adopted by J. H. Kurtz and Dr. Chalmers, supposes

"that the main description in Genesis does not relate to the geological periods at all, that room is left for these periods between verse 1 and verse 2, that the life which then flourished upon the earth was brought to an end by a catastrophe the results of which are alluded to in verse 2, and that what follows is the description of a *second* creation, immediately preceding the appearance of man"

The second, which "was adopted and accommodated, with great eloquence and skill, to the geological periods by Hugh Miller," supposes

"that the narrative was not meant to describe the actual succession of events, but was the description of a series of *visions* presented prophetically to the narrator's mental eye, and representing not the first appearance of each species of life upon the globe, but its maximum development. The 'drama of creation,' it is said, is not described as it was enacted historically, but *optically*, as it would present itself to a spectator, in a series of pictures, or tableaux, embodying the most characteristic and conspicuous feature of each period, and, as it were, summarizing in miniature its results."

The third method, which is embraced by Sir J. W. Dawson,

"adopts another mode of reconciliation, assigning nearly the whole of the Palæozoic and Mesozoic periods to the Fifth Day, and supposing the Huronian and Cambrian periods to contain such relics as survive of the work of the Third Day."

It is almost needless to say that Canon Driver finds no difficulty in disposing of each of these three methods of reconciliation. The most rudimentary knowledge of Geology

[1] *The Cosmogony of Genesis* (the *Expositor*, January, 1886, p. 23), by Rev. S. R. Driver, D.D., Canon of Christ Church.

is sufficient to satisfy any candid critic that the Genesis narrative, as interpreted by any one of them, cannot be brought into harmony with the admitted facts of Science.

Having thus demolished (to his own satisfaction) the scientific truthfulness of the Genesis narrative from the geological point of view, Canon Driver turns to consider "two discrepancies of a different order" which he regards as fatal, the one from the astronomical, and the other from the gastronomical, standpoint. The former of these is that—

"upon the assumption of Laplace's theory of the formation of the solar system (which may be said to be tacitly accepted upon both sides), the formation of the sun and moon cannot be placed subsequently to the separate existence of the earth and the appearance upon it of a tolerably complete vegetation ('trees'): it is assigned in Genesis to the Fourth Day."

And the latter "discrepancy" is that—

"from the injunction in verse 30, it is a legitimate inference that the narrator considered the original condition of animals generally to be one in which they subsisted solely on vegetable food. This is not merely inconsistent with the physical structure of many animals (which is such as to require animal food), but is contradicted by the facts of palæontology, which afford conclusive evidence of animals having been the prey of one another long before the date of man's appearance upon earth."[1]

From these considerations Canon Driver eventually concludes that—

"however reluctant we may be to make the admission, only one conclusion seems possible. Read without prejudice, or bias, the narrative of Genesis i. creates an impression *at variance with the facts revealed by science*: the efforts of reconciliation which have been reviewed are different modes of obliterating its characteristic features, and of reading into it a *view which it does not express*. Every proposed scheme either combines what is separate in one series, or divides what is united in the other; and all presuppose a non-natural interpretation of *made* in verse 16. . . . Recognizing these facts, many theologians of the present day are satisfied with establishing what is termed by Zöckler, an 'ideal harmony,' *i.e.* a harmony not extending to details, but limited to salient features. No other reconciliation is, under the circumstances, possible."

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[1] This objection will be dealt with in the chapter on "Death," to which the reader is referred.

Obviously, if the conclusion at which Canon Driver thus unwillingly arrives be sound, all further effort at reconciliation is useless. His estimate of the barrenness of the reconciler's task is more than justified :—

"Those who accept this solution do not always appear to perceive that it involves really an abandonment of the position for which the harmonists have throughout contended. Yet this result clearly follows. If the relative priority of plants and animals, or the period at which the sun and moon were formed, are amongst the details on which harmony cannot be established, what other statement can claim acceptance on the ground that it forms part of the narrative of Genesis? Commentators and apologists are justified in directing the reader's mind either to the broader truths of physical fact, or to the permanent truths of theology, which the narrative enunciates; but they ought not, in doing this, to conceal from him the grave discrepancies in detail which it at the same time exhibits."

It will be very generally admitted that if we are to successfully upset Canon Driver's conclusion, we must do so by attacking his premises. As long as these stand, his conclusion is logically irresistible. Undoubtedly, the three methods of attempted reconciliation which he enumerates are open to the objections which he raises. Undoubtedly, too, the astronomical difficulty of the Fourth Day, and the gastronomical difficulty of the vegetarian dietary alleged to be assigned by Genesis to the whole animal kingdom, must somehow be disposed of, before the Genesis narrative can be regarded as in any sense true. If, therefore, we would establish the required harmony between Genesis and Science, we must look once again for an interpretation of the chapter which, whilst doing no violence to the text, will bring the narrative into harmony with the requirements of Science. Nor will such an enquiry go unrewarded. For it so happens that a critical examination of the text will yield an interpretation, of which it is not too much to say, that it gives rise to the following four propositions, each of which it conclusively establishes : First, that, being the direct antithesis to the usually accepted interpretation (upon which all Canon Driver's objections are based), it is itself free from all those objections ; second,

that it brings the narrative into perfect harmony with the teachings of modern Science ; third, that, so far from doing any violence to the text, it is not merely a perfectly tenable interpretation, but is, in fact, the only tenable interpretation ; and fourth—which is a corollary to the last—that it shows the commonly accepted interpretation to be itself absolutely untenable. Let us proceed without further preliminary to consider this interpretation, and the reasons which render its acceptance imperative.

When we turn to the text, we at once observe that the history of each of the six days is uniformly introduced by the notable words, "And God said." No reader, however superficial, can fail to be struck by this remarkable circumstance, that God on each day is in the first instance represented not to have *done* something, but to have *said* something.

Now, the attitude of the Deity in relation to the first and third days is represented to have been confined to *saying* alone ; in the history of each of these two days He is not stated to have *done* anything. But in the history of each of the other days, He is first represented to have *said* something, and then He is subsequently stated to have *done* something ; and in each of these cases it is to be observed that that which He is stated to have done is an exact, or virtually an exact, repetition of that which He is first represented to have said. Thus, in the description of the second day the text states :—

"And God said, Let there be an expanse. . . . And God made the expanse . . ."

the description of what He is here stated to have made exactly corresponding with—being, in fact, an exact repetition of—that which He is first stated to have said. So, too, on the fourth day, the narrative proceeds :—

"And God said, Let there be lights in the expanse. . . . And God made two great lights . . ."

a similar, though not in this case the same exact verbal, correspondence between what was said, and what was done, being here again observable. A similar remark applies to each of the fifth and sixth days, the correspondence between the descriptions of the two processes of saying and doing being, in the case of each of these two days, complete.

Now, what is the meaning of this repetition? What does the writer intend when, in the course of his description of each of these days, he first states that God said something, and then that He did that which He had said? Does the narrative mean that in respect of each of these four days there were (so to speak) two distinct actions on the part of the Deity?—that in the first instance God commanded; and then, His command being disobeyed, proceeded by some sort of mechanical process to effect that which His command had been powerless to produce? This interpretation (which Mr. Herbert Spencer designates the "Carpenter-theory of Creation") is almost universally accepted. But is it the right interpretation? Is it even a tenable interpretation?

In the first place, it is open to the very obvious objection that it is opposed to the whole teaching of the Bible as to the power of God. From the first page of the Bible to the last, the absolute omnipotence of God is either asserted, or assumed. How, then, can we reconcile with this doctrine an interpretation which represents that the first efforts (so to speak) of the Deity towards the Formation of the Universe were failures?—that, whatever success may have ultimately attended His *actions*, the existences of the various phenomena were successively preceded by a series of ineffectual and vain commands? And be it observed that the words attributed to God are, in each case,[1] not the mere propounding of problems to be afterwards solved by action, but are in the nature of direct commands; and consequently, if we assume that after these commands had been uttered anything further

[1] Except, perhaps, in the case of the making of man.

remained to be *done*, we are forced to conclude that the commands were (at all events to some extent) disobeyed. This is a preliminary objection of considerable weight to the commonly accepted interpretation.

In the next place, the text apparently represents that some of the commands were *not* disobeyed. When we read,

"Let there be Light, *and there was light*,"

we have no difficulty in concluding that the writer intends that the operative agent in the production of the phenomenon 'ight was the "Fiat" of God, and nothing more;—that, in order to produce light, God did nothing beyond pronouncing the command. So, too, when we read,

"And God said, Let the waters under the heavens be gathered together unto one place, and let the dry appear: *and it was so*,"

we cannot avoid the conclusion that here, too, it is represented that the required phenomenon was produced, not by any active formative interference on the part of the Deity, but simply by the pronouncing of a command, which was obeyed. Similarly the 11th and 12th verses,

"And God said, Let the Earth bring forth grass . . . *and it was so. And the earth brought forth grass*,"

necessarily give rise to a similar conclusion.

But when we read in the 6th verse,

"And God said, Let there be an expanse. . . . And God made the expanse . . ."

can we come to the same conclusion? Are we to understand that here, too, as in the three former cases, the operative agent in the formation of the expanse was simply the uttered command followed by obedience? Or must we conclude that in this case (unlike the other cases) the command was disobeyed, and that consequently God had recourse to some mechanical (some "carpenter-like") act, to effect that which His command had failed to produce? If the latter interpreta-

tion is the true one, what is the *ratio* for the distinction drawn between the mode of origin of this phenomenon and that of the three other phenomena just referred to? If, on the other hand, the former of the two interpretations is permissible, it will obviously have this, at all events, to recommend it—that it represents the agency employed in the production of "the expanse" to have been the same as that by which the phenomena of light, of the division of the sea and dry land, and of the origin of the vegetable kingdom were severally brought into existence.

In choosing between these two interpretations it will be observed that they are radically distinct. The former treats the command as the operative agent, and represents the "God said" as being the narrative proper, the subsequent "God made" being (as will be shown more fully hereafter) added incidentally *by way of explanation* of what was the mechanical result of the previously narrated "God said." For this reason we shall, for the sake of convenience, distinguish this interpretation as "the explanatory interpretation." The other interpretation, which is that adopted by those who speak of the "Carpenter-theory of Creation," or the "Special Creation Hypothesis," represents that the passage relates to some *mechanical act of construction*, and makes the "God made" the essential part of the narrative, ignoring altogether the preceding "God said." This interpretation we will therefore distinguish as "the constructive interpretation."

It will be further observed that these two interpretations, being distinct, cannot both stand. One of them must be wrong. If we can establish the one, we shall in so doing by necessary implication have discredited the other. It is, therefore, from all points of view of the utmost importance, in order to a correct understanding of the chapter, that we should definitely conclude which of the two interpretations is the true one. Taking Evolution and the teachings of Astronomy and Geology as established facts, it must be conceded that the constructive interpretation would be irreconcilable with those

facts ; for Science will not allow us to suppose that the vegetable kingdom was produced by some carpenter-like process within three days after the first appearance of light. If, therefore, the constructive interpretation could be established as the true interpretation, it would be impossible to reconcile the first chapter of Genesis with the teachings of Science. We shall, therefore, in the remainder of this chapter, endeavour to show that the explanatory (and not the constructive) interpretation is the true and only possible interpretation. And, in order to establish this all-important point with the greatest possible emphasis, we shall support our contention by a two-fold argument. We shall point out that every consideration which recommends the explanatory interpretation simultaneously condemns the rival interpretation.

We have already seen that the explanatory interpretation is strongly recommended by its compatibility with, as the constructive is discredited by its incompatibility with, the Bible doctrine of the omnipotence of God. It is a boast of English Equity that she "does nothing in vain"; and it may be safely assumed that the author of the first chapter of Genesis would scarcely have represented the Deity as uttering a series of vain and ineffectual commands. We have also seen that the explanatory interpretation is further recommended by the circumstance that it would attribute the origin of all phenomena to one and the same cause—namely, the *Word* of God ; while the constructive interpretation is further discredited by the circumstance that it would draw a distinction, grounded apparently on no rational basis, between the origin of some phenomena and that of others. But there are certain words in the text which, even apart from other considerations, furnish almost conclusive evidence in support of the explanatory interpretation.

Consider once more the 11th and 12th verses :—

"And God said, Let the earth bring forth grass. . . . And it was so. And the earth brought forth grass. . . ."

Here the words "And it was so" conclusively indicate that the writer intends that the sole operative agent in the production of the vegetable kingdom was the command "Let the earth bring forth." If there had been room for any doubt as to this, the "And it was so" must be taken as conclusively deciding the question. What, then, is the meaning of the added words "And the earth brought forth grass," etc.? It seems indisputable that they are added by way of explanation; that they are, in fact, merely an expansion of the preceding "And it was so."

This conclusion will appear still more probable if we turn to consider the copulas which introduce the various sentences of which the first chapter of Genesis, and the first three verses of the second chapter, are composed. Readers of the Revised Version will be familiar with the remarkable fact that every one of those sentences is introduced by the single copula "and"—ו (*vav*), with, of course, its idiomatic variants. If, now, we turn to the Authorized Version, we shall find two apparent exceptions to this universal rule. In the 27th verse of the first chapter we read:—

"*So* God created man,"

and in the 1st verse of the second chapter:—

"*Thus* the heavens and the earth were finished."

What is the meaning of these two apparent exceptions? They mean simply this—that as so frequently happens in archaic documents, the single copula thus universally employed is a *generic* copula, used to introduce all sentences, irrespectively of the specific transition of thought which it is intended to express; and that the translators of the Authorized Version, feeling that the connection of thought between the 26th and 27th verses of the first chapter, and, again, between the last verse of the first chapter and the 1st verse of the second chapter, could not in modern language be adequately expressed otherwise than by the more specific

copulas "so" and "thus," translated the generic copula by these appropriate specialized copulas, and in so doing gave to each of the respective passages a rendering which, though in one sense less verbally exact, will probably be regarded as a more perfect translation by those who value a version in proportion as it presents, not so much the mere archaic diction, as the actual meaning, of the original.

Bearing this fact in mind, we shall not only understand why the generic copula "and" is used for the introduction of explanatory sentences, which by a less archaic writer would have been introduced by more specialized copulas; but we shall also realize that, if we desire to rightly understand the text, it will be advisable to follow, or rather extend, the example of the Authorized Version in the 27th verse of the first chapter, and the 1st verse of the second chapter, by giving to "and," where occasion requires, its more specific meaning. Admitting these considerations, few probably will dispute that the first "and" of the 12th verse may properly be rendered "for." The two verses, in fact, read as follows:—

"And God said, Let the Earth bring forth . . . and it was so; *for* the Earth brought forth. . . ."

This rendering, without in the least altering the sense of the passage, will serve to make more clear the force of the explanatory interpretation.

When we turn to the 6th and 7th verses a similar conclusion is forced upon us:—

"6. And God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters. 7. And God made the expanse, and divided the waters which were under the expanse from the waters which were above the expanse: *and it was so.*"

For to what do the last four words relate? Clearly to the "God said" of the 6th verse, and not to the "God made" of the 7th verse; for if referred to the latter, they would be meaningless. There is, perhaps, a slight apparent inversion in the order of the sentences contained in the

7th verse, but the construction is the same as before; and even the apparent inversion disappears when viewed in the light of the foregoing remarks on the copula "and." For, bearing those remarks in mind, and further considering that a primary object which the writer of Genesis must have had in view was, doubtless, not only to explain scientifically the *mode* of genesis of the phenomena which he describes, but also to emphasize the fundamental principle which underlies all Religion, that it is God who is their Author, it will probably be very generally admitted that the meaning of the 6th and 7th verses will be not inaccurately rendered by the following paraphrase :—

"And God said, Let there be an expanse, etc. . . . *Thus* it is God who made the expanse and divided the waters from the waters, *for* it came to pass as He commanded."

Here, once more, the substitution of the specialized copulas "thus" and "for" for the then comprehensive copula "and," whilst further illustrating our previous remarks, will help to show that, in the case of the 6th and 7th verses, the explanatory interpretation is no violation of the text. But even without assenting to the above paraphrase, (which is, of course, in no sense *necessary* to the argument,) we have no escape from the conclusion that the words "God made the expanse" are merely added by way of explanation of what was the result of the previously narrated command —are, in fact, again merely an expansion of the accompanying "and it was so."

Similar remarks obviously apply to the history of the Formation of the various phenomena described in the remainder of the chapter. In each case it becomes clear on examination that the explanatory interpretation in no way conflicts with the text.

Thus far we have been dealing solely with internal evidence; but there is a further test which we may apply. Let us now consider how far it supports the explanatory interpretation.

In arriving at the true meaning of difficult passages, two kinds of tests are admitted by scholars ; the one is known as internal, and the other as external, criticism. If a classical student is in doubt as to the meaning of some passage in a Greek author, he enquires whether any other Greek writer, either actually, or approximately, contemporary with the author in question, has left on record what *he* understood to be the meaning of the doubtful passage. If such a writer can be found, the scholar will attach great importance to his interpretation of the passage. And so, in the present case, if we can find a Hebrew author, who has pronounced an opinion between the explanatory and constructive interpretations of these passages in the first chapter of Genesis, the judgment of such an author upon the point will be little less than conclusive.

There is such an author, and he has pronounced such a judgment. Whatever date we may attribute to Religion's cosmogony, the obvious allusions to it which are to be found in the thirty-third Psalm will probably satisfy most scholars that the author of that Psalm was not unfamiliar with the first chapter of Genesis. Writing, then, with this chapter before him, this is the Psalmist's view of the agency by which the Universe was formed ; this is, in other words, the interpretation which he puts upon the language of Genesis. Of the earth, he writes :—

"For *He spake*, and it was ; *He commanded*, and it stood fast ;" [1]

and of the heaven and its worlds he is, if possible, still more explicit :—

"*By the word of the Lord* were the heavens made ; and all the host of them *by the breath of His mouth.*" [2]

This last is the Psalmist's interpretation of "and God said, Let there be lights in the expanse. . . . And God made two great lights, the stars also." It is true that the Bible

[1] Psalm xxxiii. 9 [2] *Ibid*, 6.

elsewhere speaks of heaven as "the work of Thy fingers"; but this and other passages, in which existing phenomena are referred to as the works of God's *hands*, will be found, on examination, only to refer to the nature of their authorship —to the fact that it is God who is their Author—and do not refer (as the two passages just cited clearly do) to the *mode* or *means by which* God produced them.

If any further confirmation of this view is required, it is supplied by the author of the Epistle to the Hebrews, who must be taken to have been familiar with the first chapter of Genesis (whether in the Hebrew, or the Septuagint translation, is immaterial,) and who states it as his view of the origin of the Universe that

"the worlds have been *framed by the word of God.*"[1]

To which authority we may, with similar force, add the authority of St. John:—

"In the beginning was the *Word*. . . . *All things were made by Him*, and without Him was not anything made that was made."[2]

These two last-mentioned passages afford an important confirmation of the explanatory interpretation; for, whatever date may be assigned to the Cosmogony, it is certain that it was published long before the dates at which the Epistle to the Hebrews, and the Gospel according to St. John, were written; and each of these latter passages, therefore, certainly contains a reference to the first chapter of Genesis.

Now, consider for a moment what these passages amount to; for, from the critical point of view, it is scarcely possible to exaggerate their value. Assuming, as we may safely do, that the two quotations from the thirty-third Psalm correctly represent their author's understanding of the corresponding passages in the first chapter of Genesis; and further assuming, as we may do with absolute certainty, that the third and fourth quotations correctly represent their respective authors' under-

[1] Heb. xi. 3. [2] John i. 1, 3.

standing of the corresponding passage in Genesis; it is clear that to the Psalmist, as well as to the authors of the Epistle to the Hebrews, and of the Gospel according to St. John, the "God made" did not represent any "carpenter-like" process; for the mode of origin which these authors assert altogether precludes any such process. They obviously give to those words no place in the narrative proper, but treat them as mere adjuncts, added by way of explanation or reflection. The authority, therefore, of the writers just cited, with all the weight which attaches to such authority, is enlisted on the side of the explanatory interpretation; the constructive interpretation these writers, not only discountenance, but preclude.[1]

The case, as thus stated, appears so conclusively favourable to the explanatory interpretation, and so absolutely destructive of the rival interpretation, that it may, perhaps, be thought by some that, in thus attempting with some degree of elaboration to discredit the constructive, and establish the

[1] Even if, out of all possible assumptions as to the date and authorship of the thirty-third Psalm, as compared with the date and authorship of the first chapter of Genesis, we make the assumptions which are most unfavourable to my argument, the argument itself will lose little, if anything, of its force. Old Hebrew became a dead language about 500 B.C.; new Hebrew, about 50 A.D. The date and authorship of the thirty-third Psalm are unknown. It is assigned by the Septuagint (but not by the Hebrew) to David; and if so, it would date from about 1000 B.C. On the other hand, it is treated by many critics as undoubtedly post-captivity in date. It is written in very good Hebrew; and the smoothness of the language employed certainly points to a comparatively late date.

As regards the date and authorship of the first chapter of Genesis, the results of recent criticism point to the probability that the Elohistic and Jehovistic portions of Genesis were pieced together by a Redactor. From what sources he may have derived his materials for this purpose is uncertain; but the Archaic diction of the Elohistic narrative comprised in Genesis i.—ii. 3 (inclusive) points to a very early date; and it seems, on the whole, probable that that narrative, as well as the Jehovistic narrative comprised in the remainder of the second chapter, must be referred to a date not later than the time of Moses.

But be this as it may, it appears to be in the highest degree probable that the Cosmogony was written before the Psalm.

If, however, we make the most unfavourable assumptions possible, and assume, what very few scholars will ask us to assume, that the

explanatory, interpretation, we are setting ourselves an unnecessary task; that we are raising a spectre in order to lay it; that no one who has taken the trouble to ascertain that the text is capable of suggesting these two alternative interpretations—for the fact is not, perhaps, at first sight very self-evident—would seriously adhere to the constructive interpretation, as opposed to the explanatory. We answer that scientists do adhere to the constructive interpretation; for what else is the meaning of Mr. Herbert Spencer's "Carpenter-theory of creation"? Obviously, by this expression Mr. Spencer, and the numerous scientists who follow him, mean nothing else than this—that Religion attributes the formation of the material Universe to some carpenter-like actions on the part of the Deity; which is to assert what we have here distinguished as the constructive interpretation. We contend that such a charge, however well founded as against certain theological expounders of the Bible, is opposed to the Bible itself, no less than to the

Psalm was written before the first chapter of Genesis, the argument will be scarcely, if at all, weakened. For as the first chapter of Genesis and the Psalm are both written in classical Hebrew, it is obvious that the author of either possessed the necessary qualifications to enable him to form a reliable opinion as to the meaning of the other. Consequently, the facts of the case, even on this assumption, strongly recommend an interpretation of the Genesis narrative which will bring it into harmony with the Psalm.

The only assumption which would really weaken—though even this assumption would not destroy—the force of this portion of my argument, would be the supposition that either passage was written independently, and in ignorance, of the other. And against this assumption the probabilities are immense.

As regards the passages cited from the Epistle to the Hebrews, and the Gospel according to St. John, it is by no means necessary, for the purposes of the argument, that we should assume that the authors of those passages were themselves competent Hebrew scholars. It has been argued with great force that the author of the Epistle to the Hebrews, whoever he may have been, had no knowledge of the Hebrew version of the Old Testament, but was familiar only with the Septuagint translation. This fact, however, if it be a fact, still leaves him a reliable authority as to what, in the first century A.D., to which the Epistle certainly belongs, was the current opinion upon the question of the true meaning, whether derived directly from the original Hebrew, or indirectly through the Septuagint, of the first chapter of Genesis.

teachings of Science; and it is, therefore, of the highest importance that we should prove conclusively that it is not the meaning of the text.

Again, it may be asked, What is the real value of this discussion? Even if we succeed in establishing the explanatory, and demolishing the constructive, interpretation, does not the former, equally with the latter, conflict with Science, in asserting that the Universe was physically completed in six days, and that vegetable life sprang into existence within two days after the first appearance of light? We answer, No. The explanatory interpretation, when properly understood, is in perfect harmony with the teachings of Science.[1] This assertion can be fully justified by the concluding considerations on the question of interpretation, which have now to be offered, and which not only conclusively establish the explanatory interpretation as the only possible rendering of the text, but also dispose of the old familiar chronological difficulties of the six days. These further considerations will be conveniently discussed in a separate chapter.

[1] All the difficulties which have arisen in the reconciliation of the chapter with Science, spring solely out of the erroneous acceptance of the constructive interpretation. Eliminate that untenable interpretation, and every scientific difficulty vanishes.

CHAPTER XII

THE SIX DAYS OF THE FORMATION (*continued*)

"In interpreting a written document an interpretation which would give a meaning to the document is always to be preferred to an interpretation which would render it nonsensical."—LEGAL MAXIM.

WHEN we read in the 7th verse, "And God made the expanse," the question naturally arises, "When did He make it?" To this question almost everyone will reply, "On the second day, the day on which the command, 'Let there be an expanse,' was uttered." But is it certain that this is the right answer? Clearly we are not necessarily committed to it; for the text nowhere states, either expressly, or by necessary implication, that the effect was produced on the day on which the command was given; and if, as we are endeavouring to show, the words are added, not as part of the narrative proper, but by way of an independent explanation, there is, obviously, still less reason why we should of necessity be obliged to adhere to such an interpretation. Is there, then, anything in the context to show that the writer did *not* mean that the expanse was formed on the second day?

If we turn to the 3rd and 4th verses, we read as follows:—

"3. And God said, Let there be light: and there was light. 4. And God saw the light, that it was good: *and God divided the light from the darkness.*"

Here again the form of narrative is similar, and here again we are faced by the same question, "When did God divide the light from the darkness?" Are we bound—or, indeed,

are we entitled—to interpret the 4th verse as meaning that the process of dividing the light from the darkness, which it relates, took place on the first day—the day on which the command related in the third verse was uttered? Biblical scholars and critics have hitherto almost unanimously assumed that such is the meaning of the text. Let us see whether they are right.

When we turn to enquire what is the nature of the alleged division between light and darkness, we receive a perfectly clear answer. The division referred to is the division which separates day from night. That this is so is proved by the 5th verse, which identifies the division referred to by stating that "God called the light Day, and the darkness He called Night."

Now, however much, or however little, astronomical knowledge we may choose to impute to the author of the first chapter of Genesis, it will be readily admitted that we must at all events credit him with the knowledge that the light which distinguishes Day from Night emanates from the Sun. Equally clear is it that we must credit him with the knowledge that the division between Day and Night is due to the Sun and Earth alternately facing, or not facing, one another. Whatever notions we may choose to impute to him as to the shape of our planet, or her relations to the Sun; whether we assume that he believed the Earth to be flat or spherical; whether we contend that he conceived of the Earth as travelling round the Sun, or of the Sun as travelling round the Earth, can make no difference to our conclusion upon this point. Daily observation must have taught him that the division between "the light which God called Day, and the darkness which He called Night," is due to the alternations of the relative positions of the Sun and the Earth.

Now, it is common knowledge—in fact, it is the point in the chapter which is, perhaps, more frequently attacked than any other, and the point to which Canon Driver especially takes exception—that, whereas the production of light is the

subject of the command uttered on the first day, the Sun, Moon, and Stars are not mentioned before the fourth day. But this being so, and seeing that the division between light and darkness related in the 4th verse is expressly identified with the division between Day and Night, and further that the author must be taken to have known that this latter division is caused by the alternations of relative positions of the Sun and the Earth, and would not in the absence of the Sun exist at all, we might have reasonably assumed, even if the narrative had contained no express statement upon the point, that the division between light and darkness referred to in the 4th verse is not intended to be understood as having taken place prior to the formation of the Sun, which latter event, as we have seen, is represented not to have been effected before the fourth day.

We might safely have made this assumption, even if we had had nothing but probability to guide us. But it so happens that we have no choice in the matter; for the interpretation, thus incidentally supported by probability, is actually necessitated by the text itself. We have only to turn to the 17th and 18th verses to find the order of events which we have assumed positively asserted :—

"And God set them [the sun and the moon] in the expanse of the heaven to give light upon the earth . . . *and to divide the light from the darkness.*"

In other words, the event recorded in the 4th verse, which, at the first blush, we might have understood to be represented as having happened on the first day, is, on a closer inspection of the text, found to be expressly stated not to have happened before the fourth day.

Nor is it open to our opponents to suggest that the text represents that there were two distinct divisions of light from darkness, one on the first day and another on the fourth day; for, as we have seen, the 5th verse, by identifying the division recorded in the 4th verse with the division between Day and Night, prohibits such a suggestion.

Hence, it is clear that the explanatory passage contained in the 4th and 5th verses relates events which are represented to have happened, not only not on the first day, but certainly not prior to the fourth day.

But now observe. When we read on to the 6th verse, the narrative proper is again resumed. In the 6th verse (in which the return to the narrative proper is again marked by the introductory "And God said") the author proceeds to relate what happened on the second day; so that the explanatory passage—"And God divided the light from the darkness, and God called the light Day, and the darkness He called Night"—is *anticipatory*, and is, as it were, *in a parenthesis*. This circumstance is of itself almost sufficient to force the explanatory interpretation upon us; indeed, it affords the key to the whole chapter. The explanatory passages not only form no part of the narrative proper, but are anticipatory, and relate events which are represented to have been fulfilled subsequently—long subsequently, it may be—to the events related in the narrative proper—namely, the commands pronounced on the six days, and the Rest on the seventh day.

What we have thus found true of the explanatory passage contained in the 4th and 5th verses, we also find to be true of others of the explanatory passages.

If we turn to the 26th and 27th verses, we read as follows:—

"26. And God said, Let us make man in our image, after our likeness. . . . 27. So" (Revised Version "And") "God created man in His own image, in the image of God created He him; *male and female created He them.*"

Here once more the form of narrative is similar, and here again we are faced by the same question as before, "When did God create man?" Are we bound to interpret the 27th verse as meaning that the events which it relates took place on the sixth day, the day on which the command related in the 26th verse was uttered? Here, again, as in the former case, the 27th verse contains a statement which shows that

such an interpretation not only is not obligatory, but is not even tenable; we refer to the words "male *and female* created He *them*." It appears from the 20th, 21st, and 22nd verses of the second chapter, that Woman did not come into existence until some time (how long is not stated) after the *seventh* day; hence it is clear that the 27th verse of the first chapter, so far, at all events, as relates to Woman ("male *and female*"), narrates an event which is represented to have occurred not on, but subsequently to, the sixth day—in fact, that an undefined interval took place between the events of the 26th verse and the events of the 27th verse.[1]

And here once more, when we read on, we find that the narrative proper is again resumed. In the 2nd verse of the second chapter the author proceeds to relate what happened on the *seventh* day; so that everything interposed between the 26th verse of the first chapter and the 2nd verse of the second chapter is again anticipatory, and is, as it were, in a parenthesis. Thus once more we find the explanatory interpretation forced upon us. Once more we find that the

[1] It has been objected to this argument that either it assumes that the first and second chapters of Genesis were written by the same author—an assumption which is absolutely negatived by modern criticism; or else, that it is unsound in attempting to deduce the meaning of one author from the words of another. I answer that the objection cannot be sustained. Admitting, as I do, that there are the strongest reasons for believing that the *Elohistic* and *Jehovistic* portions of Genesis emanate from different authors, and that there is no evidence that the Jehovistic author was acquainted with the Elohistic passages, I must, of course, admit that I am not entitled to argue from the words of the Jehovist as to what he understood to be the meaning of the Elohist.

But the objection leaves me face to face with the almost equally important question of the state of mind of the *Redactor*, who pieced the two narratives together. I am no more entitled to assume self-inconsistency on his part, than I am entitled to assume self-inconsistency on the part of the original authors. Until the contrary is proved, I am bound to assume that, in piecing together the various portions of the narrative, he did so in the belief that he was compounding a narrative which, as an aggregate, was consistent with itself. And hence, although as against the original authors I may not, as against the Redactor I both may and must, argue from the statements contained in one part of the aggregated narrative to the meaning of statements contained in another part.

explanatory passage not only forms no part of the narrative proper, but relates events which are represented to have been fulfilled subsequently—long subsequently, it may be—to the events related in the narrative proper.

The same conclusion with reference to the explanatory interpretation, and the dates to which the explanatory passages relate, is forced upon us by yet further considerations. If we again turn to the 20th and 21st verses, we are once more confronted by the same question, and once more receive a similar reply. We there read :—

"20. And God said, Let the waters bring forth abundantly the moving creature that hath life, and let fowl fly above the earth in the open expanse of heaven. 21. And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind."

In the 21st verse there is one word which at once arrests attention, and here, again, shows that the writer did not mean that the effects mentioned in the 21st verse were fulfilled on the fifth day, the day referred to in the 20th verse, and on which God pronounced the law, "Let the waters bring forth." This all-important word is, of course, the word "moveth." It is the present tense of this word which supports our contention. The passage clearly was written at a date long after that at which the writer represents the law to have been pronounced. Here, again, the interval is undefined. But, whatever that interval may have been, the force of the present tense "moveth," so far as it affects our argument, remains the same ; for it refers to the date at which the passage was written, and not to the date at which the law was pronounced. Convert "moveth" into its equivalent "is moving," and the force of the argument will at once become clear. Bear in mind that the writer's primary object was to impress upon his readers the fundamental religious doctrine that God was the Author of *all the phenomena which they saw in existence around them*, and the force of the present tense will be readily appreciated.

If to this argument it be objected that the present tense "moveth" *may* be used, not in the definite, but in the indefinite sense, meaning "every living creature *whose attribute it is to move*," without conceding the point we reply that, apart altogether from the word "moveth," there is yet another consideration which equally forces upon us the same conclusion as that which we deduced from the present tense of that word. Pass for the moment from the fish to the fowls, and consider the expression "every winged fowl." It will be readily admitted that these words mean "every *individua.* fowl," and not "every *kind* of fowl;" for not only is this the natural meaning of the expression, but the words "after his kind," which immediately follow, fix this as the only possible meaning. "Every *individual* after his kind" is sense; "every *kind* after his kind" would be nonsense. Now, this being so, the expression "every winged fowl" must either mean "every fowl that was living at the time when the author of Genesis wrote," if we take "moveth" in its strictly present tense, as equivalent to "is moving"; or else, if we treat "moveth" as an indefinite tense, the expression is wider still, and includes every individual fowl that had ever lived, as well as those which were alive at the date when the narrative was written. But, whichever interpretation we adopt, it is clear that those which were living at the date when the narrative was written are included, for "every individual fowl" is a comprehensive expression; "it is God," says the writer, "who is the Author of *every one of them*."

Now, it is clear that it cannot be intended that those which were living at the date when the narrative was written were made by God on the fifth day; and it is equally clear that it cannot be meant that those particular fowls were produced by some "carpenter-like" process, for the writer must have had an everyday experience to the contrary. What, then, is the meaning of the 21st verse? There is no escape from two inevitable conclusions: first, that the 21st verse is simply an explanation of what was the effect of the pronouncing of the

law narrated in the 20th verse—that it is simply an elaborated "and it was so"; and second, that it is not represented that that law took effect (completely, at all events) on the fifth day, but that, on the contrary, it is represented as still in active operation at the date when the narrative was written. The 21st verse is, in fact, an explanatory parenthesis.

When we turn to the description of the sixth day contained in the 24th and 25th verses, we find that the same considerations lead to the same conclusions. These verses are as follows:—

"24. And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so. 25. And God made the beast of the earth after his kind, and cattle after their kind, and everything that creepeth upon the earth after his kind: and God saw that it was good."

Here, again, the same arguments apply, but with additional force in consequence of the "and it was so" of the 24th verse, words which necessarily imply that the command was obeyed, and consequently that the 25th verse is merely an explanatory adjunct to the 24th. Thus the present tense "creepeth" gives rise to the same conclusion as that which we based upon the present tense "moveth"; the words "after his kind," and "after their kind," once more compel us to the conclusion that the writer is speaking, not of species, but of individuals; and hence we arrive at the same conclusions as before.

Now, it has already been pointed out that in the descriptions of the first and third days no question between the constructive and explanatory interpretations arises, for no words are used that could suggest any formative *act*.

"God said, Let there be light, *and there was light*"; "God said, Let the waters be gathered together, *and it was so*"; "God said, Let the earth bring forth, . . . *and it was so, And the earth brought forth.*"

In these cases, as already pointed out, the *word* of God is clearly represented as the only operative agent.

We have seen, moreover, that the description of the second day is identical with the descriptions of the first, fifth, and sixth

days in this respect—namely, that the events recorded in the 7th verse ("And God made the expanse") are inserted by way of parenthetical explanation, and not as part of the narrative proper. From these considerations it is fair to assume, (in fact it would be illegitimate to assume the contrary,) that the true interpretation of the second and third days (each of which we have found to be essentially identical with the descriptions of the first, fifth, and sixth days in those respects in which the fulness of the narrative permits a comparison) is also, *mutatis mutandis*, essentially identical with the same descriptions in those respects in which the succinctness of the narrative forbids the application of actual test. But we have just seen that the events described in the explanatory passages attached to each of the first, fifth, and sixth days not only may, but must, be interpreted as relating events which are represented to have happened long after those respective days. Hence we are not merely justified in assuming, but are in fairness compelled to conclude, that the events described in the explanatory passage contained in the 7th verse are not represented to have taken place (by which is meant, *to have been completed*, however soon the law pronounced may have *commenced to operate*) on the second day; and similarly, that the "and it was so" of the 9th verse, and the narrative of the events recounted in the 12th verse, ("And the earth brought forth grass,") are not intended to mean that the effects of the commands uttered on the third day were fulfilled on that day, but, on the contrary, that an undefined interval intervened.

The fourth day only remains to be considered with reference to this point, for the question obviously does not arise, or is not, for our present purpose, of much material importance, with reference to the first day; and with regard to the fourth day our conclusions are once more the same; for the arguments which have been advanced with reference to the other days apply with increased force to this day, in consequence of the "and it was so" of the 15th verse.

Hence we conclude once more, that the 16th, 17th, and 18th verses are explanatory, and (by the analogy of the 4th, 5th, 21st, 25th, and 27th verses) that the events mentioned in these explanatory verses are not represented to have been completed on the fourth day, but at some subsequent date.

What, then, to sum up the foregoing argument, are our conclusions as to the narrative contained in verses 3 to 27 (inclusive) of the first chapter of Genesis? We have found that the history of the Formation of the Universe described in these verses is divided into six days; that on each of those days God is represented to have pronounced one or more commands—to have enunciated one or more laws; that it is represented that the *Word* of God, enunciating those laws, was the sole and only operative agent in the production of the various phenomena described; that the effects of the pronouncing of those laws in the production of such phenomena are explained in some detail, and with the repetition characteristic of early writings, but that it is not represented that such effects were fulfilled on the very days on which the respective laws were pronounced; on the contrary, that in respect of the three days (the first, fifth, and sixth) in which the effects are explained with sufficient elaboration to give us any clue as to what is the meaning of the narrative upon this point, it is represented that such was not the case; for it is represented, in the case of the division of light from darkness, that such division, though mentioned in the explanatory passage attached to the description of the first day, did not take place, at all events before the fourth day; and in the case of Woman it is represented that she was not produced until after an interval, the length of which is not defined; while, in the case of water-life and land-life, the laws which were pronounced on the fifth and sixth days are represented to have been still in active operation, and responsible for the effects which were still taking place, at the date at which the narrative was written. From which considerations it appears that, not only is Mr. Herbert Spencer's

"Carpenter-theory of Creation" altogether inconsistent with the Bible narrative, but also that the first chapter of Genesis flatly negatives the commonly accepted notion that the work of the Formation of the Universe, as we know it, was physically accomplished in six days—was finished, that is, in any other sense than that in which the word "finished" is used in the 1st verse of the second chapter :—

"Thus" (Revised Version "And") "the heavens and the earth were finished, and all the host of them. And on the seventh day God ended His work which He had made; and He rested on the seventh day from all His work which He had made."

In the six days God pronounced all the laws upon which the production of phenomena depends ; and as those laws were (as we have seen) the only operative agents of production, the work of producing was clearly complete as soon as the laws had been pronounced. Nothing more remained to be *done*, but for the Deity to rest, and allow the laws which He had pronounced time to take effect, and bring into existence the various phenomena which they have produced, and are still producing to-day. How long an interval elapsed between the pronouncing of the laws and the first appearance of the resulting phenomena, is not stated in the Bible ; and if Science avers that countless ages must have passed between the first appearance of light, and the first appearances of vegetable and animal life on our planet, she tells us nothing that is contradictory to the teaching of Religion, for Religion is simply silent on the subject.

Such, then, is the only possible interpretation of the "six days" narrative. It is arrived at without doing violence to the meaning of a single word ; and it gives to every sentence its true position in the narrative—that position, namely, which, regarding the narrative as a whole, is obviously in accordance with the intention of the author. The only word, the meaning of which can in any sense be said to have been forced, is the word "and" ; and even

in that case the rendering here advocated is by no means necessary to the interpretation advanced. In extending its meaning as above suggested, we have done it neither more nor less than justice. No one has ever yet objected to its being rendered "so" in the 27th verse of the first chapter and "thus" in the 1st verse of the second chapter; and it is, therefore, a little difficult to understand on what ground objection can be taken to giving it a similar rendering in other verses, in which it is similarly situated. But if any one thinks otherwise, let him simply drop that extension out of the argument. Let him consider that the authors of the Authorized Version were wrong in their renderings of "so" in the 27th verse of the first chapter, and "thus" in the 1st verse of the second chapter. Let him now, for the first time, take an objection which has never been raised before; and let him insist that "and" shall in every case be the only rendering. Even if this be done, it will be found on examination that the contention here put forward remains wholly unimpaired. The rendering of the word "and" which has been here suggested in no way alters the sense; it is solely valuable as *emphasizing* a meaning which, in any case, is the only possible meaning of the text.

We find, therefore, that the explanatory interpretation, which we have thus examined, is the only tenable interpretation of the first chapter of Genesis. And if so, it follows that the Bible cosmogony conflicts with the scientific cosmogony neither in point of time, nor in point of manner. Not in point of time, because the text states only that in the six days the commands, or laws, were uttered, by virtue of which the resulting phenomena came into existence; and does not state at what particular dates the resulting phenomena first appeared, beyond impliedly stating the strictly scientific fact, that those phenomena did not make their appearance until dates posterior to the pronouncing of the laws. Not in point of manner, because the text represents that the pronouncing of the laws was the sole operative

factor in the production of the resulting phenomena. And as Science insists that every phenomenon has been brought into its present condition by, and solely by, the operation of some law or laws, it is obvious that the two statements exactly coincide as regards manner. Both authorities agree in asserting that existing phenomena are not products of any special acts of formation on the part of the Creator, but are traceable to the action of Law.

Upon this last point it is curious to observe that here, as in so many other cases, Religion has actually forestalled the very terminology of Science. Recall once more the opening words of St. John's Gospel :—

> "In the beginning was the Word, and the Word was with God, and the Word was God. . . . All things were made by Him ; and without Him was not anything made that was made."

Here the word which is translated " Word " is, in the original, *Λόγος* (*Logos*) ; in other words, Religion attributes the making of all phenomena to the operation of *Λόγος*.

Turning now to Science, she, as has just been remarked, attributes all phenomena to the operation of Law. Thus, in respect of the making of the Universe, Law is to Science what (according to St. John) the *Λόγος* is to Religion.

Now, the word " Law " is derived from the English word " Lay," the primary idea of Law being that which is laid in order, or laid down as a command ; and " Lay " is the same word as the German *Legen*, and the Greek *Λέγειν* (*Legein*) ; and *Λέγειν*, again, stands to *Λόγος* in the same relation as that in which " Lay " stands to " Law "—the two words are, in fact, philologically identical. Hence we see that *Λόγος* is philologically the same word as " Law."

Now, the coincidence here is well worth noting. Science attributes the formation of all phenomena to Law ; Religion attributes the formation of all phenomena to *Λόγος* ; and Law and *Λόγος* are philologically one and the same word. Here, as in so many other cases, the exact identity between the beliefs of Religion and the beliefs of Science extends

down to minute details of terminology. Here, too, as so often elsewhere, Religion has led the way, and Science, after centuries of ignorance and doubt, has tardily, but, in the end, unreservedly, followed.

We see, then, first, that the "explanatory interpretation" is the only tenable interpretation of the first chapter of Genesis; and, secondly, that that interpretation brings the chapter into exact harmony with the cosmogony of Science as regards both the time occupied by the Formation, and the manner in which the Formation was effected. In order, however, to place before ourselves as vividly as possible the full force of the arguments by which this interpretation is supported, it will be well, before passing on, to reverse the picture, and observe how entirely the reasons which support the explanatory interpretation, negative the rival "constructive interpretation."

Those who insist upon forcing upon Religion this unscientific rendering of the first chapter of Genesis must remember that, in so doing, they are taking the following liberties with the text: In the first place, they are insisting upon an interpretation which renders the most prominent and characteristic portion of the narrative ("And God said") not merely meaningless, but contradictory to the main doctrine which the narrative is obviously and primarily intended to support. According to that interpretation God ceases to be omnipotent, and becomes fallible. In thus belying its own principal term, "Elohim," this interpretation impales itself upon a suicidal dilemma.

In the next place, the interpretation draws an unexplained, and inexplicable, distinction between the three commands which were obeyed, and the four commands which (according to it) were disobeyed. And this very obvious absurdity lands us once more in a still more absurd dilemma; for in the case of three out of the four disobeyed commands, the insertion of the words "and it was so" (which, as we have seen, can only be referred to the commands themselves) declares—by a

hopeless self-contradiction—that those disobeyed commands were not disobeyed. Apart, therefore, from the absurdity of the meaningless distinction, we must, if the constructive interpretation is to stand at all, in each of these three cases expunge from the text the one, or the other, half of the narrative. Either the commands must disappear, or the acts (which this interpretation attributes to the Deity) must be ignored; but both—so long as the "and it was so" remains—cannot stand.

Once more, we find this interpretation condemned by one after another of those most competent to judge. Every contributor to the Bible, who has pronounced an opinion on the subject, has consistently negatived the constructive interpretation, and has adopted the rival interpretation. Those, therefore, who persist in demanding that we shall accept the usually adopted rendering, as the true interpretation of the text, must recollect that they are asking us to act in direct defiance of the unanimous testimony of the highest authorities on the subject.

And finally, the constructive interpretation necessitates the excision of several further most important portions of the text. Not only are its supporters compelled to strain the present tenses "moveth" and "creepeth" so as to give them a forced and non-natural meaning; not only are they compelled to make the first chapter inconsistent with the second,—an alleged inconsistency which exists nowhere outside the imaginations of heated controversialists; but they must bodily expunge from the narrative the expressions "after his kind" and "after their kind," expressions to which the author attached such importance that he has inserted them no less than seven times. Yet nothing can be clearer than the fact that, if the popular interpretation is to stand, these must go. As long as they remain the constructive interpretation is simply an impossibility. For while they are retained it must be admitted that the narrative is speaking, not of species, but of individuals; and this being so, unless we choose to give

to the expression "every individual" some meaning wholly different from its natural and, indeed, only possible, meaning, we must perforce admit that the passages, which we have distinguished as "explanatory," are not intended to refer to the respective dates on which the laws are represented to have been uttered; and we must simultaneously admit that the "Carpenter-theory" of the Formation is absolutely negatived.

Thus we see that every consideration which supports the explanatory interpretation negatives its rival. We find the latter condemned on every ground. It belies the main doctrine of the Bible, and its own principal term, "Elohim." It contradicts itself. It is negatived by the most competent critics. And it can only be rendered tenable at all by bodily excising all the most prominent portions of the text.

To a scholar of ordinary intelligence it certainly does seem a little arbitrary—not to say unreasonable—that he should be asked to take such liberties as these with his text. That the plainest language of an ancient author should be occasionally subjected to a moderate amount of torture, in order to meet the wishes of his interpreters, is doubtless a debt which antiquity owes to the improved mental calibre of the present day. But this literary licence should, surely, be confined within reasonable bounds. We cannot, as scholars—whatever we may do as controversialists—habitually ignore those portions of the narrative which the author has laboured to express with a special emphasis. A seven-fold reiteration in the space of five verses cannot have been entirely unintentional on his part; and it must not be treated as wholly meaningless on our's. And when we see the most prominent and most characteristic portions of the text bodily disappearing before the pruning-knife of pseudo-criticism, in order to support the preconceived notions of the pseudo-critic, we may perhaps be pardoned if the picture recalls to us, not without a smile, reminiscences of schoolboy days, when monstrosities of mistranslation rested for their slender support upon the desperate

remedy of supplying a gratuitous negative. That case, however, though similar to the present case in respect of the recklessness of the remedy applied, was in all other respects its direct antithesis. There the misdemeanant was intellectually *in extremis*, and his misdemeanour was the product of despair. Here the literary outrage is voluntarily perpetrated without reason, and therefore without excuse. There the act was prompted by a genuine, if blundering, desire to convert nonsense into at least a semblance of sense. Here, by a strange obliquity, the process is reversed, and all these outrages are perpetrated in order that a narrative of sublimely scientific truthfulness may be wantonly perverted into self-contradictory nonsense.

Upon these materials we have to make our choice. Shall we, in company with the old Hebrew authors, be content to give to every word of the text its true and natural meaning; and, in so doing, to find every word instinct with scientific significance? Or shall we, with the pseudo-critics of to-day, blot out from the narrative its eight-times repeated "*God said*"; excise its seven-fold "*and it was so*"; convert its present tenses into past tenses; aud change its "*Almighty*" into "fallible"? And, having done all this, shall we arbitrarily force upon the mutilated remains a "carpenter" meaning which, though perhaps rendered *possible* by this process of wholesale amputation, is still as far as ever from being demonstrated to be even the probable meaning of the author? Let those who can choose this latter alternative. But while they claim to have established their contention, let them remember that their success—such as it is—has been achieved, not by the exposure of error, not by the triumph of reason, but by a literary massacre unparalleled, in point of atrocity, even in the bloodstained annals of Biblical criticism.

CHAPTER XIII

GASEOUS MATTER

"Hunc spiritum, incognitum hactenus, novo nomine *Gas* voco."—VAN HELMONT.

THE extraordinary subtlety of Thought is nowhere so strikingly emphasized as when it is brought into competition with the corresponding subtlety of Speech. Wonderful as is the apparent comprehensiveness of language, the flexibility and rapidity of movement which characterize the intellectual processes are so immeasurably greater, that words cannot possibly keep pace with ideas. There is a constitutional inflexibility about Speech, to which Thought is an entire stranger. Even at the present day, with all the resources of the richest and most versatile of modern languages at our command, we are constantly being brought face to face with ideas for which no exact verbal equivalents have been provided. The practical impossibility of inventing a new sound for the expression of every new shade of thought, as it comes into being, has left us with a whole host of mental conceptions, to which no corresponding verbal symbol has been exclusively appropriated. In such cases the best that can be done is to make use of the nearest available symbol; and, as a consequence, it not infrequently happens that the meaning thus intended to be conveyed is very different from the original and natural meaning of the symbol employed. As illustrations of this tendency we may cite two instances, chosen, the one from modern theology, and the other from modern science.

The most important, as it is the most characteristic, of all theological ideas is that which is usually expressed by the word "spirit." Spiritual life, spiritual death, spiritual world, are the very central terms of modern theology. But what is "spirit"? If we examine the word, we find, of course, that it is derived from *spirare*, "to breathe," and means nothing more nor less than "breath." Ancient metaphysicians perceived that a living animal possesses something which a dead animal does not possess. As long as life lasts, breathing continues; the instant that life comes to an end, breathing ceases. Therefore, they argued, the vital principle is inseparably connected with breath—it is breath. And so they called this vital principle "spirit"—that is, breath.

Now, when the modern theologian uses the term "spirit," the idea which he intends to express, not only is not synonymous with breath, but even excludes the idea of breath altogether. Yet such is the congenital inflexibility of language, that this totally transformed idea—in spite of the fact that it is one of the most important of all theological ideas—has no distinctive symbol appropriated to it; and if we desire to express it, we are compelled to use, as the nearest available symbol, a word which, so far from meaning what we are endeavouring to express, actually signifies something which we mentally exclude altogether from our meaning. We mean something which does not breathe; and we call this something "spirit"—breath. If we wish to realize to what an immeasurable distance thought has in this instance wandered away from language, we need only note how vast is the transition from the original and natural meaning of the term "spirit" to the meaning which Religion intends to convey, when she tells us that "God is a Spirit."

Turn to Science. What is Electricity? A fluid, we are told. Yet, as Mr. Herbert Spencer has pointed out,[1] not one of the Physicists who daily use the term "electric fluid"

[1] *Essays*, vol. ii. p. 168 (1891 ed.).

believes for a moment that electricity is a fluid within the natural meaning of that term. That electricity is some "mode of motion" is highly probable—indeed, practically certain. But until our ideas on the subject have become more fixed, and until some new term shall be coined which will correctly express those ideas, electricians continue —or, at all events, have until recently continued—to use the incorrect term "fluid," as being the most convenient—in other words, the nearest available—symbol at their command.

Yet, as in the case of "spirit," so here, the natural meaning of this nearest available symbol not only does not coincide with the idea intended to be expressed, but actually denotes something which we mentally exclude from that idea. The term "fluid" is, in its natural sense, applicable only to a substance. Electricity we now know to be not a substance at all, but a mode. And yet, so strong is the congenital conservatism of language—so far does speech lag behind the progress of thought—that we still continue to speak of the "electric fluid."

Observe, now, one of the consequences which is almost certain to ensue in the remote future from this antagonism between the progressiveness of thought and the conservatism of language. Project the imagination forward to a date in the far distant future, when the English language shall have become a dead language, and its nineteenth-century literature shall have long been buried in the forgotten past. Suppose that at such a date some antiquarian should chance to light upon two documents, written in the English language, and belonging to the nineteenth century—the one a theological discourse on Spiritual Life, the other a scientific treatise on Electricity. Would he not, if he judged of the meaning of the language used in these documents from purely philological considerations, naturally conclude that our nineteenth-century ideas both of Theology and of Science were hopelessly unscientific? "What strange notions," he would say, "this

ancient theologian held concerning Religion; he evidently thought that God is 'breath.'" "What abysmal ignorance," he would argue, "this antiquated physicist betrays; he seems to have imagined that electricity is a substance." Who can doubt that such would be the antiquarian's criticism? And who will dare to impugn that criticism as unjust? For would not the antiquarian be following the example which we ourselves have set him? Would he not be doing to our literature exactly what we are now doing to the dead literature of the past? And yet we know that his criticism would be unsound. It is certain that he would be wronging both our modern theology and our modern science. For his conclusions would be directly at variance with what we know to be the facts.

Should not this last consideration warn us that, in attempting to decipher the writings of an ancient author, it is not safe to rely solely on philological considerations? Should it not teach us that, for purposes of interpretation, the science of philology, blindly followed, is not always a certain guide? And does it not suggest, with an emphasis which is almost irresistible, that, in cases of difficulty or doubt, we shall do well to supplement the general principles of extrinsic evidence, by turning to the particular intrinsic clues which the context itself supplies? By those who duly consider the foregoing remarks it will probably be admitted that the adoption of such a course is in all cases permissible. But there are certain specific cases in which it can be shown to be, not merely permissible, but absolutely imperative. Let us explain.

So vast is the antiquity of language, and so gradual the introduction of new words, that, in the immense majority of cases, the origin of any given word lies hidden in impenetrable darkness. It is seldom that we can point to a word and say, "That man was its author, and that year was the date of its birth." There are, however, a few rare exceptions to this general rule. There are certain words

which, possessing little, or no, philological value, are nevertheless of particular interest to the student of Science, because, by reason of their known authorship, they stand out as landmarks in the history of speech, and thus serve as beacons to mark the rise of the flowing tide of thought. Such a word, in Theology, is the term "Agnostic," first suggested by the late Professor Huxley in the year 1869.[1] Such a word, in Science, is the chemical term "Gas."

The history of this latter truly epoch-making word is well known to all students of Science. It was invented by the famous Dutch philosopher—half chemist, half alchemist—Jean Baptiste Van Helmont, in the early part of the seventeenth century,[2] and it marks an entirely new departure in the progress of chemical invention and research. What the science of chemistry must have been without it will be to some extent realized, when it is remembered that it denotes one of the three grand divisions into which all substances, in respect of their constitution, are classified. It will be recollected that in the chapter on the Nebular Hypothesis it was mentioned that, for the reasons there stated, all substances assume one of three conditions—solid, liquid, or gaseous. In the absence, therefore, of Van Helmont's invention of "gas," one of the three great divisions of the physical Universe bodily disappears.

Now, although the three-fold division just cited is strictly correct, and was, for the immediate purposes for which it was made, sufficiently exact, it is, for the higher and more particular purposes of Science, inexact. The fact is that Science, in the first instance, classifies all bodies in respect of their constitution, not into three divisions, but into two. According to the rigidly scientific classification, all substances are divisible into two grand genera—the one *solid*, the other *fluid*.

[1] Huxley's *Collected Essays*, vol. ix. p. 134.

[2] Van Helmont expressly says: "Hunc spiritum, incognitum hactenus, novo nomine *gas* voco."

At first sight it may appear as though this two-fold classification were at variance with the three-fold classification already given; for the term "fluid," here employed, finds no place there; while the terms "liquid" and "gaseous," which were there used, are absent here. Such, however, is not the case. The apparent variance has no existence in reality. The explanation lies in the fact that the genus "fluid" is subdivided into the two species—*liquid* and *gaseous*. And thus, according to the strictly classical formula, all substances are divided into two genera—solid and fluid; while the latter genus—fluid—is again subdivided into two species—liquid and gaseous. Clearly, therefore, a scientist who should divide all bodies into solid and fluid will, from the scientific point of view, have given a complete classification—a classification, that is to say, which will include all substances and all conditions. And a scientist who, before the seventeenth century A.D., made such a two-fold classification, would have given the most complete classification which was then possible. For, prior to Van Helmont's famous discovery, the subdivision of the genus, fluid, into the two species, liquid and gaseous, was unknown.

Turn now to the text before us. If the author of the first two verses of Genesis desired to classify, in the most scientifically complete manner that was then open to him, all possible conditions of the Matter which he was describing, he ought to have mentioned the two grand genera, solid and fluid. We must not, of course, require him to use exactly these two scientific terms; but we must look for their theological equivalents. We shall expect to find the proper symbols of these two ideas, expressed in language less abstract, and more concrete. A glance at the text will satisfy us that this expectation is amply fulfilled. In the terms "the earth" and "the waters," which both occur in the 2nd verse, we clearly have the exact equivalents of the two genera which science distinguishes as solid and fluid.

Now, let us suppose that the author, writing, as he did, at

least some two or three thousand years ago, desired to express the idea "gaseous matter"—or, what is the same thing translated from chemical into astronomical terminology, "nebulous matter." Clearly, he could not express such an idea in terms, for the term "gas" had not then been invented. The only possibility open to him was to express the idea by means of a paraphrase. He must have given such a detailed description of what he meant, as would express the condition which modern science terms "gaseous."

What is that condition? A solid is defined as follows: "Having its constituent parts so compact or so firmly adhering as to resist the impression or penetration of other bodies; *having a fixed form.*" The last four words, italicized in the foregoing definition, show that solid is, in fact, the exact opposite of the expression "without form," occurring in the 2nd verse of Genesis. When, therefore, the author of the first chapter of Genesis states in the 2nd verse that "the earth was without form," he is stating, in the most exact terminology known to modern science, the proposition that the primordial condition of what is now solid matter, was not solid, but fluid.

Turning, now, to the subdivision of the genus "fluid" into its two species of "liquid" and "gaseous," we have to note that a liquid is defined as follows: "A substance of which the molecules, while not tending to separate from one another like those of a gas, readily change their relative position, and which therefore *retains no fixed form* except that determined by the containing receptacle." And, finally, a gas is thus defined: "A substance possessing perfect molecular mobility and the property of indefinite expansion." Thus we see that a solid has *a fixed form*; a liquid has *no fixed form*; while a gas has *no form at all.* And, consequently, the term "without form" is an exactly correct description, not merely of the genus, fluid, but also of the species, gaseous. The statement, therefore, that "the earth was without form," is the assertion, in language of exact scientific accuracy, that

the primordial condition of what is now solid matter was, not solid, not liquid, but gaseous.

But, according to the definition just given, a gas has a second characteristic besides formlessness. This second characteristic is *molecular mobility*. "According to the kinetic theory of gases, now accepted, the molecules of a gas are in a state of rapid motion." If, therefore, the author of the first chapter of Genesis desired to give, not merely a correct, but a complete, description of the gaseous condition, he ought to have added to his narrative this remaining factor—molecular mobility. We turn again to the text, and there once more we not only find the required characteristic, but we find it inserted just at the very point where the requirements of Science demand that it should have been inserted—namely, as a qualification of the generic term, fluid: "The Spirit of God *moved upon the face of the waters*." And when it is added, as already pointed out, that the Hebrew term, *rachaph*, which is here rendered "moved," expresses molecular motion, as opposed to molar motion, it must be admitted that the accuracy of the text, regarded as a scientific statement, is curiously exact. Clearly the term "the waters," as qualified by the addition of molecular motion, correctly describes, by reference to the second of its characteristics, what modern science would now term "gaseous matter." And the two expressions "formless earth" and "molecularly mobile waters," taken together, constitute a complete description, by reference to both its characteristics—its objective characteristic of formlessness, and its subjective characteristic of molecular mobility—of Matter in a gaseous condition.

Thus we find that in the 2nd verse of Genesis every requirement of Science is rigidly complied with. While classifying, with exact scientific accuracy, all Matter into two grand genera—solid ("the earth") and fluid ("the waters") —the author has been careful to add to his description of either genus a further description which exactly expresses, in the one case the objective, and in the other case the

subjective, aspect of the attributes of gaseous matter. He has in effect stated, by a method which, in the then absence of any term capable of expressing the idea "gas," was the most scientific method available to his hand, that both solids and fluids were, at the period which he is describing, in a gaseous, or nebulous, condition—which is precisely the condition postulated by the Nebular Hypothesis.

In the foregoing interpretation of the 2nd verse of Genesis there is one point which may be thought to require some additional confirmation. It will have been observed that we have treated the term "the waters" as not having the specific meaning of "water," but as having the more generic meaning of "fluid matter" generally; and by those who insist that an author may only be interpreted by philological considerations, it may be urged that in adopting this rendering we are taking an unwarrantable liberty with the text. To such a criticism there is a complete, if somewhat complicated, answer.

Note, first, the important fact of the word מַיִם (*mayim*) being used in the plural number. It is scarcely possible that the plural thus introduced can be without significance. If the writer had meant "water," it seems more than probable that he would have used the singular number. But if, in accordance with a well-known classical usage of the plural number, we understand the word to mean "water-like mass," "fluid matter," we are really doing less violence to the text, than if we insist upon ignoring the plural, by treating it as equivalent to the singular.

Note, next, that we are seeking to interpret a document of great antiquity, written in a dead language, upon one of the most abstruse and recondite problems that can engage the human intellect. There is, therefore, an *a priori* probability that an author, hampered by the poverty of such a language, while writing upon so recondite a subject, must have frequently found himself confronted by ideas to which no specific word had been appropriated. It is likely

that, in order to express an abstract conception for which no abstract term was then available, he would occasionally be compelled to make use of a concrete term, which, though not exactly expressing that abstract conception, yet denoted the most generic concrete representative of that abstract idea. Thus the term "the earth" obviously denotes the widest then available concrete representative of "solid matter." Thus, too, "the waters" clearly denotes the most generic concrete representative of "fluid matter." This, therefore, is just one of those cases in which, as we have seen, it is *permissible* to supplement purely philological considerations by contextual considerations.

Note, next, that the words "without form" (*tohu*), coupled with the idea of molecular motion expressed by the special word "moved" (*rachaph*), render a partial disregard for mere philological considerations not merely permissible, but *imperative*. For these words, being inconsistent with any other condition of Matter than the gaseous condition, conclusively indicate that the writer is attempting to describe the gaseous condition. And, inasmuch as no term to represent the idea "gas" had then been invented, he was obliged, by the obvious necessities of the case, to express his meaning by means of a certain straining of language. No other course was in the circumstances open to him; and consequently, in seeking to interpret the terms "the earth" and "the waters," which are the most important of the terms thus employed, we are imperatively compelled to look for their meaning elsewhere than in philology alone. We know for certain that these words are here being forced to bear a meaning which is not their natural philological meaning, but a strained, artificial meaning. And if we disregard this consideration we shall fail to decipher the author's true intent.

Observe, next, that the immediate context furnishes additional data, all pointing to the conclusion here advocated. That the use of the term "the waters," as employed in the 2nd verse, will correspond with the use of its companion

terms "the heaven" and "the earth" as used in the 1st verse, is an inference which most scholars will probably regard as irresistible. But we have already seen,[1] by a chain of reasoning which can scarcely be regarded otherwise than as conclusive, that "the heaven" and "the earth" of the 1st verse have a wide meaning, corresponding with the wide context in which they are there placed, (meaning, respectively, Space and Matter in relation to the Universe, that is, Space and Matter generically,) as opposed to the narrower and more specific meanings which these terms acquire in the narrower context of the 8th and 10th verses: "and God called the expanse, Heaven"; "And God called the dry, Earth." Reasoning, therefore, by analogy, we could scarcely avoid the conclusion, even if it were unsupported by other considerations, that "the waters" of the 2nd verse has the wide signification which is appropriate to the wide context, and consequently means "fluid" generally.

This expectation is fully justified by the facts. For upon turning to the 10th verse, we find that, when the author desires to express the idea "water," he speaks not of "the waters," but of "the gathering together of the waters"—an expression which, as will be shown more fully immediately, means the segregation of what remained of "the waters," after the solid matter which "the waters" originally contained had been eliminated. Consequently, it follows that the term "the waters" of the 2nd verse—like the companion terms "the heaven" and "the earth" of the 1st verse—has a wider and more generic meaning than the subsequent expression "the gathering together of the waters" of the 10th verse.

But now observe that the generic interpretation of "the waters" of the 2nd verse, which is so strongly recommended by the foregoing considerations, is rendered absolutely imperative by the further considerations to be now adduced.

[1] Pp. 129–133, *supra*.

For it can be shown that "the waters" of the 2nd verse are synonymous with "the earth" of the 1st verse. Let us state briefly the reasons which compel us to this conclusion.

We have seen that "the earth" of the 1st verse means Matter, using that term in the widest sense. Consequently, it obviously includes all forms and conditions of Matter. We have seen, too, that the primordial condition of this Matter is represented to have been gaseous, as is proved by the fact that the writer expressly attributes to it the three distinguishing characteristics of gas, namely, invisibility ("darkness was upon the face of the deep"); formlessness ("without form"); and molecular motion ("the Spirit of God vibrated").

It is further obvious that, as "the earth" of the 1st verse includes all Matter, it must include water as well as all other forms of Matter. Hence, it is evident that, whatever meaning we may give to "the waters" of the 2nd verse, the term means something which is comprised in "the earth" of the 1st verse.

If, now, we turn to the 9th and 10th verses, we shall observe that it is there represented that on the third day steps were taken for differentiating, and segregating, the solid from the fluid, or, in theological terminology, "the dry" from "the waters."[1] It should, moreover, be specially noted that this process of segregation is introduced with the words, "Let the waters which are under the expanse be gathered together unto one place, and *let the dry appear*." From the four words here italicized it is clear that, according to the author's notion, "the dry" (*i.e.* solid) had been in existence from "the beginning," and was comprised in the

[1] It should be here observed that the distinction between "wet" and "dry" (*i.e.* "fluid" and "solid"), which is at the basis of these two verses, has been somewhat obscured by the gratuitous interpellation of the word "land" after the word "dry." A glance at the Authorized Version will show that the original reads as follows:—

"And God said, 'Let the waters under the expanse be gathered together unto one place and let *the dry* appear.'"

The distinction here drawn is between "the dry"—*i.e.* "solid"—(יַבָּשָׁה, *yabbasha*), and "the waters"—*i.e.* "fluid"—(מַיִם, *mayim*).

original act of Creation ; but that, previously to the process of segregation here introduced, it had been so indistinguishably intermingled with the fluid that it *did not appear*, as differentiated from the fluid. In other words, it had been contained in "the waters" in a state of solution, or fusion.

But, this being so, it obviously follows that the term "the waters," being clearly intended to include solid, as well as fluid, Matter, must, as regards its subject-matter, be co-extensive with "the earth" of the 1st verse. The two expressions, in fact, denote, not two separate entities, but two aspects—or, rather, two characteristics—of one and the same entity, namely, gaseous Matter. In order to express this novel idea, the author has utilized the most appropriate verbal symbols that were then available for the purpose. The principal characteristics of gas, which he desired to describe, being, from the objective point of view, invisibility and formlessness, and, from the subjective point of view, molecular mobility, he has selected the two most generic concrete representatives of these characteristics. Gaseous Matter, in its objective aspect, relating to form, is called "the earth"—the earth being the most generic concrete representative of form ; in its subjective aspect of molecular mobility, it is called "the waters," water being the most generic concrete representative of molecular mobility. And thus it becomes clear that the two terms, "the earth" and "the waters," are interchangeable. Either expresses, though under a different aspect, all that is included in the other.

Thus, on examination, all considerations are found to converge towards one conclusion—that "the waters" of the 2nd verse, not merely may, but must, be interpreted as meaning "gaseous Matter." Translated out of their theological terminology into the exact and literal scientific equivalents of the terms employed, the first two verses of Genesis run thus :—

"In the beginning the Almighty Being created Space and Matter. And Matter was then in a gaseous condition; for it was formless, homogeneous, and invisible. And the Spirit of the Almighty agitated with molecular vibrations the fluid mass."

Will any one allege that in this translation violence has been done to a single word of the text? And can any one point, in the whole range of scientific literature, to a more accurate description of the primordial condition of the physical Universe?

It is impossible to close this chapter without adding one word of comment upon the theological bearing of the indisputable fact that the idea of gaseous matter is to be found in the first two verses of Genesis. That the idea is there will scarcely be disputed by any candid critic who, in the light of the foregoing considerations, carefully examines the language employed in the text, and especially the three principal distinguishing gaseous characteristics of invisibility, formlessness and molecular mobility. On the other hand, few philosophers will maintain that Science herself had framed a clear conception of gas any considerable length of time before Van Helmont's discovery. The absence of any appropriated verbal symbol precludes such a contention. Consequently, when we consider that, putting the narrative at its latest possible date, the author of the first chapter of Genesis—whether consciously or unconsciously is wholly immaterial—anticipated Science in respect of one of her most recondite, and least obvious, chemical discoveries by at least some thousands of years, and has, in spite of all the difficulties of language which have been pointed out, succeeded in presenting so absolutely novel an idea in a form which precisely tallies with the postulates of the modern Nebular Hypothesis, we can scarcely avoid the conclusion that the narrative exhibits a scientific prescience which, as being truly pre-scientific, we can only call divine.

CHAPTER XIV

THE INORGANIC

"In the absence of a perfect balance of mutual attractions among atoms dispersed through unlimited space, there must arise breaches of continuity throughout the aggregate formed by them, and a concentration of it towards centres of dominant attraction."—HERBERT SPENCER.

AMONG the best known of the many objections which have been raised to the scientific accuracy of Religion's Cosmogony, is one which alleges that the first chapter of Genesis is scientifically inaccurate, in that it regards the Earth, instead of the Sun, as the centre of our Solar System. Now, although Religion is here suffering from a false accusation, inasmuch as the objection cannot for a moment be successfully maintained, yet it happens that in this case, as in so many others, Science has, by the very wrong which she has thus inflicted on Religion, unwittingly conferred upon her a signal benefit. For the charge thus put forward serves to draw attention to a fact, which might otherwise have been readily overlooked, but which is nevertheless of primary importance to a true understanding of the first chapter of Genesis. With a slight, but material, variation, the imputation is well founded. It is not true that the author regards the Earth as the *centre* of the Solar System. But it is true that he represents the Earth as occupying, for the purposes of his narrative, the point of *central interest* in the System.

And this representation is not only perfectly natural; it is also perfectly legitimate. Writing to mankind of the origin of the Universe, in so far as it practically affects man, the writer

speaks first of the origin and primordial condition of Matter generally ; and having done this, when he comes to describe the Formation, he passes, by the most natural of transitions, direct from the description of this primordial condition, to an account of the genesis, not of Neptune, Uranus, Saturn, Jupiter, or Mars, but of the Earth—man's home. In other words, the narrative of the Formation passes at one step from an account of the origin and early history of light, to an account of the formation of the Earth. It takes up the story at the point at which, according to Science, the detachment of the *terrestrial* portion of Matter was taking place. If, therefore, the text is scientifically accurate, we must look in it for statements which will correspond with the process thus supposed by Science. Let us see how far this expectation is fulfilled.

The first of such alleged changes is as follows :—

"And God said, Let there be light : and there was light. And God saw the light, that it was good : and God divided the light from the darkness. And God called the light Day, and the darkness He called Night."

The general scientific accuracy of this part of the narrative deserves a passing notice. The first perceptible effect upon diffused Matter, produced by the gradual loss of its contained motion, must, as we have already noticed, undoubtedly have been the production of luminosity. The general purport of the narrative, in introducing light as the first perceptible change in diffused matter, is, therefore, unimpeachable. But when from this general allegation we pass to the particular allegations contained in the above verses, we find an adherence to scientific truth so exact and rigid as to deserve the closest attention.

When the author of the first chapter of Genesis alleges that "God said Let there be light and there was light. . . And God divided the light from the darkness," he obviously asserts, by necessary implication, that light at its earliest stage was not divided from the darkness. Had the division

existed simultaneously with the first appearance of light, it would not have been necessary, or even possible, to subsequently effect the division; no process of "dividing" could have taken place if the division had existed from the first. Clearly, therefore, the narrative represents that there was a time, commencing with the first appearance of light, when there was no division between light and darkness; and that the division between light and darkness took place subsequently. We have already seen that this division is, in the 5th verse, identified with the division between Day and Night.

Reading, then, the 1st, 3rd, 4th, and 5th verses together, we find that the text represents that there were three stages in the history of light and darkness. First, a period of universal darkness; second, a period of light undivided from darkness; and third, a period of alternating light and darkness.

In order to appreciate the full scientific significance of these allegations, two points deserve special attention.

Note first, what has often been noted before, that the origin of light is mentioned prior to the origin of the Sun, Moon, and Stars. Whereas the command which produced light is attributed to the first day, the command in obedience to which the Sun, Moon, and Stars are represented to have owed their individual existences, is referred to the fourth day.

Note, next, what has been almost universally overlooked, that though light is represented to have come into existence before the Sun, Moon and Stars received their individualities, light is not stated to have preceded the existence of the Matter of which the Sun, Moon and Stars are represented to have been subsequently composed. That Matter, as we have seen, is alleged to have come into existence prior to the first day:—"in the beginning God created . . . the earth."

Now the statement that the earliest condition of Matter was one of universal darkness, coupled with the further statement that light, though not preceding the creation of Matter, did precede the formation of the Sun, Moon, and Stars,

constitutes a highly original conception ; there is nothing in the present constitution of the Universe at all likely to suggest the possibility, much less the probability, of such an arrangement. But when to these statements is added the yet further implied assertion, that at this period the light, though existing, was not divided from the darkness, it will be very generally admitted that the theory presented by the narrative must to any one unacquainted with the Nebular Hypothesis appear little less than incredible.

Yet, incredible as they may appear, every one of these alleged conditions is, according to the Nebular Hypothesis, undoubtedly true. Let us glance for a moment at the conditions which the Hypothesis supposes.

At its earliest stage the matter, which has since become differentiated into the various bodies constituting our Solar System, was, as we have seen, united in one mass of diffused gaseous matter extending in all directions, in an approximately spheroidal form, from the centre of the Sun to beyond the present orbit of Neptune. This single mass, at first formless, because invisible, and therefore dark, gradually, through loss of its contained motion, acquired luminosity ; and such luminosity, being at that stage radiated in all directions into surrounding space, was clearly undifferentiated from the primeval darkness, which it gradually subdued. Obviously, at the first stage in the production of light, there was, according to Science (as well as according to Religion), no division between light and darkness.

We have further seen that the equilibration of the centripetal and centrifugal forces, which necessarily ensued from the action induced by molecular attraction, must have resulted in the detachment from the parent mass of an equatorial ring ; which, eventually collapsing on itself, and acquiring an axial rotation of its own, while still retaining its orbital motion, formed itself into the planet Neptune. Now, it is obvious that so long as this body, which at the date of its detachment must have been luminous in approximately the

same degree as the parent mass, retained its luminosity to a degree equivalent, or nearly equivalent, to that of the parent mass, there must still have been no division between light and darkness. This must have been the case even after the detached body had acquired a spheroidal shape, provided that it still remained highly luminous. For while in this condition it must have radiated light in all directions ; and, consequently, that portion of surrounding space which, for the time being, was deprived of the light radiated by the parent mass, through the interposition of the detached mass, was nevertheless illuminated by the light which emanated from the latter.

But as soon as the more rapid cooling of the detached mass, consequent upon its smaller size, had diminished its luminosity to an intensity appreciably lower than that of the parent mass, then that portion of surrounding space which, for the time being, was screened from the light of the parent mass by the interposition of the detached mass, must have fallen into comparative shadow ; and thus the first division between light and darkness must have arisen—a division which must have become gradually intensified with the loss of each successive unit of light lost by the detached mass.

The same thing must have happened on the occasion of the detachment from the parent mass of each planetary ring. Thus, upon the detachment of the nebulous ring which afterwards formed itself into the Earth, the division of light from darkness, which constitutes the distinction between Day and Night, was gradually effected in the manner just indicated.

Obviously, therefore, the state of things supposed by the Nebular Hypothesis corresponds exactly, so far as light is concerned, with the narrative contained in the 1st, 3rd, 4th, and 5th verses. Clearly, in the history of our Earth, the three alleged stages of ubiquitous darkness, ubiquitous light, and alternate light and darkness, actually took place. Upon this matter the doctrine of Religion exactly accords with the theories of Science.

But when we pass on to consider the narrative of the second day, we find an accordance more extraordinary still; for we find, there recorded, the exact process by which Science alleges that the division between light and darkness, so far as our Earth is concerned, was in fact effected. Recall once more what that process was at the period to which the Bible narrative relates, namely, the date of the detachment from the parent mass of the terrestrial portion of Matter.

We have seen that the period of undivided light and darkness assumed by the Nebular Hypothesis not only lasted, so far as the Earth was concerned, whilst the Earth formed part of the parent mass, but continued after its detachment, so long as the Earth continued to be highly self-luminous; but gradually gave way to an alternation of light and darkness as the Earth's luminosity became appreciably less than that of the parent mass. The Earth, being smaller in bulk than the parent mass, parted with her contained heat and her consequent luminosity more rapidly; and from this more rapid loss of luminosity arose the ensuing division between light and darkness. But as such loss of heat must have been gradual, extending over an immense period of time, so must the corresponding distinction between light and darkness have been gradual. For a lengthened period the division must have been imperceptible; only as the terrestrial light was slowly lost, must the division between Day and Night have become gradually more and more pronounced.

Now, this loss of heat and light must, as we have seen, have been accompanied by a corresponding shrinkage of the mass. Every unit of light radiated from the Earth was measured by a corresponding contraction of the Earth's mass. And similarly, every unit of light radiated from the parent mass was marked by a corresponding shrinkage of that mass. So that, side by side with the gradually developing division between light and darkness, there went on a corresponding two-fold contraction on the part of the two luminous masses. On the one hand, the surface

of the Earth was continuously retiring from the surface of the parent mass ; and, on the other hand, the surface of the parent mass was continuously retiring from that of the Earth.

And now observe what was the effect upon the intervening space of this gradual shrinkage of the two masses. In proportion as the two surfaces retired from one another, the intervening space increased in size. That which, as regards the two material bodies, was a gradual shrinkage, was, as regards the intervening space, a gradual *expanding*. Every yard lost by the retreating matter was a yard gained by the continuously expanding intervening space. And thus the gradually developing division between light and darkness was marked by a correspondingly developing *expanse*.

Turn now to the account given in the 6th, 7th, and 8th verses, and observe how exactly the process which we have thus been tracing is there described :—

> 6. "And God said, *Let there be an expanse* in the midst of the waters, and let it divide the waters from the waters. 7. And God made the expanse, and divided the waters which were under the expanse from the waters which were above the expanse : and it was so. 8. And God called the expanse Heaven. . . ."

It would be scarcely possible to improve upon the exactitude with which the process supposed by the Hypothesis is here described. We have already seen that "the waters" is the equivalent of what Science would term Matter in a gaseous condition. And this being so, the process described in the above verses is obviously identical with the corresponding theory of Science. It would be strange that so exact a similarity should have been so persistently overlooked, were it not that two special causes have combined to conceal it. In the first place, it has been obscured by the curious mistranslation of "firmament" for the Hebrew word רָקִיעַ (*raqia*), in place of its true interpretation, "expanse." A glance at the marginal notes in the Authorized, as well as in the

Revised, Version will show that, in the opinion of the authors of either version, "firmament" *is* a mistranslation; for the marginal note in the Authorised Version is "Heb. Expansion," while that in the Revised Version is "Heb. Expanse." Why, therefore, the authors of the latter version should have chosen to follow the Septuagint version, στερέωμα, and thereby perpetuate a rendering which, on their own showing, they considered to be a mistranslation of the Hebrew word, is not very clear.[1]

And in the next place, the misconception which confines the meaning of the term "the earth," used in the first verse, to our planet, has obviously contributed to the misunderstanding. We have already discussed the reasons which compel us to give to that term the wider meaning which Science gives to the term "Matter." Those reasons appear to be conclusive; but it should here be added that the 6th, 7th, and 8th verses lend still further reasons for adopting that interpretation. For not only does this interpretation render these verses both intelligible and strictly scientific, but it avoids an absurdity into which the usually accepted interpretation necessarily leads its adherents. Observe what that absurdity is.

By the term "space" in the widest sense, is meant "extension" generally. Just as "time" expresses the idea of sequence, so "space" expresses the idea of co-existence.[2] But, in practice, by "space," as distinguished from "matter," is generally meant space which is apparently unoccupied; empty, or, rather, apparently-empty, space. Thus, to take a familiar instance, in reference to a furnished room it is customary to think and speak of the furniture as actually diminishing the space of the room. A disproportionately large piece of furniture is said to occupy too much space; and if additional space is required for any particular purpose,

[1] It is generally admitted that רָקִיעַ means "expanse." רקע (*raqa*), the root verb of רָקִיעַ, means "to expand."

[2] *First Principles*, pp. 163-4 (5th ed.).

the whole, or a portion, of the furniture is removed, in order, as we say, to make more space. Clearly, therefore, the term "space" is habitually used to mean "unoccupied space."

If this is true of Space generally, doubly true is it of the term "heaven." By "the heaven," as contrasted with "the earth," is habitually meant the space *which surrounds the earth.* The space which for the time being is occupied by the Earth is mentally excluded from the term "the heaven."

If we now enquire what is the difference between the terms "space" and "expanse," we find that the two are not quite synonymous. While the term "space" is purely statical, expressing a condition without any reference to its origin, the term "expanse" is to a certain extent dynamical, and has reference to the mode of origin of that which it expresses, implying that it has expanded,—that it is *the result of expansion.*

We have already seen how appropriate is this term to the process which the Nebular Hypothesis supposes to have taken place. "The heaven" being thought of as the space which surrounded the diffused body of matter, but which ceased with the boundaries of that matter, the formation of a fissure, or rent, within the body of the matter clearly gave rise to a new space, which did not exist as space before; and as this new space gradually expanded through the shrinkage of the matter by which it was environed, it became a space produced by a process of expansion, and is thus appropriately termed an "expanse." Read in the light of this interpretation, the command "Let there be an expanse" is perfectly intelligible. It relates to the formation of a new space, which did not exist as space before. And further, the terms in which the command is expressed are exactly appropriate. The new space thus formed was, in the strict sense of the word, and in a sense not applicable to "the heaven" of the 1st verse, an *expanse.*

Both these two attributes of intelligibility and appropriateness, which characterize and, by so doing, recommend our

interpretation, are wanting to the usually accepted interpretation. And, further, so great is the difficulty which the supporters of that interpretation feel upon this point, that they are compelled to disguise the defect by forcing upon the word "expanse" a non-natural meaning, which upon their own confession they know to be not its true, or, at all events, not its natural, meaning. The usually accepted interpretation assumes that "the earth" of the first verse means, not Matter generally, but our planet only. It further assumes, in spite of the indications to the contrary which have been pointed out, that the primordial condition of the Earth is represented as having been identical with its present condition so far as regards density and mass, and as having differed solely, or chiefly, in the two particulars of being in a state of darkness, and of the land being wholly submerged beneath the water. Those, then, who accept this interpretation, have to explain the command, "Let there be an expanse." Where are we to suppose that the author of the narrative wishes us to understand this new expanse to have been placed?

It is very generally taken for granted that in interpreting a narrative of great antiquity, such as the first chapter of Genesis, we are at liberty to assume that the author may have been guilty of the most absurd and illogical blunders. Such, however, is by no means the case. No such right on the part of the interpreter exists. Mr. Spencer, in his *Principles of Sociology*, has been at some pains to show that even "the primitive man" was very far from being an irrational, or illogical, being. He made plenty of mistakes; but they were rational mistakes. They are just such as would be made by a rational being, who observed phenomena, but was ignorant of their causes. They are far more often due to ignorance of facts, than to logical fallacies. But if this be true of primitive man, much more is it true of a writer who has proved himself capable of producing such a cosmogony as that contained in the first chapter of Genesis. In such a narrative we may look for

ignorance of facts—we may even assume such ignorance, until the contrary is proved; but we must not assume illogicality, or self-inconsistency, unless defects of such a nature are forced upon us by irresistible proof.

Applying this general rule of interpretation to the matter now immediately in hand, it follows that we must assume that, in alleging the formation of an expanse, the author attached, and intended his readers to attach, some definite meaning to his allegation. What, then, is this meaning? Where is the alleged expanse represented to have occurred? Only two hypotheses are possible. Either the expanse is represented to have been effected outside the surface of the Earth; or it is represented to have been effected within that surface. On examination, both these hypotheses are found to be untenable by the supporters of the usually adopted interpretation. Clearly, the expanse cannot be represented to have taken place outside the surface of the Earth; for there, according to this interpretation, there was already unoccupied space in all directions. Nor can it be represented to have taken place within the surface of the Earth; for there is nothing in the Earth that at all corresponds to such an expanse; and even if there were, it is clear from the added words, "And God called the expanse heaven," that the expanse referred to is not an expanse within the surface of our planet.

In order to avoid, or rather disguise, these difficulties, the supporters of the popular interpretation have strained the word "expanse" to a forced and non-natural meaning, which is doubly unsatisfactory—first, because, on their own showing, it *is* strained and non-natural; and, secondly, because this strained and non-natural meaning gratuitously perverts a strangely scientific narrative into an unscientific fable.

Once again, the statement that "God called the expanse heaven," unintelligible under the usually accepted interpretation, becomes in the light of our interpretation perfectly intelligible; and thus once more supports the latter

interpretation at the expense of the former. Let us verify this.

Even assuming that the popular interpretation could explain (which, as we have seen, it cannot) how the alleged expanse could have been effected outside the surface of our planet, the question at once arises, Why should it be expressly added that God called this expanse heaven, seeing that the first verse had already called the whole space outside "the earth" by this name?

To express the same question in another way, What is the difference, which the narrative purports to draw, between "the heaven" of the 1st verse and "the heaven" of the 8th verse?

To this question the supporters of the popular interpretation can give no answer. Unable to explain how a new space can have been formed at all—much more, how it can have been formed by expansion, they obviously can form no opinion as to the propriety of the allegation that God gave it a name, or as to the appropriateness of the name represented to have been given.

But while the popular interpretation thus proves itself inadequate to satisfy the requirements of the narrative, the interpretation here advocated supplies an intelligible answer to both questions. As long as the Matter, which now constitutes our planet, formed the equatorial portion of the parent mass, it is clear that the space which surrounded this diffused, but continuous, Matter existed only on one side—the outer side. There being then no space between the Matter which now constitutes our planet and the parent mass, there clearly was no unoccupied space on the inner side of the terrestrial matter. On the outer side was space ("the heaven" of the first verse); on the inner side was the adjoining Matter of the parent mass. But as soon as the Matter which now constitutes our planet became detached from the parent mass—at first in the form of a ring, encircling the parent mass—there came into

existence a new intervening space, which did not till then exist as space. And as this new space gradually expanded, it became similar in character to the old space, which previously existed on the outer side only of the Earth's orbit; and accordingly God gave it the same name as that by which the old external space was called—He called it "Heaven." The only difference between the two spaces was a difference in respect of their modes of origin; and this is just the difference which is expressed by the two terms "space" ("the heaven") and "expanse." As soon as the earth had assumed a spheroidal form, with the result that there was no longer anything to mark the origin of the new space, or distinguish it from the old, the two spaces became in all respects identical, and received the same name.

The interpretation of the expanse here put forward furnishes two additional little touches of scientific accuracy which must by no means be overlooked. It will be readily admitted that, for the purpose of recommending any particular interpretation of a document, as well as for the purpose of establishing the scientific accuracy of the document itself, the most valuable illustrations of such accuracy are not always those which are the most ostentatious and self-asserting. On the contrary, if it can be shown that an interpretation, besides satisfactorily providing for the most prominent scientific requirements, brings the narrative into harmony with the teachings of Science in respect also of points of detail so minute and unobtrusive that not one reader in a thousand would even notice their existence, such a demonstration will recommend the suggested interpretation with a persuasiveness little less than convincing. Of such a nature are the two further points of congruity to be here noted.

It will be recollected that the narrative draws a distinction between the term "heaven," as used in the 1st verse, and the term "heaven," as used in the 8th verse. In

the former case the term is used in an unrestricted sense, as is indicated by the fact that it receives no limiting definition; in the latter it is expressly restricted by being defined as an "expanse," the result of an expansion—"and God called the expanse Heaven." The further point to be now noted is that throughout the remainder of the chapter the author invariably uses the term in the latter restricted sense. In the 9th verse the term again occurs:—

"And God said, Let the waters *under the heaven* be gathered together unto one place."

Here the fact that the term "the heaven" immediately follows the definition contained in the 8th verse,—"And God called the expanse Heaven,"—coupled with the further fact that in the 7th verse "the waters *under the heaven*" are expressly called "*the waters under the expanse*"—

"And God made the expanse, and divided *the waters which were under the expanse* from the waters which were above the expanse"—

proves conclusively that the term "the heaven" is here being used in the restricted sense of "the expanse." Throughout the remainder of the chapter, as if to guard against the possibility of any misunderstanding on the point, the author never again speaks of "the heaven," but always of "the expanse of the heaven." Thus:—

"14. And God said, Let there be lights *in the expanse of the heaven* to divide the day from the night; and let them be for signs, and for seasons, and for days, and years: 15. And let them be for lights *in the expanse of the heaven* to give light upon the earth: and it was so. 16. And God made two great lights; the greater light to rule the day, and the lesser light to rule the night: [he made] the stars also. 17. And God set them *in the expanse of the heaven* to give light upon the earth. . . . 20. And God said, Let the waters bring forth abundantly. . . . fowl [that] may fly" (Revised Version, "Let fowl fly") "above the earth *in the open expanse of heaven*."

In these verses two points will be observed in connection with "the expanse"; the one, that the Sun and the Moon were set, and the other, that fowls were to fly, not in "the heaven" of the 1st verse, but in "the expanse" of the 8th verse.

Now, when we turn to the Nebular Hypothesis, it is obvious that both these assertions are strictly accurate. That both the Sun and the Moon are placed in the space produced by the expanse will be readily apprehended, from the fact that, immediately prior to the detachment of the Earth from the Sun, the matter which now constitutes the Sun, Mercury, Venus, the Earth, and the Moon extended continuously from what is now the centre of the Sun to beyond the outermost side of the orbit of the Moon. The whole of the space which now exists as space between each of these bodies is a space produced by the expanse. Consequently, each of these bodies is on all sides surrounded by—is "set in"—the *expanse of heaven*, as distinguished from "the heaven" of the 1st verse.

As regards fowls, it is, of course, still more obvious that their flight is always confined to "the expanse." The space in which they fly is limited to a small area around the earth. And the whole of this area was produced by the expanse.

If to these remarks it be objected that they are inapplicable to the added words "[he made] the stars also," there is a twofold reply. In the first place, these words appear to be inserted in a parenthesis, rather than as part of the narrative proper. It is not, therefore, at all necessary to interpret the words "And God set them in the expanse of the heaven" as applying to them; especially as the added words "and to divide the light from the darkness" appear scarcely applicable to the stars, which cast no perceptible shadow, though they are intelligible enough when applied to the shadows cast by the Sun and the Moon. But, in the second place, the stars *are* set in an expanse. The process which has rendered each of the visible stars perceptible to the inhabitants of the earth, and which has, therefore, enabled it "to give light upon the earth," is precisely the same process as that which has enabled the Sun and Moon to give light upon the Earth—namely, a shrinkage of its substance, with a

corresponding expansion of its surrounding space. It was by this process that it passed from the condition of an invisible nebula to a light-giving star. If, therefore, it be contended that "the expanse of the heaven" must be taken as being intended to be applicable to the stars as well as to the Sun and Moon, we answer that there is no scientific objection to such an interpretation.

In concluding the subject of the Inorganic it only remains to consider very briefly the 9th and 10th verses. For here the congruity between the narrative and the corresponding theory of science is, after what has been said in the foregoing pages, so obvious, that it will be necessary to do little more than compare the two together, in order to demonstrate their complete consistency with each other. The text is as follows :—

"9. And God said, Let the waters under the heaven be gathered together unto one place, and let the dry appear : and it was so. 10. And God called the dry, Earth; and the gathering together of the waters called He Seas : and God saw that it was good."

We have already seen that "the waters" means fluid matter. We have also seen, in the chapter on the Nebular Hypothesis, that the condition of the terrestrial matter immediately after its first separation, by means of the expanse, from the Solar matter, was that of a ring surrounding on all sides the now retreating Solar matter. We have also seen, in the same chapter, that this nebulous ring, instead of continuing to extend, as at first, in the form of a ring all round the Solar matter, eventually ruptured at one place, or at several places, and, collapsing on itself, was finally "aggregated into a single mass."

This process obviously corresponds exactly with that described in the words "Let the waters under the expanse" (*i.e.*, on the outer side of the expanse from the side occupied by the Solar matter) "be gathered together unto one place." These words clearly express the rupture of the gaseous ring, and the final aggregation into a single spheroidal mass of

the fluid terrestrial matter, which the Nebular Hypothesis propounds.

What, then, according to science was the next stage in the history of the now aggregated fluid terrestrial mass? It was exactly the process which is described in the remainder of the 9th verse, and in the 10th verse, namely, the segregation of solid from fluid, and the condensation of the great bulk of that Matter, which retained the fluid condition, into the form of the water which now constitutes the seas and oceans. The following is Mr. Herbert Spencer's description of the process :—

"Leaving behind the period when the more volatile elements now existing as solids were kept by the high temperature in a gaseous form, we may begin with the fact that until the Earth's surface had cooled down below red heat, the vast mass of water at present covering three-fifths of it, must have existed as vapour. This enormous volume of disintegrated liquid became integrated as fast as the dissipation of the Earth's contained motion allowed ; leaving, at length, a comparatively small portion unintegrated, which would be far smaller but for the unceasing absorption of molecular motion from the Sun.

"In the formation of the Earth's crust we have a similar change similarly caused. The passage from a thin solid film, everywhere fissured and movable on the subjacent molten matter, to a crust so thick and strong as to be but now and then very slightly dislocated by disturbing forces, illustrates the process. . . . A molten spheroid merely skinned over with solid matter, could have presented nothing beyond small patches of land and water. Differences of elevation great enough to form islands of considerable size, imply a crust of some rigidity ; and only as the crust grew thick could the land be united into continents divided by oceans." [1]

In these words are expressed, not only the gradual differentiation of solid from fluid—"Let the dry appear"—but also the integration in the form of water of that portion of Matter which retained the liquid condition, and its differentiation from solid in the aggregated form of oceans—"and the gathering together of the waters called He Seas." In order to realize the exact scientific accuracy of the Bible narrative on these points, it is not necessary to do more than place it beside the corresponding narrative of Science.

[1] *First Principles*, pp. 309-10 (5th ed.).

There is, however, one objection which may possibly be taken. It may, perhaps, be urged that "the gathering together of the waters" of the 10th verse must refer to the same thing as that which is referred to by the words "Let the waters . . . be gathered together" occurring in the 9th verse ; and that, consequently, as the words used in the 10th verse are therein expressly defined as "Seas," and must therefore have the specific meaning of "water," instead of the generic meaning of "fluid," we are bound to give the same specific meaning to the term "the waters" occurring in the 9th verse. This objection certainly at first sight appears specious enough, and seems to constitute a serious difficulty in the way of the interpretation here put forward. As a matter of fact, however, a moment's close inspection of the supposed objection will show that, instead of opposing, it really supports, our interpretation.

Observe the order in which the events recorded in the 9th and 10th verses are placed. That order is as follows :—

(1) Let *the waters* be gathered together.
(2) Let *the dry* appear.
(3) God called *the dry* Earth.
(4) The gathering together of *the waters* called He Seas.

It will be at once noticed that "the waters" (1) precedes while "the waters" (4) follows, the appearance of "the dry." What is the meaning of this distinction? Its effect is obvious. It indicates a distinction of meaning between "the waters" (1) and "the waters" (4). The former means something which existed before the segregation of solid from liquid had been effected—something which included both solid and liquid. The latter means something which existed after that segregation had taken place—something which remained after the solid had been extracted from it. In other words, "the waters" of the 9th verse means that form of Matter, generically termed "fluid," in which the solid was so intermixed with the liquid that it "did not appear" ; while "the waters" of the 10th verse means the Matter, specifically

termed "liquid," which remained after the solid matter had been so segregated as to "appear"—namely, "water." And, finally, this view is confirmed by the fact that, while the 9th verse speaks simply of "the waters," the 10th verse speaks not of "the waters," but of "the gathering together of the waters"—that is, the liquid after it had been segregated from the solid.

We conclude, therefore, that the account of the Formation of the Inorganic contained in the first ten verses is rigidly accurate. It is correct in representing that the history of light, so far, at all events, as it affects our Earth, is divisible into three stages: the first, a condition of ubiquitous darkness; the second, a condition of ubiquitous light, undivided from darkness; and the third, a condition of alternating light and darkness. It is correct, also, in asserting the formation of an "expanse in the midst of the then existing gaseous matter," which expanse was, according to Science, the operative cause of the division between light and darkness. Further than this, it is correct in its description of the gathering together unto one place of the fluid matter, consequent upon the disruption of the equatorial nebulous ring. And, finally, it is correct in its description of the segregation of solid from fluid—of solid, which formed itself into the "dry land"; and of fluid, which assumed the form of those masses of water which God called Seas.

CHAPTER XV

THE ORGANIC

"It is not true that the species composing any one of the three populations (water, air, and land) originated during any one of three successive periods of time, and not at any other of these. . . . It is not even admissible to say that the water-population, as a whole, appeared before the air and the land populations."—HUXLEY.

"The lowest organisms have so little definiteness of character that it is difficult, if not impossible, to decide whether they are plants or animals. Respecting sundry of them there are unsettled disputes between Zoologists and Botanists; and it is proposed to group them into a separate kingdom, forming a common basis to the animal and vegetable kingdoms."—HERBERT SPENCER.

IN a series of articles which appeared in the *Nineteenth Century* in 1885–6, and which at the time attracted a good deal of attention, the late Mr. W. E. Gladstone and the late Professor Huxley discussed at considerable length, and not without acrimony, the question of the scientific accuracy of the Bible account of the origin of organic beings. Whatever view may be taken of the antagonistic opinions advanced in those articles, it will be very generally admitted that it is impossible for any reader, who brings to their perusal an unbiassed judgment, to fail to arrive at two conclusions. In the first place, it must be allowed that the victory lay wholly on the side of Professor Huxley. Mr. Gladstone's attempted defence is utterly discredited. But, in the second place, it must also in fairness be conceded, that the Professor's victory was gained, not at the expense of Religion, but at the expense solely of Mr. Gladstone. The proposition which Mr. Gladstone attempted to maintain, and which

Mr. Huxley succeeded without much difficulty in demolishing, is summed up and refuted by the Professor in two sentences :—

"It is not true that the species composing any one of the three populations [water-population, air-population and land-population] originated during any one of three successive periods of time, and not at any other of these."[1]

And again :—

"It is not even admissible to say that the water-population, as a whole, appeared before the air and the land populations."[2]

Now, a moment's reflection will show that the proposition, the subject of the above two quotations, is founded on the error of confounding the "explanatory" passages in the first chapter of Genesis with those passages which we have distinguished as "the narrative proper." It assumes that the work of each of the six days is represented to have included, not only the uttering of the command represented to have been spoken on that day, but also the physical production of all the various phenomena which resulted from that command ; that in each case the work of physical production was completed before the close of the day. We have already, in the eleventh and twelfth chapters, seen that such an interpretation of the text is quite untenable, for that it is absolutely negatived by the considerations to which a critical examination of the internal structure of the narrative necessarily gives rise. We need not repeat the arguments which were there adduced. Suffice it to remind ourselves that we found, on examination, that the narrative proper is confined to the statement that on each of the six days God pronounced one or more commands—enunciated one or more laws ; that it represents that the Word of God, enunciating those laws, was the sole and only operative agent in the production of the various phenomena described ; that the effects of the pronouncing of those laws in the production of such phenomena

[1] *Essays on Controverted Questions*, p. 91 (1892 ed.).
[2] *Ibid.*, p. 87.

are explained in some detail; but that it is not represented that such effects were fulfilled on the days on which the respective laws were pronounced; on the contrary, that in respect of the three days (the first, fifth, and sixth) in which the writer has explained such effects with sufficient elaboration to give us any clue as to what is his meaning upon this point, it is certain that he means that such was not the case; for he clearly represents, in the case of the division of light from darkness, that such division, though mentioned in the explanatory passage attached to the description of the first day, did not take place at all events before the fourth day; and in the case of Woman, it is represented that she was not produced until after an interval, the length of which is not defined; while, in the case of water-life and land-life, he represents the laws which were pronounced on the fifth and sixth days to have been still in active operation, and responsible for the effects which were still taking place, at the date at which he was writing.

From these facts it clearly follows that the text does not represent (as the arguments of Mr. Gladstone and Professor Huxley assume it to have represented) that all vegetables were produced on one day (or at one period), and subsequently all water animals and all air animals on a later day (or during a later separate period), and still later all land animals on one day (or during one separate period). On the contrary, the narrative alleges that the operative laws were pronounced in a certain order of succession, and that they produced their effects, not at once, but after an interval; not instantaneously, but protractedly; not during separate periods, but (at all events, to some extent) cotemporaneously. That such an assertion is negatived by Science, who will allege?

When, therefore, Mr. Huxley argues that—

"according to the Authorized Version, Genesis specially mentions, among the animals created on the fifth day, 'great whales,' in place of which the Revised Version reads 'great sea monsters,' . . . [and] that if whales and porpoises, dugongs and manatees, are to be regarded as

members of the water-population (and if they are not, what animals can claim the designation?), then that much of the water-population has, as certainly, originated later than the land-population as bats and birds have,"[1]

he is obviously advancing an argument which may have been a very good answer to Mr. Gladstone's interpretation of Genesis, but which is entirely pointless as against Genesis itself, inasmuch as it is simply based upon a misunderstanding of the whole framework of the chapter. As we have seen, Genesis nowhere states that "whales," or "great sea monsters," were "created on the fifth day," or on any other specified day; or even that "whales," or "great sea monsters," were created before the earliest, or any other, members of the land-population.

It is clear, therefore, that the once famous Gladstone-Huxley controversy has neither advanced nor hindered the cause of Religion. It does not so much as touch the fringe of the real matter at issue. The great question of the scientific accuracy of the first chapter of Genesis it leaves exactly where it found it. The fact is, that Mr. Gladstone advanced, and attempted to support by strictly unscientific arguments, an interpretation of Religion's cosmogony which a careful examination of the text shows to be, on purely critical grounds, quite untenable. While, therefore, it is by no means surprising that an advocate, possessed of Mr. Huxley's precise information and controversial dexterity, found but little difficulty in tearing away the threadbare patches of pseudo-science, with which Mr. Gladstone attempted to conceal the weakness of his position; it must be borne in mind that a triumph so won no more constitutes a victory of Science over Religion, than did the fate of the sons of Sceva denote the fall of Christianity before the onslaught of demonology.

But while the question discussed by Mr. Gladstone and Mr. Huxley was thus wholly immaterial to the real question at issue, there is undoubtedly a nearly allied, though some-

[1] *Essays on Controverted Questions*, p. 87 (1892 ed.).

what different, question, which is not undeserving of attention. In discussing the truthfulness of the first chapter of Genesis, one of the first questions which naturally arises is this: Is the order of sequence, which Science attributes to the respective origins of the various phenomena described, duly observed? Up to the point which we have at present reached, the scientific order of events has clearly been maintained. That the inorganic world preceded its organic inhabitants is a proposition which requires no proof. We have seen, moreover, that up to the present point the various successive stages, through which the inorganic Universe is represented to have passed, have been accurately recorded. Not only are the five primordial factors of the Formation identical with Mr. Herbert Spencer's five factors of phenomena; not only are the primordial conditions of Matter and Motion described in terms of which Mr. Spencer's corresponding description is but an echo; not only is the darkness attributed to formless mobile matter a scientific fact; but the subsequent appearance of ubiquitous light, the later division of light from darkness by means of an expanse, and the still later separation of liquid from solid, are all events the alleged sequence of which is fully endorsed by Science.

Pursuing this enquiry to the next stage, and recalling once more the fact, never to be forgotten, though hitherto habitually ignored, that upon the question of sequence we must regard only the narrative proper, and must leave out of consideration the various interposed explanatory and anticipatory parentheses, we have to observe that the following is the alleged order of events:—

(1) The command, Let there be a vegetable population;
(2) The command, Let there be lights for signs and for seasons and for days and years;
(3) The command, Let there be a water-population and an air-population;
(4) The command, Let there be a land-population; and
(5) The command, Let us make man.

Treating these allegations first on the most general grounds, it is to be noted that there is an obvious correspondence between a succession of commands and a succession of phenomena. If, to make this proposition clear, it could be shown that all organic beings, vegetable and animal, had sprung into existence in a moment of time, such a discovery would clearly be inharmonious with the mode of origin alleged by Genesis. Clearly, we may say that the theory of Evolution confirms the narrative, at least to the extent of proving that the Formation was, as is alleged by the text, not an instantaneous, but an extended, process. And equally clearly, we may say that, to this general extent, the narrative possesses the great scientific merit that it foreshadows Evolution. But now, does this primary and general correspondence extend to the particular details of the narrative?

As a preliminary to this enquiry, it should be noted that the fact—if it were a fact—that Science could show that the order of sequence of the first appearance on the Earth of the various phenomena described did not rigidly adhere to the order of sequence of these commands, would be by no means fatal to the credibility of the narrative. If, as is the fact, the text, in so far as it deals with the question of sequence, narrates only a series of commands; and if, as is also the fact, the text represents that the respective resulting phenomena appeared not immediately, but after intervals, the actual and relative lengths of which are in no case defined; and if, further, it be a fact, as may very well be the case, that the lengths of those various intervals differed from one another according to the complexity of the phenomena to be produced; is it not perfectly conceivable, and perfectly compatible with possibility, that the commands may have been issued in one order, and their resulting phenomena may have made their respective first appearances in another order? On what ground, or by what right, can we insist upon requiring Religion to guarantee that all the intervals were

of exactly equal duration, when she has given no such guarantee, and, indeed, made no such assertion?

A due recognition of these considerations will not improbably suggest the question whether, in the circumstances, the truth of the narrative is really affected at all by the order of sequence which Science may ultimately establish as the actual order, should she ever succeed in establishing such an order.

The true answer to this question appears to be that, although the discovery—should such discovery ever be made—that the alleged order of the commands did not exactly coincide with the order of the first appearance of the corresponding phenomena, would not in any way contradict the truth of the narrative; yet, if it can be shown that the two orders do exactly, or at least in general outline, harmonize with one another, this fact would very strongly confirm the truth of the narrative. For it is not easy to suppose that the author of the text could have hit off the true order of sequence by chance. The only conceivable explanation of such a coincidence would be, either that he wrote with a knowledge of the facts, or that his pen was guided by some Power which possessed such a knowledge. At all events, if we choose to put the case no higher, the discovery of such a coincidence would prove that this part of the text is possessed of a positive, as well as a merely negative, scientific accuracy; which, indeed, is more than our argument strictly requires us to prove. It will, therefore, be worth while to consider briefly what, in the opinion of Science, is the true order of sequence.

That vegetable life preceded animal life is a proposition which, at first sight, appears almost self-evident. The fact that all animal life is dependent, mediately or immediately, upon the vegetable kingdom for nutriment, certainly seems to suggest with great emphasis the impossibility of inverting this order of sequence. How could animal life have preceded the existence of that upon which it is dependent for its daily

support? Surely, it may be urged, vegetable life must have existed long—so long that vegetable organisms had become numerous—before the maintenance of animal life upon our Earth became possible.

That this dependence of animal life upon vegetable life is at the present time a recognized scientific fact requires no demonstration. In the words of Mr. Herbert Spencer—

"All animals live directly or indirectly on plants."[1]

And for evidence that this scientific fact is correctly, and, indeed, emphatically, asserted by Religion, we need only turn to Genesis i. 29, 30 :—

"And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; *to you it shall be for meat. And to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every herb for meat.*"

When to this important fact we add the theoretical consideration that, speaking generally, animal life, by virtue of its higher complexity, greater heterogeneity, superior power of manufacturing heat, and other qualities, stands higher in the scale of Evolution than vegetable life, and that it is, therefore, reasonable to look for its origin at a later period than that which gave birth to the lower form of vegetable life, we may fairly say that the order of sequence in which the commands relating to vegetable life and animal life respectively are represented to have been uttered is, from the scientific point of view, likely to have been the order in which the corresponding phenomena appeared.

Nor is there wanting high scientific authority in support of this view. Thus Mr. Russel Wallace, in tracing the evolution of life, asserts that—

"There are at least three stages in the development of the organic world. . . . The first stage is the change from inorganic to organic, when the earliest vegetable cell, or the living protoplasm out of which

[1] *First Principles*, p. 315 (5th ed.).

it arose, first appeared. . . . The next stage . . . is the introduction of sensation or consciousness, constituting the fundamental distinction between the animal and vegetable kingdoms."[1]

In view of such an opinion, expressed by so high an authority, we are clearly at liberty to put the case at least as high as this—that, whether or no scientists are all agreed on the point, it certainly cannot be claimed that Science has disproved the proposition that vegetable life appeared on our planet before animal life; that, on the contrary, there are high authorities, and weighty considerations, which may be cited in support of such a proposition.

And here, so far as our argument is concerned, we might safely leave the point. But, having regard to opinions which have recently been expressed by experts on the subject, it may be not uninteresting, while we are upon the question, to pursue it a little further.

In spite of the apparent impossibility involved by the theory that animal life preceded vegetable life, the priority of vegetable life has recently been seriously called in question; and at least one high authority has boldly advanced the opposite view. Professor Huxley considers that the point is at present undetermined:—

"As to the first appearance of life, the whole argument of analogy, whatever it may be worth in such a case, is in favour of the absence of living beings until long after the hot seas had constituted themselves; and of the subsequent appearance of aquatic before terrestrial forms of life. *But whether these 'protoplasts' would, if we could examine them, be reckoned among the lowest microscopic algæ, or fungi; or among those doubtful organisms which lie in the debatable land between animals and plants,* is, in my judgment, a question on which a prudent biologist will reserve his opinion."[2]

But unfortunately, the advice that we should reserve our opinion is a species of precept which it is much easier to recommend to others than to follow ourselves. Clearly though we may recognize, in a case of doubt or difficulty, the impossibility of forming more than a provisional opinion,

[1] *Darwinism*, p. 474 (1890 ed.).
[2] *Essays on Controverted Questions*, p. 111 (1892 ed.).

we are pretty sure to form an opinion of some sort, however tentative that opinion may be. It is, therefore, scarcely possible to avoid making a brief enquiry as to the grounds on which the generally accepted theory of the priority of vegetable life has thus been called in question.

The broad distinction between plants and animals is based upon their mode of nutrition :—

"Plants can take up the carbon, hydrogen, oxygen, and nitrogen necessary to build up their growing protoplasm from mineral compounds soluble in water, compounds which constitute the resting stage of those elements in the present physical conditions of our planet. Plants can take their nitrogen in the form of ammonia or in the form of nitrates and their carbon in the form of carbonic acid. Accordingly they require no mouths, no digestive apparatus ; their food being soluble in water and diffusible, they absorb at all or many points of their surface. The spreading diffuse form of plants is definitely related to this fact. On the other hand the series of organisms which we distinguish as animals cannot take the nitrogen, necessary to build up their protoplasm, in a lower state of combination than it presents in the class of compounds known as albumens ; nor can they take carbon in a lower state of combination than it presents when united with hydrogen or with hydrogen and oxygen to form fat, sugar, and starch. Albumens and fats are not soluble in water and diffusible; they have to be seized by the animal in the condition of more or less solid particles, and by chemical processes superinduced in the living protoplasm of the animal by the contact of these particles they are acted upon, chemically modified, and rendered diffusible. Hence the animal is provided with a mouth and a digestive cavity, and with organs of locomotion and prehension by which it may search out and appropriate its scattered nutriment. Further the albumens, fats, sugars, and starch which are the necessary food of an animal are not found in nature excepting as the products of the life of plants or of animals ; accordingly all animals are in a certain sense parasitic upon either plants or other animals."[1]

It is clear, therefore, that at the present time the animal kingdom is absolutely dependent for its support, either directly or indirectly, upon the vegetable kingdom. But when we come to enquire by what means plants are enabled to absorb their nourishment direct from the inorganic kingdom, we are brought face to face with a very real difficulty. For while, on the one hand, we find that the process is due to the presence within their structures of a certain green-

[1] E. Ray Lankester, *Encyclopædia Britannica*, vol. xix. p. 830 (9th ed.).

coloured substance called chlorophyll, we also find unmistakable indications that the earliest plants possessed no chlorophyll. The organs which are concerned with the manufacture and production of this peculiar substance exhibit a complexity which betrays a much later date of origin than that attributable to the simplest and earliest vegetable cell; and it is, therefore, an accepted doctrine with evolutionists, that the plant kingdom must have lived and evolved for a very considerable period before chlorophyll made its appearance.

How, then, it is asked, can these early plants have been supported during the period which preceded the evolution of that particular substance upon which their power of absorbing their nutriment depends? Is it not reasonable to suppose that, inasmuch as, while plants depend for their subsistence upon the presence of chlorophyll, animals exist independently of chlorophyll; and inasmuch as the earliest living germs possessed no chlorophyll; therefore the earliest living germs must have resembled animal life more nearly than vegetable life? Such, at least, is Mr. Ray Lankester's conclusion. In his own words—

> "We are led to entertain the paradox that though the animal is dependent on the plant for its food yet the animal preceded the plant in evolution, and we look among the lower Protozoa and not among the lower Protophyta for the nearest representatives of that first protoplasm which was the result of a long and gradual evolution of chemical structure and the starting-point of the development of organic form."[1]

But here again, when we come to examine this conclusion, we find not only that it is purely speculative, but that, even regarded as a speculation, it is highly unsatisfactory. The difficulty is by no means avoided, or even reduced; at the best it is only shifted. If it be difficult to see how the earliest a-chlorophyllic plants subsisted, it is, we submit, immensely more difficult to conceive how an animal can have

[1] E. Ray Lankester, *Encyclopædia Britannica*, vol. xix. p. 832 (9th ed.).

existed in the conditions supposed. What was its food? And how did it obtain it?

Vegetable organisms are so constructed that, without requiring any locomotive powers, they are sure of finding a sufficiency of food. Through their roots, and through their external surfaces, they are continually absorbing nourishment from the very substances in which they are perpetually immersed. Possessing neither organs for seeking food, nor intelligence to conduct such a search successfully, they are nevertheless safe from starvation, from the very fact that their food is being perpetually brought to them in every drop of rain, and every breath of air. They live, in fact, in a perpetual bath of nutriment. Animals, on the other hand, are by no means so happily circumstanced. In order that animal life may be maintained, it is necessary that the organism should be brought into contact with a continuous supply of suitable food. And this can be successfully accomplished only under one or other of two alternative conditions: either the food must be so abundant in quantity that the chances are in favour of surrounding forces wafting a continuous and sufficient supply of the manufactured material to the motionless and insensate organism; or the organism must itself be so active and intelligent as to be able to conduct a successful hunt after its scattered food.

Now, it is manifest that neither of these two conditions is likely to have been fulfilled at the date of the first beginnings of life. The earliest organisms were in all probability entirely unconscious, and practically incapable of any locomotion. Nor is it easy to see how the manufactured food material can have been so abundant, or so ubiquitous, as to afford a constant supply of food to an organism possessing only receptive faculties.

In answer to this grave difficulty, Mr. Lankester offers the following suggestion:—

"A conceivable state of things is that a vast amount of albuminoids and other such compounds had been brought into existence by those

processes which culminated in the development of the first protoplasm, and it seems therefore likely enough that the first protoplasm fed upon these antecedent steps in its own evolution just as animals feed on organic compounds at the present day, more especially as the large creeping plasmodia of some Mycetozoa feed on vegetable refuse." [1]

Without enquiring how far this suggestion meets the difficulties of the case, it is easy to see that the conditions and requirements of plant life, as compared with those of animal life, are such as to admit of the maintenance of plant life when animal life would be impossible, and, consequently, to suggest an almost overwhelming probability in favour of plant life having preceded animal life, if only we can get rid of the chlorophyll difficulty. What, then, does that difficulty really amount to?

In the first place it should be remarked that we have in Fungi a large order of acotyledonous plants, comprising nearly five thousand known species, and probably as many more unknown species, all of which possess no chlorophyll at all. These peculiar organisms, ranking amongst the lowest forms of vegetable life, possess certain qualifications which certainly suggest the possibility that they may be direct representatives of the earliest form of life. Possessing no chlorophyll, they are incapable of absorbing carbonic acid from the air. Indeed, they reverse the usual vegetable processes. Instead of absorbing carbonic acid and giving out oxygen, as other plants do, they resemble animals in that they absorb oxygen and give out carbonic acid; and for this reason, as well as because of the remarkably nitrogenous character of their chemical composition, some naturalists have proposed to constitute for them a distinct kingdom of nature, intermediate between the animal and the vegetable; while De Bory, the most eminent botanist on the subject of Mycetozoa, has boldly expressed the view that they are to be regarded as animals rather than as plants.

Here, then, is a form of organism which may possibly

[1] E. Ray Lankester, *Encyclopædia Britannica*, vol. xix. p. 832 (9th ed.).

represent the earliest type of life. Unlike vegetables, they live without chlorophyll; and, unlike animals, they can subsist without the intervention of vegetable life; for though many species live on decaying animal, or vegetable, matter, some species grow in earth. Thus, if we look for the earliest form of life in the direction indicated by fungi, we escape, on the one hand, the chlorophyll difficulty, which attends the theory which attributes priority of existence to the vegetable kingdom; and we escape also, on the other hand, the still greater difficulties which attend the converse theory.

Thus the truth suggested by the foregoing considerations seems to be somewhat as follows: The earliest form of life was analogous to that exhibited by the fungus tribe of organism, and derived its nutriment from the earth in the manner exemplified by earth-growing fungi. It belonged, properly speaking, neither to the animal kingdom, nor to the vegetable kingdom, but was the common ancestor of both. Within the structure of these humble organisms chlorophyll was in course of time evolved; and with the formation of chlorophyll arose the resulting faculty of extracting and assimilating the carbonic acid contained in the surrounding air, which is now one of the prominent characteristics of the more highly developed members of the plant kingdom.

Cotemporaneously with the later stages of this gradual development, certain organisms, availing themselves of that semi-parasitic tendency which is so prominent a characteristic in many species of fungi, adopted a mode of life which enabled them, instead of going through the laborious processes of extracting and assimilating carbonic acid from the surrounding atmosphere, to absorb their nutriment, ready manufactured and fit for immediate use, from the tissues of decaying vegetables. The advantages derived from this arrangement raised these more aspiring organisms into a grade of life superior, in every respect, to that enjoyed by the vegetable organisms upon whose tissues they fed. Acquiring their

nourishment, not only with less expenditure of energy to themselves, but also in a more nutritive form, it became possible for them to expend a smaller proportion of their energy upon self-sustentation without any resulting diminution of nutrition. Consequently, they retained a surplus of energy, available for purposes other than self-sustentation. This surplus energy expended itself in modes which gradually developed into those superior motile powers which at length fitted their possessor to receive the faculty of consciousness ; and this last-mentioned faculty was, according to Religion, introduced, at the appropriate moment, by an act of creation.

Such a theory appears to be satisfactory. Avoiding, on the one hand, the chlorophyll difficulty, and avoiding, or at least modifying, the difficulty as to food which Mr. Lankester's theory involves, it suggests a primitive form of life which existing fungi prove to be at least possible, and which from other considerations appears to be not improbable. That vegetable and animal organisms are derived from a common ancestor is a proposition rendered probable by many considerations. The two kingdoms overlap each other in every direction. Whatever test of distinction we choose to apply, we find it impossible to draw a distinct line of demarcation between them.

"The mere automatic motility of unicellular organisms was at one time considered sufficient indication that such organisms were animals rather than plants. We now know that not only are the male reproductive cells of ferns and similar plants propelled by vibratile protoplasm, but such locomotive particles are recognized as common products ('swarmspores' and 'zoospores') of the lowest plants."[1]

Again, another apparent distinction between plants and animals lies in the fact that, while plants absorb their nutriment, to a very large extent, through their external surfaces, animals, doing this to an inappreciable extent, require and possess a stomach and an elaborate digestive

[1] E. Ray Lankester, *Encyclopædia Britannica*, vol. xix. p. 831 (9th ed.)

apparatus. But here, again, we find the two kingdoms overlapping one another, as in the case of the "insectivorous plants," which possess a digestive cavity, (the pitchers of pitcher-plants, etc.,) and which "actually feed by acting chemically upon the albumens of insects which they catch in these digestive receptacles."

Once again, if we take as our *ratio dividendi* the possession of chlorophyll, to which we have already alluded, we are met by the same difficulty as before. For not only do we find plants, such as the fungi, which possess no cholorophyll; but we find animals, such as the *hydra viridis*, which do contain chlorophyll in their tissues, and which, consequently, absorb carbonic acid like plants.

From these considerations it would seem that plants and animals must have been originally very closely interconnected. Every attribute which at first sight appears to be exclusively characteristic of the one kingdom, is found on examination to be shared in some degree by the other. And this interconnection appears scarcely explicable, except upon the assumption of a common ancestry.

But whatever may be the truth as to the priority of the existence of vegetable and animal organisms respectively, two facts appear to be certain: the one, that the earliest living beings possessed either not at all, or only in an inappreciable degree, the characteristic features by which plants and animals are now distinguished—namely, chlorophyll, motility, digestive apparatus, consciousness; so that among primitive organisms the distinction between animal and vegetable had no existence; the other, that when, in the course of evolution, the respective distinguishing features of the vegetable and animal kingdoms came into existence, those that characterize the vegetable kingdom preceded—or, at least, developed more rapidly than—those which characterize the animal kingdom. This proposition is a necessary corollary from the fact that, speaking generally, vegetable organisms are less highly evolved

than animals; so that, even if both kingdoms started simultaneously and on equal terms, the development of the vegetable would naturally be completed first; while, as a matter of fact, the development of the animal kingdom has been relatively retarded by the fact that, with some insignificant exceptions, all animals feed, directly or indirectly, on vegetables, and consequently could not evolve to any appreciable extent until after vegetable organisms had evolved, both quantitatively and qualitatively, to a sufficient extent to furnish the animal organisms with a continuous supply of food. From which fact it is obvious that, whatever may be the truth as to the earliest form of life, vegetable life, *as distinguished from animal life*, preceded animal life.

The question of the relative priority of the first appearance of vegetable and animal organisms has been dealt with thus at length, not so much in order to establish any particular theory, as to show how problematical, from the standpoint of Science, the whole question is. The truth is that Science is here groping entirely in the dark. As to the relative antiquity of vegetable and animal life, her most authoritative utterances are pure speculations; and her most plausible speculations are, at least partially, unsatisfactory. Clearly, in such circumstances, this part of the Bible narrative stands unimpeached. Science may weigh chances and discuss probabilities, but she knows nothing for certain. No one to-day can allege that Religion is wrong in attributing—if she does attribute—priority of existence to vegetable life.

This is, strictly speaking, all that the present argument requires—a passive assent to the Bible narrative. But in the circumstances above mentioned we may certainly go further, and say that the available evidence goes to support the correctness of the order of sequence which Genesis, without alleging, seems to suggest. In the absence of any guides but probabilities, the available probabilities, so far as they go, tend to show that plant life did precede animal life, and

thereby confirm the utterances of Religion, in so far as those utterances seem to point in the same direction.

Passing now to the fifth day, we have to observe that Science entirely endorses the order of sequence of the Biblical "commands," by admitting that animal life first appeared in the water. Not only does this doctrine harmonize with the general theory of Evolution, fishes being, from the evolutionist's point of view, the least evolved of vertebrates; but it is expressly admitted by Professor Huxley:—

"Undoubtedly, it is in the highest degree probable that animal life appeared first under aquatic conditions."[1]

We need, therefore, spend no further time upon this point, beyond remarking that Religion is entitled to the full credit of having advanced, and successfully maintained, a doctrine which is very far from being self-evident.

When we proceed to that part of the narrative which deals with the "air-population," we pass to a proposition which has been the subject of keen discussion, but which owes all its difficulties to the misunderstanding of the text which has already proved responsible for so much. Thus Mr. Huxley's allegation that

"'fowl' are said in Genesis to be created on the same day as fishes"[2]

requires no other refutation than the remark that it is not in accordance with the fact. For the same reason the whole class of hostile criticism which is based upon the supposition, now almost universally accepted by evolutionists, that birds have been evolved from reptiles, falls to the ground. Granted that birds have had a reptilian origin, and that therefore their existence pre-supposes the existence of certain land animals, how would this fact discredit the truth of a narrative which says nothing as to the date, or even the comparative date, at which "fowl" first made its appearance?

[1] *Essays on Controverted Questions*, p. 91 (1892 ed.).
[2] *Ibid.*, p. 109.

It thus becomes clear from a careful examination of the text that, so far as the Organic is concerned, the first chapter of Genesis in no way conflicts with the beliefs—still less with the proved facts—of Science. Even if Science were to prove, which she has not as yet succeeded in doing, that the order of sequence, in which the various organic beings have respectively made their appearance, was entirely different from the order of sequence of the commands narrated in the text, such a demonstration would in no way impugn the perfect truth of the narrative, inasmuch as that narrative does not allege, or even suggest, that the resulting phenomena appeared in the relative order in which the various laws were pronounced. As a matter of fact, however, the stated order of the laws is in curiously exact agreement with the order of events which the requirements of Evolution seem to demand.

CHAPTER XVI

THE STRUGGLE FOR EXISTENCE

"One of the most essential conditions, if not the chief cause, of the struggle for existence, is the tendency to multiply without limit, which man shares with all living things."—HUXLEY.

"And God blessed them, saying, Be fruitful, and multiply, and fill the waters in the seas."—THE AUTHOR OF THE FIRST CHAPTER OF GENESIS.

THERE is one point, already incidentally approached in the last chapter, which deserves a somewhat closer notice before we leave it, because it curiously illustrates the exactness of the scientific accuracy which the Bible narrative displays.

We have already seen that evolution maintains that the highest existing animal beings have, so far, at all events, as their physical parts are concerned, evolved, by a perfectly natural process, and without any supernatural intervention, from the lowest primordial animal germ. We have seen, further, that Religion and Science are agreed in the belief that animal life appeared first in the water, and evolved thence into the various existing forms of life on the land. It has now to be observed that the efficient agent in the effectuation of this evolutionary progress, from the lowest primordial water animal up to the highest existing land animal, has been the "struggle for existence."

Now, this being so, it is obvious that wherever in the chain of evolutionary progress the greatest steps of advance have been achieved, there we must expect to find that the

struggle for existence has been most severe. Slight structural modifications may be effected without any very violent efforts on the part of the organism undergoing them. But violent modifications can only be referred to violent effort. And as organisms will not make violent and persistent efforts except under stress of a pressing necessity, it follows that any marked structural modification, which can only have been effected by violent effort, must point to an unusually pressing necessity as its efficient cause.

Now, when we review the chain of evolution which connects the lowest primordial water animal at the one end with man at the other, we cannot fail to observe one point of transition which stands out above all others in marked relief. Of all organic structural modifications, that is undoubtedly the most remarkable which has enabled organisms, originally fitted to breathe in the water, to breathe in the open air of the atmosphere. The most violent organic change is that which has converted branchial respiration into pulmonic respiration. And consequently, the pressure of the struggle, which induced certain organisms to achieve the effort sufficient to effect this violent transformation, must at this particular point have been specially severe. Obviously, creatures adapted to branchial respiration, and to whom pulmonic respiration was impossible, would naturally remain in the habitat which was suited to their structural requirements, until some overwhelming necessity impelled them to seek another, and uncongenial, habitat. Nothing short of the direst necessity can have induced water-breathing animals to quit their natural element, and adopt that new mode of life which ultimately developed the air-breathing faculty.

Here, then, where we find the most violent transformation, we must look for the greatest stress of the struggle for existence. From the magnitude of the effect produced we must expect to find a corresponding magnitude of cause. And we must, therefore, on *a priori* grounds believe that, in consequence of "over-multiplication," life in the waters

had become practically intolerable, before an effort, sufficiently violent and persistent to have induced so extraordinary a change of life, can have been resorted to. In other words, we must expect to find that the struggle for existence has at some time been more severe amongst water animals than amongst any other animals.

What we are thus led by *a priori* considerations to expect, is sufficiently confirmed by positive evidence. There are to be found in the contrivances to which water animals have resorted unmistakable indications of the extraordinary severity of the struggle to which they have been exposed. It will be sufficient for our present purpose to select one such indication, as an illustration of the point upon which we are now insisting.

It is pretty generally known that the distorted position of the eyes of flat-fish, which had long been a puzzle to anatomists, has recently been the subject of a curious discovery, and one which is especially interesting, both as evidencing the truth, and illustrating the powers, of evolution.

"Soles, turbots, and other flat-fish," writes Mr. Russel Wallace, "are, as is well known, unsymmetrical. They live and move on their sides, the under side being usually differently coloured from that which is kept uppermost. Now the eyes of these fish are curiously distorted in order that both eyes may be on the upper side, where alone they would be of any use. It was objected by Mr. Mivart that a sudden transformation of the eye from one side to the other was inconceivable, while, if the transit were gradual, the first step could be of no use, since this would not remove the eye from the lower side. But, as Mr. Darwin shows by reference to the researches of Malm and others, the young of these fish are quite symmetrical, and during their growth exhibit to us the whole process of change. This begins by the fish (owing to the increasing depth of the body) being unable to maintain the vertical position, so that it falls on one side. It then twists the lower eye as much as possible towards the upper side; and, the whole bony structure of the head being at this time soft and flexible, the constant repetition of this effort causes the eye gradually to move round the head till it comes to the upper side.

"Now if we suppose this process, which in the young is completed in a few weeks or days, to have been spread over thousands of generations during the development of these fish, those usually surviving whose eyes retained more and more of the position into which the young fish

tried to twist them, the change becomes intelligible; though it still remains one of the most extraordinary cases of degeneration, by which symmetry—which is so universal a characteristic of the higher animals—is lost, in order that the creature may be adapted to a new mode of life, whereby it is enabled the better to escape danger and continue its existence."[1]

Now, what has happened in the case of flat-fish is obvious, and it significantly illustrates the intensity of the struggle for existence amongst water animals. The remote ancestors of the sole were, like other fish, perfectly symmetrical, having one eye on either side of the head; and, moreover, like other fish, they kept their bodies, in swimming, in the vertical position. But at length some member of the species, finding the struggle for existence increasingly severe, and happening, possibly, to possess, by reason of an unusual depth of body, a particular facility for assuming a recumbent position, hit upon this happy expedient for escaping enemies and lying in wait for food. Lying flat down upon the sand at the bottom of the sea, it readily escaped the notice both of the enemies by whom it was sought, and of the prey which it required. And by this ingenious device it succeeded in prolonging an existence which must otherwise have succumbed to the increasing severity of the struggle for existence.

But the unnatural attitude, which the necessities of self-preservation had thus induced it to assume, was attended by one serious inconvenience. Nature, having originally intended the fish to swim in a vertical position, had placed its eyes on either side of its head. Hence, by assuming the recumbent position, the lower eye was rendered useless: and to correct this inconvenience became a serious desideratum.

Obviously, this end could be accomplished only in one way. The shortness and stiffness of the neck, which is so marked a characteristic of the fish tribe, precluded the possibility of raising the head, so as to look about, while

[1] *Darwinism*, pp. 129–30 (1890 ed.).

retaining the body in the recumbent attitude; and to have raised the body from time to time into the vertical position, in order to use the lower eye, would simply have been to court the very risks which the recumbent position was intended to avoid. Hence arose that determined effort to bring the lower eye on to the upper surface of the head which Mr. Russel Wallace has described, and which effort, persistently repeated generation after generation, has, as we have seen, been finally crowned with complete success.

To the man who thoughtfully considers the matter, the grotesque and distorted form of the sole will come almost as a revelation. For it speaks of a condition of life beneath the placid surface of the waters, when over-population was so intense, that every available shift had to be resorted to in the fierce struggle for existence; and it points, with a significance not to be mistaken, to the approach of a condition of things when the less favourably conditioned water animals had to face one or other of two stern alternatives—either to perish altogether; or else to overflow their natural habitat, and assay a new, and, as the event has shown, a higher mode of life, in an alien, and at first uncongenial, atmosphere.

But before we can accept the foregoing explanation we have naturally to enquire whether it is really conceivable that evolution can have effected so radical an organic change as that from branchial to pulmonic respiration. How can the change have been effected? And what was the first step towards the acquisition of the higher faculty? Mr. Spencer has answered these questions with his usual inexhaustible ingenuity; and the speculation is of such interest that it will be worth while to transcribe his suggestions at some length:—

"When many gold-fish are kept in a small aquarium, as with thoughtless cruelty they frequently are, they swim close to the surface, so as to breathe that water which is from instant to instant absorbing fresh oxygen. In doing this they often put their mouths partly above the surface, so that in closing them they take in bubbles of air; and sometimes they may be seen to continue doing this—the relief due to

the slight extra aëration of blood so secured, being the stimulus to continue. Air thus taken in may be detained. If a fish that has taken in a bubble turns its head downwards, the bubble will ascend to the back of its mouth, and there lodge; and coming within reach of the contractions of the æsophagus, it may be swallowed. If, then, among fish thus naturally led upon occasion to take in air-bubbles, there are any having slight differences in the alimentary canal that facilitate lodgment of the air, or slight nervous differences such as in human beings cause an accidental action to become 'a trick,' it must happen that if an advantage accrues from the habitual detention of air-bubbles, those individuals most apt to detain them, will, other things equal, be more likely than the rest to survive; and by the survival of descendants inheriting their peculiarities in the greatest degrees, and increasing them, an established structure and an established habit may arise. And that they do in some way arise we have proof: the common Loach is well known to swallow air, which it afterwards discharges loaded with carbonic acid.

"From air thus swallowed the advantages that may be derived are of two kinds. In the first place, the fish is made specifically lighter, and the muscular effort needed to keep it from sinking is diminished—or, indeed, if the bubble is of the right size, is altogether saved. The contrast between the movements of a Goby, which, after swimming up towards the surface, falls rapidly to the bottom on ceasing its exertions, and the movements of a Trout, which remains suspended just balancing itself by slight undulations of its fins, shows how great an economy results from an internal float, to fishes which seek their food in mid-water or at the surface. Hence the habit of swallowing air having been initiated in the way described, we see why natural selection will, in certain fishes, aid modifications of the alimentary canal favouring its lodgment—modifications constituting air-sacs. In the second place, while from air thus lodged in air-sacs thus developed, the advantage will be that of flotation only if the air is infrequently changed or never changed; the advantage will be that of supplementary respiration if the air-sacs are from time to time partially emptied and refilled. The requirements of the animal will determine which of the two functions predominates."[1]

Mr. Spencer then proceeds to consider what are "the different sets of conditions under which these divergent modifications may be expected to arise." Having shown that "the respiratory development is not likely to take place in fishes that inhabit seas or rivers in which the supply of aërated water never fails," and that "hence in fishes so circumstanced, the air-chambers arising in the way described would naturally become specialized mainly or wholly into floats"; he argues as follows :—

[1] *Principles of Biology*, vol. ii. pp. 323–4 (1884 ed.).

"Contrariwise, aquatic vertebrata in which the swallowing of air-bubbles, becoming habitual, had led to the formation of sacs that lodged the bubbles; and which continued to inhabit waters not always supplying them with sufficient oxygen; might be expected to have the sacs further developed, and the practice of changing the contained air made regular, if either of two advantages resulted—either the advantage of being able to live in old habitats that had become untenable without this modification, or the advantage of being able to occupy new habitats. Now it is just where these advantages are gained that we see the pulmonic respiration coming in aid of the branchial respiration, and in various degrees replacing it. Shallow waters are liable to three changes which conspire to make this supplementary respiration beneficial. The summer's sun heats them, and raising the temperatures of the animals they contain, accelerates the circulation in these animals, exalts their functional activities, increases the production of carbonic acid, and thus makes aëration of the blood more needful than usual. Meanwhile the heated water, instead of yielding to the highly carbonized blood brought to the branchiæ the usual quantity of oxygen, yields less than usual; for as the heat of the water increases, the quantity of air it contains diminishes. And this greater demand for oxygen joined with smaller supply, pushed to an extreme where the water is nearly all evaporated, is at last still more intensely felt in consequence of the excess of carbonic acid discharged by the numerous creatures congregated in the muddy puddles that remain. Here, then, it is, that the habit of taking in air-bubbles is likely to become established, and the organs for utilizing them developed; and here it is, accordingly, that we find all stages of the transition to aërial respiration. The Loach before-mentioned, which swallows air, frequents small waters liable to be considerably warmed; and the *Cuchia*, an anomalous eel-shaped fish, which has vascular air-sacs opening out at the back of the mouth, 'is generally found lurking in holes and crevices, on the muddy banks of marshes or slow-moving rivers.' Still more significant is the fact that the *Lepidosiren*, or 'mud-fish' as it is called from its habits, is the only true fish that has lungs. But it is among the *Amphibia* that we see most conspicuously this relation between the development of air-breathing organs, and the peculiarities of the habitats. Pools, more or less dissipated annually, and so rendered uninhabitable by most fishes, are very generally peopled by these transitional types. Just as we see, too, that in various climates and in various kinds of shallow waters, the supplementary aërial respiration is needful in different degrees; so do we find among the *Amphibia* many stages in the substitution of the one respiration for the other."[1]

Accepting the foregoing remarks of Mr. Spencer, we see clearly that the development of aërial respiration has been effected through the intensity of the struggle for existence among water animals. Not only is it among fish which have been driven to take up their abode in "waters not

[1] *Principles of Biology*, vol. ii. pp. 325-6 (1884 ed.).

always supplying them with sufficient oxygen," and which have thus been compelled to "live in habitats that had become untenable without this modification," that the first symptoms of pulmonic respiration can be discerned; but it is amongst *Amphibia*, which have been compelled to occupy "pools, more or less dissipated annually, and so rendered uninhabitable by most fishes," that the relation between the development of air-breathing organs and the peculiarities of the habitats is most conspicuously seen. And thus we are led to the conclusions, that air-breathing animals have evolved from water-breathing animals, by some such process as that suggested by Mr. Herbert Spencer; that the change has been induced by over-population of the waters which has led to land-life, as a result of water-life overflowing its original habitat; and, finally, that the organic transformation involved in this change is of such magnitude as, of necessity, to imply a correspondingly violent effort on the part of the organisms undergoing the change—a conclusion which involves the further implication that that violent effort must have been induced by some pressing and, indeed, overwhelming necessity. In other words, the struggle for existence in the waters must have been marked by an extraordinary and special severity.

Now, the point to which particular attention is here invited is, that this fact, which is so very real to Science, is specially emphasized by Religion. The Bible draws a marked distinction between the over-population which was to take place on the land, and that which was to take place in the waters. Referring to the "dry land," of the vegetable kingdom it is said :—

"And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth : and it was so. And the earth brought forth grass, and herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself, after his kind."[1]

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[1] Gen. i. 11, 12.

And of the animal kingdom inhabiting the "dry land" it is said:—

"And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so. And God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind."[1]

In each of these cases there are words of procreation; but there is nothing to specially suggest the idea of *over*-population.

But when we turn to the description of water-life the language is entirely different:—

"And God said, Let the waters bring forth *abundantly* [Heb. *swarm with swarms*] the moving creature that hath life, and let fowl fly above the earth in the open expanse of heaven. And God created great whales, and every living creature that moveth, which the waters brought forth *abundantly*, after their kind, and every winged fowl after his kind: and God saw that it was good. And God blessed them, saying, Be fruitful, and multiply, and *fill the waters* in the seas, and let fowl multiply in the earth."[2]

Clearly, in the foregoing quotations a marked distinction is drawn between the amount of increase of population amongst the various land populations and air populations therein referred to, on the one hand, and that of the water population on the other. While the Earth was to "bring forth" (רָשָׁא and יָצָא) the vegetable and land populations, the waters were to "swarm with swarms" (שָׁרַץ); and the multiplication of water animals was to be such that they were to "fill (מָלֵא) the waters in the seas."

This last expression exactly denotes the process which Science believes to have taken place. In the eyes of the scientist all land-animal life is simply the result of the overflowing of water-animal life. The faculty of pulmonic respiration is the product of violent and persistent effort, induced by that "filling of the waters" which, eventually rendering life in the waters intolerable, induced the trans-migration of overcrowded water animals to the terrestrial

[1] Gen. i. 24, 25. [2] *Ibid.* 20–22.

habitat. The point in the scale of evolution at which Science predicates the most violent transition, induced by the greatest stress of the struggle for existence—the point, therefore, at which she assumes the greatest pressure of over-population—is the transition from animal water-life to animal land-life. And this is exactly the point at which Religion, in pronouncing her injunction to "be fruitful and multiply," expresses herself in terms of extraordinary—but, as Science has conclusively shown, not exaggerated—emphasis.

CHAPTER XVII

THE ANTIQUITY OF MAN

"As regards Adam's fall, the discovery of Palæolithic man is that which has really given the greatest shock to received theological opinions; for this discovery, which is an entirely new one of the last half-century, though now confirmed by innumerable instances, not only flatly contradicts the narratives of recent descent from Adam and Noah, but it assails, in its most vital point, the whole dogma of Pauline Christianity."—SAMUEL LAING.

WE are now face to face with the famous problem of the origin and antiquity of Man—a problem which stands in the very forefront of the religious controversy. Ever since pulpit and platform first rang with the howl of execration which greeted the appearance of the *Origin of Species*, there has been growing up in religious circles an involuntary, but irresistible, conviction that, whether Mr. Darwin's theory is to be accepted or no, the scientific doctrine of man's enormous antiquity upon earth cannot be successfully disputed.

The importance which the solution of this problem must possess in relation to religious beliefs is to be measured by the certainty of the facts upon which the scientific doctrine is based. Theories affecting the formation of suns and planets, which carry us back into regions of thought that can be explored only through the telescopic lens of conjecture, cause the theologian but little anxiety. However plausible they may appear, they rest, after all, upon no more solid basis than that of scientific speculation; and if they threaten to give rise to any inconvenient conclusions, they can be readily cast aside with an airy "not proven."

But the question of man's antiquity cannot be thus easily disposed of; for it rests upon the impregnable foundation of solid facts. It is impossible to ignore a theory which has been acquiring fresh force from every discovery that Palæontology has made during the last fifty years. Whatever we may think of the teachings of Science with reference to the Nebular Hypothesis, we cannot disregard her lessons when she actually points to the relics of prehistoric man. And hence it is that the theologian turns with special anxiety to enquire how far the scientific theory of man's antiquity accords with Religion's doctrine upon the same subject.

It can scarcely be denied that the results of this enquiry have hitherto proved eminently unsatisfactory to the theologian. Upon this point it is almost universally admitted that there is an irreconcilable conflict between Science and Religion. Here, if anywhere, Mr. Herbert Spencer's allegation that "in the devoutest faith as we habitually see it, there lies hidden an innermost core of scepticism," finds its justification. Unable to contradict the evidence of the facts adduced, yet equally unable to reconcile that evidence with the opening chapters of Genesis, perplexed Theology continues to teach and to preach what, in her heart of hearts, she is more than half inclined to disbelieve.

To show that any such disbelief is entirely misplaced; to demonstrate that, for a verification of the truth of her history of the origin of man, Religion is scarcely less deeply indebted, than is Science herself, to the researches of modern Palæontology, is the object of the present chapter.

The first step towards the solution of this problem is to realize exactly the nature of the problem which we have to solve. Shortly stated, the position is as follows :—

From the recent investigations of geologists, it appears that man is of much greater antiquity than was until lately supposed. Modern explorers have unearthed from Quaternary strata thousands of stone implements, which are confidently pronounced by geologists to be undoubted human productions;

and it is now maintained by many of the leading palæontologists that human handiwork has been discovered in Pliocene, and possibly even in Miocene, deposits. Pictures and prints of implements, believed to have been manufactured by Neolithic and Palæolithic man, have rendered their general character familiar to all. The most ancient are pieces of flint, or other hard stone, broken or chipped into shapes irregular and uncouth, but still with the apparent purpose of being used for scrapers, chisels, or borers; while late Neolithic specimens exhibit flint adzes and spear-heads, but little inferior to those produced by New Zealanders at the present day. Rough calculations have been made with a view to fix the date of man's first appearance upon our planet; and though the figures are necessarily only approximate, Science avers that there is good reason to believe that he has existed for at least a period of between one and two million years.

Now, with this undoubted testimony of the rocks the Bible narrative appears to be in direct conflict. In its pages we find what is unquestionably intended to be a more or less connected history of man, from Adam down to historical times. There we see genealogies traced, and births, deaths, and ages recorded, with a particularity which enables the whole space of time covered by the Bible history, from Adam downwards, to be calculated with something like an approximate accuracy.

That these data are insufficient to enable us to fix the Bible chronology with anything like precision must, indeed, be admitted. In fact, the incompleteness of the data is sufficiently attested by the wide discrepancies between the conclusions arrived at by various Biblical experts. Thus, while Archbishop Ussher fixes the date of Adam's creation at 4004 B.C., Dr. Hales, following the Septuagint version, fixes the date of the same event as 5411 B.C.; while the Alexandrian reckoning gives 5503.

No opinion is here offered as to the comparative merits of these rival chronologies. It is sufficient to point out that

they exist. And it must be further remarked that this uncertainty as to the Bible chronology is accompanied—and, perhaps, caused—by two phenomena, either of which introduces the utmost uncertainty into the question. In the first place, apart altogether from variations and imperfections of the text, the Hebrew method of denoting numbers by letters introduces a possible source of error into all their chronological records ; and, in the second place, almost all ancient genealogies habitually confuse the term "son" with the term "descendant," and frequently use the term "father" as if it were equivalent to the term "ancestor." Thus it is no uncommon thing in antique records to find two persons spoken of as "father" and "son," when the relationship really intended by the author is that of ancestor and remote descendant ; and hence, in such documents, gaps which the author intended are overlooked by the reader, with the result that the period of time covered by the narrative is correspondingly curtailed.

That this criticism holds good of the Bible is clear beyond dispute. For not only do we find in a marginal note to Genesis xxi. 23, an admission by the authors of the Revised Version that the expression "my son nor . . . my son's son" there used is equivalent to "my offspring nor . . . my posterity," but we find Lot, who in Genesis xi. 27 and xiv. 12 is called (as he is clearly represented to have been) Abram's brother's son, called in Genesis xiv. 14, and again in Genesis xiv. 16, Abram's "brother," the terms "brother," and "brother's son" being treated as if they were equivalent. Clearly in a narrative which introduces such generalities as these, no chronological calculations can be fixed with certainty ; and we shall be doing the narrative neither more nor less than justice, if we claim that, upon questions of chronology, it is entitled to receive an interpretation more elastic than that which scientists have hitherto been willing to permit.

But, while offering these preliminary suggestions, we must not assert that of themselves they can afford any satisfactory

solution of the great problem, how to reconcile the Bible account of man's origin and antiquity with the corresponding theory of Science. There are at least two points in respect of which the two records appear completely irreconcilable. First, the mere question of years presents a hopeless discrepancy. Even if we stretch the Bible narrative to its utmost limit, so as to extend to a period of, say, eight, or even ten, thousand years, we are, so far as mere length of time is concerned, very little better off than before. Even such figures as these must be multiplied by at least a hundred before they can be brought into harmony with the calculations of Science. What, then, is to be said as to the truth of the Bible account of the first man, when his Palæolithic remains prove incontestably that man existed throughout the Quaternary, and probably far into the Tertiary, periods?

This very apparent difficulty is supplemented by another. The fact is that neither the conditions, nor the surroundings, of Adam are the conditions, or the surroundings, of the first man known to Science. The two theories do not fit at any point. The Bible, so say the scientists, represents primal man as having been endowed with a glorious nature and high faculties, which he subsequently partially forfeited. Geology, on the contrary, points to exactly the reverse process. The earliest cave-dwellers must have been so barbarous and rude as to have been scarcely distinguishable from the brutes; and the subsequent history of man has been a history of gradual progress and improvement, from worse to better, from lower to higher.

To these two objections Science demands a reply. What answer will Religion return?

The first objection certainly at first sight appears insuperable. How can the Bible narrative be reconciled with the Palæolithic human remains? But a moment's reflection will show that the difficulty is apparent only. The whole question is simply a question of terminology. Everything

depends upon our definition of "man." The truth is that the second objection suggests the solution of the first. The barbarous, brutish cave-dwellers, who are among the earliest human beings known to Science—nay, the comparatively civilized lake-dwellers—in virtue of what atttibutes, or on what grounds, does Science call them men? Let not our meaning be misunderstood. We are not accusing Science of a misnomer, nor do we dispute for a moment the title of Neolithic, or even Palæolithic, man to be classed in the genus "homo." We are prepared to be told that the answer to our question is to be found in the undoubted fact that the Palæolithic, as well as the Neolithic, remains exhibit unmistakable signs of being the productions of human design, the handiwork of intelligent and, in the case of the more recent specimens, even skilful workmen; and that hence it is not only just, but unavoidable, to conclude that, at the period referred to, man must have existed. All this we grant; but now we call for the scientist's definition of "man."

It is not a little remarkable that to this most reasonable demand on the part of Religion, Science is unable to return an answer. The truth is that, from the scientific point of view, man defies definition. Science never has defined, and never will succeed in defining, man—by any definition, that is, which possesses the essential requisites of at once including all members of the genus "homo," and excluding all others. The reason for the impossibility of so doing is grounded in the very nature of things. The evolutionist's theory, if true, absolutely precludes any such definition.

For consider the matter a little more closely. Accepting the theory of Evolution, we assert that the man of to-day has evolved from the ape—or, at least, from an ape-like being—of the past. We are speaking now of the physical part of man, as to which evolutionists are more or less agreed—we may even include the purely intellectual part; but we leave out of sight, for the moment, his religious faculties, as to which evolutionists are by no means

unanimous. Evolution, then, teaches that there has existed an immensely long chain of beings, starting with the ape-like being at the one end, and ending with man at the other, and exhibiting, in its course, every grade of transition between these two poles. The time which must have been occupied in the effectuation of this triumph of evolution must, we are told, have been immense—almost immeasurable ; and the process of change must have been correspondingly gradual—almost imperceptible. We welcome both these two last considerations, for they will help to explain our meaning. Now picture to the imagination this immense chain of creatures complete ; let it pass before the mind's eye with each link in its proper place. And let it be remembered that, in proportion as the chain is long—and it is *ex hypothesi* immense—so will the grades of transition be correspondingly infinitesimal. Now, which of these creatures are monkeys, and which men ?

Near either extremity of the chain it is easy to distinguish ; the anthropoid apes near the one end are readily separated from the human beings near the other by marks of distinction broad and well defined. But if we try to pursue the process far, we are met in time by a hopeless difficulty. Where the shades of gradation are infinitesimal, it is manifestly impossible to draw, in accordance with any rational basis, a distinct line of demarcation between two adjoining individuals, and to say of one of them, This is ape ; and of his companion, This is man. We do not say that such a line of demarcation cannot be drawn. If every individual in the series we have imagined is to be classed—and Science insists upon classifying every being of whom she treats—such a line obviously must, for practical purposes, be drawn somewhere. But what we would point out is, that the drawing of such a line will not be decided by any *ratio dividendi* based upon inherent differences in two adjoining individuals, (for such differences are, *ex hypothesi*, practically imperceptible,) but will be arbitrary and, to a certain extent,

irrational. Two independent scientists might conceivably, with equal justifiability, draw the line at two very different places, even though they were both actuated by the same views as to what the *ratio dividendi* was to be. And obviously, their conclusions as to where to draw the dividing line might—or, rather, would—be still further at variance, if their views as to the proper basis of distinction differed —if, for instance, the one attached greater importance, as a distinguishing feature, to the possession of a great toe, instead of a thumb, on the foot; whilst the other based his distinction rather on the comparative shortness of the arm, or the flatness of the jaw. In such a case it is quite conceivable that the two lines might be drawn very far apart, and yet that it would be quite impossible to justify, on any rational ground, the assertion that the one line was less correctly drawn than the other.

But assuming Science to have drawn her arbitrary line between two apparently identical individuals, and to have settled that "man" shall commence from that point, what sort of definition can she devise, which will include all the individuals above that point, while it equally excludes all those below? Such a definition is clearly impossible. The only conceivable description, which would be at once sufficiently inclusive and sufficiently exclusive, would be one based not on characteristics, but on individuals; which would be no definition at all.

Now, the case which we have just put is not purely hypothetical. It is of the very essence of Evolution. In theory, at least, the chain we have suggested is to the evolutionist a reality; and every fresh discovery of an intermediate link serves to emphasize with increasing clearness the real difficulty of classifying and defining. Nor does the difficulty diminish when we pass from pure theory to practical application. The scanty knowledge which we possess of these prehistoric beings increases our perplexity. Test them, for example, by Cuvier's celebrated definition

of man—"a mammiferous animal having two hands." If, as a matter of theory, it is difficult to fix the link in the ape-man chain at which four hands cease and two hands commence, how much more perplexing to classify, in this respect, a being whose hands we have never seen!

If, again, for Cuvier's definition of man we substitute the old scholastic definition of "a rational animal," we are no better off. To the evolutionist, Reason—the offspring of a union between Instinct and Language—is but a product of evolution. Between the instinct of the gorilla and the dreams of the philosopher, between the senseless cries of the gibbon and the noble diction of a Milton or a Shakespeare, there is a difference not of kind, but of degree. Each of these faculties is, in theory, at least, linked to its parent germ by a chain of graduated transition; and in either case the several grades of development are again imperceptible. Here, then, once more we find ourselves face to face with our old problem. Apart from the theoretic difficulty of fixing the exact point at which instinct becomes thought, and sound becomes language, how are we to classify beings whose thoughts we have never scanned, and whose voices we have never heard?

But, while drawing attention to these difficulties, we are very far from objecting to those scientists who classify even the earliest Palæolithic beings as "men." Science has an undoubted right to make her own classification, and, having done so, to frame, on the basis of that classification, the best definition she can; and her classification may for scientific purposes be perfectly correct. If she chooses to class the manufacturers of the Neolithic and Palæolithic remains in the genus "homo," and to frame her definition of man accordingly, we certainly shall not object to her so doing. What we do maintain and insist upon is, that she is entitled to so class them *only for scientific purposes.* Religion also is entitled, no less than Science, to make *her* own definition of man; and that definition, even though

at variance with the definition of Science, may for the purposes of Religion be equally true. Nay, more; the definition of Science, though scientifically true, may for Religion's purposes be absolutely incorrect. Hence it is that there may be no real conflict between the two histories at all, for Science and Religion may not be at one as to the subject under discussion. If Science tells us that man has existed on our planet for more than a million years, and Religion asserts that the first man came into existence not more than a few thousand years ago, it does not necessarily follow that there is in these two statements any contradiction; for it may turn out that by "man" Science means one thing, and Religion another. In that case both statements might clearly stand side by side, without inpugning one another; each might at the same time be equally true.

Now, the considerations which we have been discussing may serve to show that, on *a priori* grounds, it was not improbable that the respective views entertained by Science and Religion as to the classification of man would be different. If, as we have attempted to demonstrate, the difficulties of classifying, even for scientific purposes alone, are such that two scientists, guided by the same motives, and pursuing the same methods, might conceivably construct two very different classifications, each equally defensible and equally rational; how more than probable was it that two authorities, differing so widely from each other, both in object and method, as do Science and Religion, might—nay, would—arrive at conclusions widely different, though each for her own purposes equally true! There is nothing surprising in such a result. In the very nature of things it was inevitable. And it is for this reason that we justly complain that scientists, in accusing Religion of an anachronism which, if proved, must be fatal to the dearest hopes of mankind, have utterly ignored the one consideration which lies at the very root and core of the whole matter. The whole objection, in fact, is vitiated

by the fallacy of an *ambiguous middle*. Granted that Science has deliberately and, from the scientific point of view, correctly determined that, for her own purposes—which she cannot transcend—these prehistoric beings, including the earliest Palæolithic beings, shall be classed as "man"; is Religion under any necessity, is she even under any obligation, when dealing with these creatures for *her* own purposes, to accept the terminology of Science? May it not even be that such an acceptance would, in the nature of things, be not only unnecessary, but actually impossible. These are questions which deserve a recognition and an answer.

For, consider. When Science proclaims that man existed on earth a million years ago, what does she really mean? Is she, with Cuvier, asserting the existence of a "mammiferous two-handed animal"; or, with the Scholastics, of a "rational animal"; or, with the late Duke of Argyll, of a "tool-making animal"? What are hands, or breasts, to a Religion which teaches that it is better to enter into Life halt or maimed, rather than, having two hands, or two feet, to be cast into everlasting fire? What is Reason to a Theology whose boast it is that it hides its mysteries from the wise and understanding, and reveals them unto babes? Or what, again, is the tool-making faculty to a System which, deriding as utter vanity the works of men's hands, addresses itself primarily and essentially to the inward thoughts of the heart? We do not suggest that the beings for whom Religion claims humanity will—or even could—be wanting in these attributes. But what right has Science to assume, and, in the face of express declarations to the contrary, to insist, that they are, for the purposes of Religion's classification, *the* distinguishing features? And if they are not, what could be more irrational, what could be more unscientific, than to seek to force upon Religion a classification based upon traits which she disregards, and attributes which she sets at naught? Yet this is what scientists are habitually doing. They require that the first man of the Bible shall be the

first man of Science. Rightly concluding that the Neolithic and Palæolithic manufacturers fulfilled the conditions which entitle them to be ranked among those beings whom Science calls "men," they arbitrarily conclude that they must therefore be classed among those beings whom Religion calls "men." And this, in spite of the fact that, both by her definition, and by her history of man's origin, Religion has expressly declared that her classification is not only different from, but more exclusive than, the corresponding classification of Science.

In order to establish this proposition, we have only to realize the fact that Religion's classification of man is such as to avoid altogether those difficulties of classifying and defining in which, as we have seen, Science is involved. For when we pass from the standpoint of Science to the standpoint of Religion, we step at once on to firmer ground. Unlike Science, Religion separates man from the lower animals by a sharp dividing line; the distinction between them here is one, not of degree, but of kind. The Bible presents a perfectly clear and consistent theory on the subject; here we find man contrasted with "the beasts that perish." This, according to Religion, is the point of departure—the brute perishes, man does not.

Taking this distinction as the basis of her classification, Religion, in her very first utterances, gives us her definition of man. She distinguishes him from all other animals as "made and created in the image of God."

In these terms Religion defines "man": and in so doing commits herself to the apparently contradictory statements that man, in his inception, was both *made*[1] and *created*[2]—both "made out of something," and "made out of nothing." In order to understand this apparent self-contradiction, it is necessary to remind ourselves of a few of the facts which we have already discussed.

[1] Gen. i. 26; ii. 7. [2] Gen. i. 27.

We have first to recall the fact that by the term "made," as opposed to the term "created," is meant "constructed out of some pre-existing material"; while by "created" is meant "produced out of nothing." When, therefore, the 26th verse asserts that "God said, Let us *make* man in our image," it is necessarily implied that man was to be made out of some then already existing material.

We have also seen, that, so far as man's bodily form is concerned, this material is comprised in the term "the earth" used in the 1st verse, which term comprises all the matter of which the whole material Universe was subsequently composed, and which, in the 7th verse of the second chapter—"and the Lord God formed man of the dust of the ground"—is expressly stated to have constituted the material used for this purpose. It is clear, therefore, that the word "created," as applied to man, must refer to some part of man, other than his material form—some part which did not exist previously to this act of creation. What was this newly created part? Let us see whether Science can help us to an answer to this question.

The collapse of the theory of "Spontaneous Generation"—so far, at all events, as experimental proof is concerned—has left the evolutionist face to face with at least two mysterious and inexplicable blanks in his theory of Evolution. As Mr. Russel Wallace has pointed out, the development of the organic world is marked by successive stages, each one of which is separated from its predecessor by a barrier which can only have been originally crossed by the introduction from without of some new cause or power. The first stage is the passage from the Inorganic to the Organic—from the crystal to the vegetable—when the new attribute, which Mr. Wallace terms *vitality*, was first introduced. The next stage is the change from the vegetable to the animal, which is marked by the introduction for the first time of *consciousness*.[1] To these

[1] *Darwinism*, pp. 474–5 (1890 ed.). I omit Mr. Wallace's third stage, as many scientists may be disposed to dispute it.

two stages of Science, Religion adds a third. As Professor Drummond, in his *Natural Law in the Spiritual World*, has finely pointed out, Christ draws between the Natural Man and the Spiritual Man the same fundamental distinction as that which Science draws between the Inorganic and the Organic ; here again, according to Religion, is an impassable gulf, only to be spanned by the introduction from without of a new attribute—the attribute of spirituality.

Now, these three barriers are all clearly indicated in the first chapter of Genesis ; they form, in fact, the fundamental framework of the Bible Cosmogony. The author of Genesis, with an exact scientific accuracy, groups the phenomena with which he deals into a series of successive stages ; and he marks the barriers by which those stages are separated from each other by dividing lines which exactly tally with the classification of Science.

We pause not here to dwell upon the scientific prescience which is here displayed, but pass on to consider the question —as real and practical to Science as it is to Religion—How were these several dividing barriers originally crossed ? To this question Science is unable even to suggest an answer. That the barriers exist as barriers now, impassable from within, and yet that they must at some period have been crossed for the first time, she is fain to admit ; but the *how*, she is forced to confess, lies hidden in impenetrable mystery.

But when from Science we turn to Religion, we at once receive a candid, and highly characteristic, answer. Of the exact nature of the first passage from the Inorganic to the Organic Religion is silent ; but the gulf between vegetable and animal—between *vitality* and *consciousness*—and again the gulf between animal and man—between the *conscious* and the *spiritual*—was, she declares, in either case, spanned in the first instance by means of an act of *creation*.

Now, in either of these two cases, the word "created' necessarily implies the introduction of something new, the addition of some fresh attribute which did not till then

exist. What, then, was this new attribute which first came into existence with the production of the "moving creature," and distinguished it from all previously existing beings? And what, again, was the still newer creation, which first came into existence with man, and similarly distinguished him from the lower animals? On seeking an answer to these two questions, it becomes clear that in either case the subject of the act of Creation was not the material part of the new organism; for as we have already seen, these material parts are represented to have been not *created*, but *formed* out of a then already existing material. And, further, as regards man, it is clear that, in his case, the subject of the act of creation was not his *conscious animal life*, for the text represents that this was, at the date of man's creation, already existent, and was the subject not of creation, but of *inspiration*: "And the Lord God *formed man of the dust of the ground*, and *breathed into his nostrils the breath of life*."[1]

These considerations almost force upon us the inference that the new attributes, represented by the Bible to have been introduced by the two acts of creation referred to, were the two distinguishing characteristics already alluded to—namely, in the case of the animal kingdom, *consciousness*; and in the case of man, *spirituality*.

The reasonableness of this conclusion will be seen at a glance, if, in the light of the foregoing remarks, we tabulate the characteristic features which the Bible attributes to each of the several classes into which it divides the Cosmos, in their successive order of production. It will be recollected that Religion divides the Universe into the Inorganic and the Organic. The latter she sub-divides into the vegetable kingdom and the animal kingdom; and the latter she once more sub-divides into the water-population, the air-population, and the land-population, the last of which includes man; thus:—

[1] Gen. ii. 7.

	A. Inorganic World	B. Organic World		
	1. The Earth	2. Vegetable Kingdom	3. Animal Kingdom	4. Man
			Inhabitants of Water and Air / Inhabitants of Land	
Attributes	(1) Material Form (Creation)	(1) Material Form (2) Vitality	(1) Material Form (2) Vitality (3) Consciousness (Creation)	(1) Material Form (2) Vitality (3) Consciousness (4) Spirituality (Creation)

The inference that the "creation of man"—as opposed to his "formation"—refers to the introduction of his spiritual attributes, is rendered still more probable when we further consider the expression "in the image of God," with which man's *creation* is associated: "And God created man in His own image, in the image of God created He him."[1] As the great Author of Christianity has Himself defined God as "a Spirit," and has further given us this negative definition of a Spirit—"a Spirit hath not flesh and bones"—it is at least a fair supposition that the part of man which was the subject of this act of "creation" must have been that spiritual part by which the Bible distinguishes man from the lower animals.

Here, however, we are met by what, at first sight, looks like a difficulty, but is in reality a confirmation of the interpretation advanced in the foregoing pages. A comparison of Genesis i. 27 with the preceding verse shows that man is represented to have been, not merely *created* in God's image, but also *made* in God's image:—

"26. And God said, Let us *make* man in our image after our likeness. . . . 27. And God *created* man in His own image, in the image of God created He him."

Do not these two verses, read together, either discredit the distinction which we have drawn between "create" and "make," or else lay Religion open to the charge of Anthropomorphism, so often brought against her? Claiming, as we do, that the expression "created in the image of God" refers to man's spiritual part, and further claiming that a distinction has to be drawn between the terms "create" and "make," so that the expression "made in the image of God" must be referred to some other part of man than his spiritual part, which was the subject of the expression "created in the image of God," does it not follow that the expression "made in the image of God" must refer to man's material part?

[1] Gen. i. 27.

And if so, is not the statement a direct assertion of that conception of God which Science brands as anthropomorphic?

Not so. A careful examination of Religion's account of the origin of man not only discloses a perfect accord with the most advanced theories of modern Science, but also fixes the interpretation, advanced in the foregoing pages, of the "creation of man" as, not merely a permissible, but the only permissible, interpretation. Let us justify this assertion.

A glance at the fourth column in the foregoing table will show that Religion regards man as possessing four parts: (1) material form; (2) vitality; (3) consciousness (which in man, as distinguished from the lower animals, has attained to that high state of development in which it is more properly termed intellectuality); and (4) spirituality. It is obvious that, of these four parts, the last two—namely, intellectuality and spirituality—both of which are wanting, wholly or partially, in the lower animals, specially distinguish man from the lower animals, and consequently constitute, in Religion's view, his points of special resemblance to God.

Now, a reference to Genesis ii. 7 and i. 26 and 27, will further show that Religion asserts that "man," as regards his origin, was subjected to four different processes—namely, (1) formed, יָצַר (*yatsar*), (2) breathed into, נָפַח (*naphach*), (3) made, עָשָׂה (*asah*), and (4) created, בָּרָא (*bara*); nor will it require any very extraordinary perspicacity to enable us to perceive that, of these four processes, process (1) obviously corresponds with part (1); that process (2) is expressly stated to have been applied in respect of part (2); and that processes (3) and (4) are allocated to parts (3) and (4) by the fact that, unlike processes (1) and (2), they are used expressly in connection with the remarkable expressions "in the image of God," and "after God's likeness."

Having thus observed that Religion predicates of the being whom she calls "man" four distinct parts; that she represents him to have been, in respect of his origin, subjected to four distinct processes; and that these four processes

are respectively allocated to these four parts in the manner above mentioned; the question at once arises: How far does Science endorse, or negative, the propriety of these assertions of Religion? Let us endeavour to briefly answer this question.

Like Religion, Science has *her* own theory as to the origin of the being whom *she* calls "man," a theory which she sums up in the single word, Evolution. And, equally with Religion, Science is bound to justify the grounds upon which *her* theory is based. Now, among the most important of the facts upon which Science relies for this purpose are those which are furnished by the particular branch of study known as Embryology. To an evolutionist who, on other grounds, has come to the conclusion that man is, after ages of development and modification, a direct descendant from an organism of which the Amœba is usually taken as the simplest modern representative, the discovery that, even at the present day, every human embryo starts from a cell of amœba-like type, and passes through the successive stages of fish, reptile, and mammal before reaching that of man, is a fact the significance of which it is difficult to exaggerate; and he rightly regards these facts of embryology as affording the most convincing and reliable evidence in support of his theory. Let us, then, apply to Religion's doctrine of the origin of the being whom *she* calls "man" the same test as that which Science applies to her own theory of man's origin—namely, the test which is furnished by embryology.

First, Religion asserts that, as regards his material part, man was "formed." The word *yatsar*, which is thus rendered, means to "fashion," "model," or "mould," as a potter moulds or fashions a lump of clay. This is the interpretation of *yatsar* which Hebrew scholars have given time out of mind; and it has subjected Religion to many a jeer from lips which ought to have been better taught. What, then, has Science, to say on this subject? Is there anything among the truths of embryology to suggest that it is probable

that man's body *was* originally so "formed"? And does embryology exhibit any similar process in the formation of the human body to-day?

In reply to these questions we cannot do better than cite the late Professor Huxley's well-known description, written in the year A.D. 1860, of the process which a salamander's egg undergoes, and to which every human being is similarly subjected during the period of gestation :—

"The *plastic matter* undergoes changes so rapid and yet so steady and purpose-like in their succession, that one can only compare them to those *operated by a skilled modeller upon a formless lump of clay.* As with an invisible trowel, the mass is divided and sub-divided into smaller and smaller portions. . . . And, then, it is as if a delicate finger *traced out* the line to be occupied by the spinal column, and *moulded* the contour of the body; *pinching up* the head at one end, the tail at the other, and *fashioning* flank and limb into due salamandrine proportions, in so artistic a way, that, after watching the process hour by hour, one is almost involuntarily possessed by the notion, that some more subtle aid to vision than an achromatic, would show the hidden artist, with his plan before him, striving *with skilful manipulation* to perfect his work."[1]

In this description of the process, which Science tells us attends the early stages of the corporeal part of every human being to-day, let us examine well the material words which we have here italicized: "*Plastic matter . . . operated by a skilled modeller upon a formless lump of clay. . . traced out . . . moulded . . . pinching up . . . fashioning . . . with skilful manipulaton.*" Ask a Hebrew scholar to translate these English terms into their Hebrew equivalents, and he will render them all by one word: *yatsar.* Yet the very critics who accept, with deserved admiration, Professor Huxley's graphic description of the process, presume to deride Religion's identical assertion.

In the next place, Religion asserts that man's *vitality* was *breathed* (*naphach*) *into his nostrils.* What has Science to say to this? Is there anything in embryology to favour, or discredit, the propriety of this assertion?

[1] *Lay Sermons*, p. 227 (1891 ed.).

Most students of medical jurisprudence know that, in cases of suspected child-murder, in order to ascertain whether the child was born alive or dead, the buoyancy of its lungs is tested. If this test reveals that the oxygen of the atmosphere —the scientific equivalent of what Religion calls "the breath of life"—has been "breathed into the child's nostrils," then it is a case of infanticide ; if, on the other hand, no breath has been drawn, then it is a case of still-birth. In other words, breath or no-breath is to Science the test of vitality or non-vitality. Yet this distinction, which is to Science so very real that it is admitted as *the* test in the most momentous of all issues, is laughed to scorn when Religion puts it forward as *the* distinguishing phenomenon which marked the origin of human vitality.

Nor have we yet done quite full justice to the exact propriety of the term *naphach* as here used. This word occurs in Ezekiel xxxvii. 9 ("breathe upon these slain"); and in Jeremiah xv. 9 ("she hath given up the ghost," literally, "she hath *breathed out* her soul"—נָפְשׁ *nephesh*) ; and in other passages in a similar sense. But the commonest use of the word is for *blowing up a fire with bellows*. Now, what is the mechanical contrivance by means of which the first breath, which Science regards as the first signal of the entrance of vitality, is effected ? Clearly, this is performed by means of the lungs, which in respect both of their action and mechanical principle are exactly identical with a pair of bellows. Hence we see not only that Religion is scientifically correct in predicating the inrush of breath as one of the distinguishing stages in the production of man, but that, in describing the process, she has made use of a word which connotes, with singular propriety, the mechanical contrivance by means of which this inrush is effected.

Turning, next, to part (3), although there are a few notable exceptions, scientists are practically agreed that man's intellectual powers have evolved from corresponding faculties —similar in kind, though inferior in degree—which are found

in the lower animals. They are the product of Evolution, in the sense that they were not, in the case of man, a new creation, but are simply higher developments of faculties which pre-existed man's first appearance. But this is simply to say that they were the product of the process of "making," as opposed to the process of "creating." In other words, here is a part in respect of which Religion is scientifically correct in asserting that man was neither *formed*, nor *breathed into*, nor *created*, but *made*.

With regard to "Spirit," Science knows—or, at all events, professes to know—but little. But there is one point in respect of Spirit upon which Religion and Science are quite agreed. Religion asserts—and Science does not dispute the assertion—that Spirit does not exist in the lower animals. In other words, if it exists in man at all, it came into the world *for the first time* when man was produced. It is, in fact, a part in respect of which he was *created*.

Thus, to sum up the foregoing remarks, there is scientific propriety in Religion's four-fold account of the origin of man. If she had omitted any one of her four processes, her history would have been scientifically incorrect ; for it would have left a part of man unprovided for—a part to which her history, as thus mutilated, would have been inapplicable. And this scientific propriety extends from the general scheme of her history to the details of which it is composed. She is right in saying that man's material body is the product of the process which she calls *yatsar*. She is right, both physically and mechanically, in her description of the process which she calls *naphach*. She is right, from the evolutionist's point of view, in asserting that man possesses a part which is the product neither of *yatsar*, nor of *naphach*, nor of *bara*, but of *asah*. And she is right, so far as Science can test the accuracy of the assertion, in stating that man possesses a part which was the product neither of *yatsar*, nor of *naphach*, nor of *asah*, but of *bara*.

Thus we find, on examination, that numerous considerations

converge towards the conclusion that the new attribute represented to have been introduced into the world by the creation of man is spirituality. There, is, however, one further consideration by which the conclusion, thus strongly recommended, is fairly forced upon us. This final consideration is the argument furnished by Religion's doctrine, propounded in the third chapter of Genesis, as to the introduction into the world of Death. The argument, which is too long for insertion here, will be fully treated in a separate chapter,[1] to which the reader is referred. It will be found, from a perusal of that chapter, that Religion's treatment of death is consistent, and only consistent, with the interpretation here advocated of the creation of man, and therefore renders that interpretation not merely permissible, but, from the point of view of scientific criticism, imperative.

But if we accept that interpretation, then it necessarily follows that the Bible endorses the views advanced by such authorities as Mr. Mivart and Mr. Russel Wallace, that man's material and physical parts are the product of the law of Evolution ; whilst his spiritual part, in its inception, was the product of a process described as Creation. And thus the account of the origin of man, which Religion gives in the opening chapters of Genesis, may be summed up as follows : that God, in His purpose of creating a spiritual man, caused, by the operation of Law (*Λόγος*), which Law Science calls "Evolution," animal life to develop from lowly and humble forms up to something higher than the ape—something, we may add, higher than Neolithic man ; that, in the course of this evolution, there came at length a time when this being became fitted, by virtue of his physical and intellectual proficiency, to receive and possess this attribute of spirituality ; that when this point of development was attained, and not till then, God, by a process which is described as creation, conferred this new and transcendent gift upon

[1] Chap. XIX.

a single member of the race, who may be presumed to have been the first member who had attained to the required standard of physical and mental perfection. Until this point was reached, and until this new attribute had been conferred, whatever this being might be from other points of view, from the point of view of Religion he was not man; for he had not been "created in the image of God"—he had not become spiritual.

We conclude, therefore, that the distinction which the Bible draws between man and not-man is based upon the possession of an attribute which does not perish—the attribute of spirituality; and if Religion states that this distinctive feature was first impressed upon man not more than some thousands of years ago, she is making a statement which never has been, and never can be, disproved by Science; for of this feature Science professedly knows nothing. Thus the assertion that the Bible conflicts with the scientific discoveries of Neolithic and Palæolithic man cannot be for a moment sustained. All that Religion does, in relation to those prehistoric beings, is to deny to them the possession of that spiritual attribute, which she claims as the essential basis of her classification of man.

CHAPTER XVIII

THE ANTIQUITY OF MAN (*continued*)

"It is a biological law that the higher the organisms the longer they take to evolve."—HERBERT SPENCER.

TO the interpretation advanced in the last chapter two objections will very possibly be put forward. In the first place, we shall doubtless be asked how we account for Religion's mysterious statement as to the miraculous origin of Woman. Granting that our interpretation brings the Bible account of the origin of man into harmony with the views of Science, how about Woman? Does not Religion's account of the origin of Eve suggest a catastrophe of a nature altogether discredited by Science?

To this objection we answer that our interpretation has this transcendent merit—that, although it does not remove the catastrophe, it explains and justifies it. Let us explain.

Having regard to the admitted facts as regards Biogenesis, Science cannot now deny the fact that events which virtually amount to miracles have occasionally taken place. Unable to explain the introduction of life into the inorganic world except through a miraculous intervention, and compelled to admit a similar origin for consciousness, Science is forced to acknowledge that miracles have occasionally taken place in the history of the Universe. What she may say, and what she does say, as regards the miraculous, is this: that the available evidence is such that we are compelled to conclude that miracles have taken place very seldom; and therefore,

presumably, only upon occasions of great importance, and for very pressing reasons. Now, what our interpretation does, is to suggest a reason, which may conceivably have been quite sufficient to account for a miraculous intervention in the production of Woman. Observe what that reason is.

The Bible narrative, according to our interpretation of it, alleges that man, so far as his physical and mental parts are concerned, is the product of an evolution from a lower ape-like being. It represents that the beings, who were the physical and mental ancestors of the human race, were allowed to evolve, until the exact stage of development was reached at which the evolving being became fitted to receive the gift of spiritual life; and that this gift was then conferred upon a single member of the race by an act of creation, whereby this spiritual life, which did not till then exist, was miraculously implanted.

Now, it is obvious that, in the natural course of evolution, the probabilities would be immensely in favour of the required point of development, fitting its possessor to receive the gift of spirituality, being reached by one individual before it was attained by any other individual. The chances would obviously be immense against two or more individuals attaining the required point of development exactly, or even approximately, at the same time. If this be true of the race as a whole, still more strongly does it hold good of the two sexes. That the required standard of development should have been reached quite, or even nearly, simultaneously by a male and a female, was in the highest degree improbable. Hence, at the time when Adam first attained the required standard, it is in the highest degree probable that there was no other male being, and still more probable that there was no female being, possessed of so advanced a development as would have fitted him or her to receive the same mysterious gift.

Observe, then, the position. Adam having acquired the attribute of spiritual life at a time when there was no other being, and in particular no female being, capable of acquiring,

or possessing, the same attribute, the question at once arose, How was this gift to be perpetuated? If things had been left in this position, spiritual life must have died out again when Adam died, simply from want of any individual sufficiently highly evolved to acquire and possess this life by communication from Adam. In these circumstances only two ways are conceivable in which the desired result could be attained. Either the propagation must stand over until some other individual should evolve up to the required standard—an alternative which might, not improbably, involve a delay of many generations, during which Adam would in the natural course of events die,[1] without transmitting the spiritual attribute which he possessed ; or a suitable companion must be provided, so highly evolved as to be capable of receiving and transmitting this mysterious life. The Bible represents that the latter alternative, which it must be admitted, seems in the circumstances to have been the only feasible course, was adopted ; and that a "help meet for" Adam was provided by a miraculous intervention.

Those who object to this record as incredible, must either deny that miracles have ever occurred—a proposition which is directly negatived by the now-established law of Biogenesis ; or, granting that miracles have occasionally occurred, they must show that the present occasion was not of such pressing moment as to justify the belief that it gave rise to a miraculous intervention—a contention which, as we submit, is obviously refuted by the circumstances of the case. And thus, by furnishing an adequate reason for a miraculous interposition, the interpretation here advocated recommends itself, by placing those who reject it in a dilemma. Either they must deny—which Science forbids them to do —all miracles ; or they must allege—which they cannot—an insufficiency of occasion in the present case.

And, in the next place, it may perhaps be objected that

[1] Upon the subject of Death, see Chap. XIX., *post*.

the argument assumes that all existing human beings are the descendants of a single pair of individuals, who lived not more than a few thousand years ago. Such a space of time, it may be urged, is wholly insufficient to account for the development of the wide variations which are found in the numerous races of mankind in existence at the present day.

Before attempting to answer this objection, it will be well to make a few preliminary observations with reference to the considerations upon which it is based.

On *a priori* grounds it was, perhaps, not improbable that Science would exhibit a tendency to under-estimate the probable effects of such a period as sixty, or eighty, or even a hundred, centuries, in the production of variations. To a palæontologist, accustomed to measure years by millions, a period of eight, or even ten, thousand years may seem of little account. Yet it is, after all, a long time; and it is indisputable that vast changes may, and frequently do, take place in a hundred, nay, in fifty, or even twenty, years. Under favourable conditions of environment evolution works with great rapidity. Twenty or thirty years, according to Mr. Darwin, are sufficient to effect "an astonishing improvement in many florists' flowers," without any variation of environment, and in circumstances in which the only precaution taken by the florist is to pull up the "rogues," so as to ensure not breeding from his worst specimens. Fifty years' unconscious selection in the case of two flocks of Leicester sheep, purely bred, produced such effects that, at the end of the period, the sheep of either flock "had the appearance of being quite different varieties." If, then, in such cases, without any modifying influence derived from differences of climate, or from variations of food, temperature, or habits of life, twenty or fifty years' unconscious selection could, unaided, produce such marked changes of structure, who can say what modifications would be effected by six or eight thousand years' exposure to differences of climate (with

resulting differences of mode of life, feelings, and ideas) as wide as, say, those of Iceland and China?

In one of the most delightful of his odes Horace playfully protests the constancy of his affection, by asserting that it was proof even against the influences of scenery and climate :—

"Pone me pigris ubi nulla campis
Arbor æstiva recreatur aura,
Quod latus mundi nebulæ malusque
Jupiter urget;
Pone sub curru nimium propinqui
Solis, in terra domibus negata;
Dulce ridentem Lalagen amabo,
Dulce loquentem."[1]

Such an authority cannot, perhaps, be seriously cited in support of a scientific, still less of a theological, proposition; nevertheless, it is true to Science, and therefore to Religion, to the extent, at least, that it recognizes something of the enormous influence which Environment exercises upon Organism. Science carries the principle further still, and extends to species what the poet treated as individual. Mr. Herbert Spencer, in his essay on "Personal Beauty," has conclusively shown how vitally feelings and ideas (which are, of course, largely dependent upon environment) influence expression; and further, how expression, having a natural tendency, under the influence of heredity, to become fixed, ultimately plays an active part in the formation both of the muscular and osseous structures of the head and face. His arguments in support of this position he sums up in the pregnant formula, "Expression is feature in the making."

[1] "Place me where on the ice-bound plain
No tree is cheered by summer breezes,
Where Jove descends in sleety rain,
Or sullen freezes;
Place me where none can live for heat,
'Neath Phœbus' very chariot plant me,
That smile so sweet, that voice so sweet,
Shall still enchant me."
—Horace *Odes*, i. 22 (Conington's Translation).

In view of these considerations, and recollecting that the effects of the several influences are cumulative, it seems scarcely possible to over-estimate the variations, mental and physical, which six, or eight, thousand years might suffice to produce. The infancy of species, like the infancy of individuals, is doubtless characterized by an extreme plasticity. Imagine, then, two plastic races, subjected to the wide variations of environment which our planet affords; the one scorched by the suns of Arabia, the other pent in Siberian snows. Add to these influences the effect of a rigid in-breeding, ensured throughout the inhabited globe by the interposition of mountains, seas, and oceans, not to mention the still closer restrictions imposed, at an early date, by the sanctions of national and tribal prejudice. Add, further, the differences in the modes and habits of life, and, consequently, of feelings and ideas, which must necessarily accompany vast differences of country and climate—differences in opportunities for action, both mental and physical; in the necessity for exertion in the pursuit of food, or escape from enemies; and, later, in the incentives to scientific, or artistic, effort—and then say whether six, or eight, thousand years might not suffice to account for the number and extent of the variations, which now distinguish the several families of the human race, from the Englishman to the Chinese, from the Laplander to the Hottentot.

But we shall doubtless be told that such *a priori* considerations are beside the mark; that history is against us; that, to borrow the words of Mr. Samuel Laing, in his well-known work, *Modern Science and Modern Thought*, "the negro existed, with all his present characteristics, more than five thousand years ago, and has not varied perceptibly during that period." Well, even if we accept this statement as fact—and the mists of five thousand years preclude anything like historic certainty for an assertion so particular—still we submit that the Bible narrative stands in no way impugned.

The truth is that Religion is not careful to answer Science

in this matter, for the supposed objection does not present to her any real difficulty. No refutation is, in fact, necessary. For is she not here entitled to set up the plea known to lawyers as "Confession and Avoidance"? The objection assumes that all existing human beings are represented by the Bible to be the physical descendants of Adam. But does the Bible really commit us to any such proposition? Spiritual life, it should be remembered, is one thing; the faculty of acquiring, or possessing, such a life is quite another. The first chapter of Genesis, as we have seen, draws a radical distinction between these two. The life itself is there represented to have been, in its inception, the product of an act of creation; the faculty to receive and possess that life is, on the contrary, represented to have been acquired by the process of evolution. But if this be so, then it would almost necessarily follow that every member of the human race (using that term in the scientific sense) would naturally, by the process of evolution, and irrespectively of whether or no he were physically descended from Adam, acquire the *faculty for possessing* spiritual life as soon as he should have evolved up to the required standard of physical and intellectual proficiency; and direct physical descent from Adam would, therefore, appear to be in no way necessary for the acquisition of this faculty. If we choose to class a being so endowed as "man," we are at liberty, even from the theological point of view, to do so, provided that we remember that such a being has fulfilled only one of the two conditions connoted by Religion's two-fold definition of man, "*made and created* in the image of God"; and that, from the point of view of Religion, he is not, strictly speaking, entitled to be classed as "man," until he has also fulfilled the second of those conditions—the acquisition of the spiritual life itself.

Now, we are clearly committed to the admission that every being possessed of this spiritual life is Adam's *spiritual* descendant. But does it necessarily follow that he must also be his *physical* descendant? Why should the spiritual

element in man be transmissible only—or at all—by physical means of propagation? Do not both Science and Theology alike point to the opposite conclusion? "That which is born of the flesh is flesh, and *that which is born of the spirit* is spirit." All that we have endeavoured to show with reference to the origin of the spiritual life is, that the Bible represents this to have been, *at its inception*, the product of creation. But when once it had come into existence (even in a single individual or pair of individuals), then immediately the problem changes altogether. However inexplicable the origin of life may be, its mode of reproduction is tolerably well understood. Here the only required factors are a life-containing germ, in contact with a suitable environment—a favourable soil, a genial atmosphere, with proper conditions of light, heat, and moisture. Given these, and Nature will do the rest without any appeal to the miraculous. And if so, may—or, rather, must—it not be that spiritual life is capable of being propagated by spiritual contact alone? That this is the Bible doctrine can scarcely be disputed. "For in Christ Jesus I have begotton you through the Gospel"; "Onesimus, whom I have begotten in my bonds"; "My little children, of whom I travail in birth again until Christ be formed in you"; are all expressions which relate to the transmission, not of physical, but of spiritual, life; and they propound a doctrine which reappears, under a slight change of metaphor, in the well-known passage, "I have planted, Apollos watered, but God gave the increase."

If it be desired to still further strengthen the foregoing view, it may, perhaps, be successfully maintained that the Bible itself gives positive support to the conclusion, that there have been human beings (using that term in the scientific sense) *not* physically descended from Adam, and not possessing even the faculty for acquiring spiritual life. For how else, it may be asked, is it possible to justify the apparently harsh and intolerant treatment so constantly enjoined upon the Israelites in their relations with the "heathen who knew not God?"

Between "God's people," who prided themselves on their direct descent from Adam, and the surrounding "nations," who displayed no knowledge of, and therefore, presumably, no capacity for, God, the Bible seems to indicate a difference of kind, rather than of degree. The two are separated by a gulf forbidden to be crossed by intermarriage, and widened by a policy, persistently enjoined towards the inferior race, not of conversion, but of extermination.

So, too, the genealogy of Christ, contained in the third chapter of St. Luke's Gospel, which traces His lineage direct to Adam, may, perhaps, be thought to lend further support to the same conclusion. For what point could there be in emphasizing such a pedigree, except on the assumption that it indicated a source of origin not shared by all? It is as if, in vindicating the *humanity* of the "Son of Man" by tracing His genealogy back to Adam, Religion were distinguishing Him in this respect from beings possessed of another, and *less human*, lineage.

Once again, the mysterious verses with which the sixth chapter of Genesis opens may possibly point to the same conclusion :—

> "And it came to pass, when men began to multiply on the face of the ground and daughters were born unto them, that the sons of God saw the daughters of men that they were fair; and they took them wives of all that they chose. And the Lord said, My spirit will not abide in man for ever, for in their going astray they are flesh." [1]

Without attempting a complete explanation of this difficult passage, it is sufficient for our present purpose to note that it appears to draw a distinction between human beings who were "sons of God," and human beings who were not, in the same sense, "sons of God." And that this distinction is based upon the possession, in the one case, and the non-possession, in the other case, of the *spiritual attribute*, is suggested with a strange emphasis by the added words which immediately

[1] Gen. vi. 1–3 (introducing the variations suggested in the marginal notes of the Revised Version).

follow : " *My spirit* will not abide in man for ever, for in their going astray they are flesh." If we may hazard an opinion on so obscure a passage, we would suggest that a distinction is here being drawn between human beings possessed of the spiritual attribute, and other human beings who, not only did not possess this attribute, but who had not evolved up to a sufficiently high stage of development to be capable of acquiring or possessing it.

But any such speculations, however interesting from an academic point of view, are, for practical purposes, unnecessary to our argument. All other considerations apart, the supposed objection stands, as we submit, self-condemned ; for it is vitiated by the fallacy of being founded upon a total misconception of the nature of those characteristics, on the basis of which Religion formulates her classification of man.

In the explanation, which we have thus endeavoured to propound, of what has often been regarded as a glaring discrepancy between Science and Religion, is there anything fanciful or unreal ? Surely not. With a different definition of man, and a different *ratio dividendi*, it was almost impossible—it was certainly infinitely improbable—that Science would draw her dividing line at the same point as Religion. And it is a significant fact that Science has drawn her line at a lower, and not a higher, point than that of Religion. Evolution teaches that the lowly forms of life come before the higher, the simple precede the more complex. And if spirituality really is a far higher form of life than mere intellectuality, must it not follow, as a necessary corollary, that the standard which Science sets up as the distinguishing mark of man would, in the course of evolution, be reached long before that infinitely higher standard which is proposed by Religion ? Probably few will be disposed to dispute the proposition that the most valuable, as it is the most subtle, trait in the human character is Affection. Immeasurable as is the value of Intellect, that of Affection stands higher still ;

for it is the concentrating power which binds together the fabric of Society. That primary and elemental manifestation of Force which is known as "molecular affinity" in the molecule, and as "gravitation" in the mass, is the concentrating force of the material Universe. Eliminate this single influence, and worlds and systems instantly dissolve into chaos. Such a force in the social system is affection, equally elemental and equally essential. Eliminate this single bond, and Society melts into social chaos. Those only who have realized the transcendent value of this unpretentious, but ubiquitous, influence can appreciate in any degree how profoundly scientific is the truth which Religion enunciates, when she claims this force, in its perfection, as the essential attribute of God, in her central doctrine that "God is love." This is the recognition of the highest of all. Thought, knowledge, speech, writing, art, science, intellectual civilization, all the brightest ornaments of our physical existence, "if they have not love, are nothing." What, then, must be the perfection of those organs which are to enable man to correspond with a Being whose essential attribute is the quintessence of Love? If the physical eye, with its exquisite mechanism for receiving and transmitting the tiny pulsations of ethereal waves, is an organ of almost perfect function and design, how infinitely more delicate and responsive must be that spiritual eye, which, vibrating to the rays of the spiritual light of Love, will in time enable man to see God! And if so, is there not a strangely scientific consistency in the dates which Science and Religion assign to the first appearance of those two different beings whom they respectively call man?

Test the case for a moment by reversing the position. Suppose that Religion had claimed for her Spiritual Man an antiquity of a million years, and that Science, in the course of her researches, had suddenly lighted upon some undoubted proof that Rational Man had not existed for more than six thousand years, would not such a proof have been fatal to the claim of Theology? Mr. Herbert Spencer states it to be a

"biological law that, the higher the organisms, the longer they take to evolve." This is true both of individuals and of species. How, then, could that which professes to be higher and more complex claim to have preceded the simpler and lower? Nay, if this law holds good, we must go further still, and say that her very claim to superiority precludes Religion from asserting even an equal antiquity. It is clear that in the history of our planet, the Inorganic (the lower) must have preceded the Organic (the higher); and on the same grounds we cannot but recognize a corresponding relationship between the Rational and the Spiritual. For the two cases are precisely analogous. They are alike in the differences of complexity which they respectively exhibit; as the Inorganic is lower than the Organic, so is the Rational lower than the Spiritual. They are alike also in respect of that mysterious dividing gulf which is present in either case—that impassable gulf which, as Science now admits, does exist between the Inorganic and the Organic; that gulf by which Religion also severs the Intellectual from the Spiritual, when she introduces the higher kingdom as the product of an act of *creation*. Hence we are compelled to seek for Spiritual Man a later date of origin than for Rational Man. To do otherwise would be to contradict a known law. And it is not a little remarkable that Religion, in fixing, as she has done, with that fearless and uncompromising candour which is everywhere her grand characteristic, the date of the first appearance of Spiritual Man, should, unknown to Science, unknown even to herself, have assigned a date which, when tested by Geology, is found to precisely satisfy the requirements of Evolution.

It is unnecessary here to dwell at any length on the second of the two objections which were mentioned in an early part of the last chapter; for the considerations which apply to the main proposition under discussion apply also to it with equal force. On *a priori* grounds, so far from being impossible, it was highly probable, that rationality would exist long,

and evolve to a high degree of proficiency, before spirituality appeared. And in support of this probability Mr. Spencer himself supplies us with something very like actual proof, when he admits "that in many places there are tribes who have no theory of creation, no word for a deity, no propitiatory acts, no idea of another life"[1]—in a word, no religion. For what does this prove? Surely it furnishes the strongest and most direct confirmation of the Bible chronology.

For does it not show that man may exist for many ages, and advance far along the paths of intellect and civilization, before attaining any perception of—and must we not add, any capacity for—God? And what is this, but to give us an actual demonstration of a state of things, which the voices of Religion and Science unite in proclaiming, that Rational Man preceded—aye, long preceded—Spiritual Man? Is it not to remove our contention from the region of speculation to the region of fact? Is it not to state, in terms of actual history, a proposition which Science affects to deride as an impossible myth?

In closing this chapter, it will be well to remind ourselves what is the immediate scope of the present argument. In a later portion of this work the attempt will be made to prove *positively* the reality of Religion's alleged spiritual life. At present we are, upon this point, concerned only with the *negative* defence of the opening verses of Genesis, by showing that the statements which they contain, with reference to the origin and antiquity of man, are not in conflict with the facts of Science. Hence it is that no objection can be taken to our defence on the ground that we have not defined "spirit," nor *proved* that man is spiritual. For the question at present before us is not "What are the *proved facts* of Religion?" but "How far do the *allegations* of the Bible tally with the discoveries of Science?"

[1] *First Principles*, p. 13 (5th ed.).

But in endeavouring to answer this question we have simultaneously, and unavoidably, transcended the negative limits of defence. The mere fact of coincidence (if established) between the allegations of Religion, and the teachings of Science, has a positive value of its own. If in a carpenter's workshop we should discover two rough chips of wood, dissimilar in shape, and having undesignedly irregular outlines; and if, on placing them side by side, we should discover that they precisely tallied, that every prominence on the one was answered by a corresponding indent on the other, so that, when brought together, they exactly fitted; it would be difficult to persuade us that they were not chips from the same block. And if, on comparing Religion with Science, we should find that their outlines, so far as they are known to us, exactly correspond, so that every point of contact is a point of coincidence; it would be difficult, while claiming for Science that she is a fragment from the rock of Truth, to attribute to Religion a less close relationship with the same infallible source. Possibly, it cannot yet be claimed that the chain of established coincidences is complete; but it should be remembered that the establishment of every fresh point of identity not only adds to the completeness of the chain, but also lends additional strength to the links already established. Such a fresh link appears to be furnished by a comparison of the chronologies of Science and Religion in connection with the origin of man. The later date assigned by Religion, so far from conflicting, will, on the evolutionist's theory, be in exact harmony with the earlier date of Science, if only there is a corresponding superiority in the attributes which Religion claims for man over those alleged by Science. Tried by this test, the harmony is beyond all dispute. Compare, for a moment, the attributes of man as understood by Science with the attributes of man as understood by Religion. The one material, the other spiritual; the one temporal, the other eternal; the one finite, the other infinite; the one human, the other divine. We are content to leave it to

those evolutionists who have realized how vast is the professed superiority of the Spiritual over the Intellectual, to decide whether the voices of Science and Religion do not unite in propounding a statement in exact accordance with the known laws of Evolution, when they concur in proclaiming that Intellectual Man came into existence, not years, nor centuries, but long ages before Spiritual Man. For not arbitrarily, but by duly proportioned distance, does the lower precede the higher, the simpler the more complex.

CHAPTER XIX

DEATH

"Adam ate the apple and introduced death and sin into the world, prior to which men never died."—SAMUEL LAING.

WE pass now to the consideration of an objection which, at first sight, certainly appears fatal to the foregoing interpretation of the opening portion of Genesis. We shall, however, find upon examination that this apparently fatal objection not only is no objection at all, but possesses this peculiar value—that it contains within itself the strongest confirmation of the interpretation of the chapter for which we contend.

In order to demonstrate to conclusion the soundness of our view as to Religion's account of the origin of man, it remains to show by further positive evidence that by the term "created," as applied to man, Religion refers to the implanting in man of the *spiritual faculty*. Having seen that the term "created," as used in this connection, cannot refer to man's bodily form, to his vitality, or to his consciousness, all of which are represented to have been in existence prior to the date of man's "creation," and which are respectively represented to have been "formed," "inspired," and "made," we have concluded that the fourth and remaining term which is applied to him—namely, "created"—must be taken to apply to the remaining part which Religion attributes to man, namely, his spiritual faculty. We have seen, moreover, that this conclusion is supported by many weighty considerations. It is, however, possible to still

further strengthen this part of our argument by additional positive proof. And it will be found that this additional proof is contained in the considerations which we have now to discuss, in examining an apparent difficulty which arises in connection with the mysterious phenomenon called Death.

When Science asserts that the past history of all organic beings is summed up in the word "evolution," she in that assertion also alleges, by necessary implication, that death has existed in the world throughout the whole period of time during which organic evolution has been at work. The process known as "the struggle for existence," which, as Darwin and Russel Wallace have conclusively shown, is in active operation in every corner of the globe, and which extends to both the vegetable and animal kingdoms, is the agent by which all organic progress is achieved; and it acts in this remarkable way:—the number of organic beings, both vegetable and animal, which are constantly being produced, is greater than their respective habitats can support; and consequently, there is a perpetual struggle carried on by every individual, to obtain that support which is insufficient for all. Obviously, those more fortunately endowed individuals, who are better fitted than their neighbours to succeed in this struggle, will in the average of cases be the members who will survive, and who will transmit offspring capable of surviving; while those individuals who are less fitted for the struggle will, in the long run, die out. And this principle, which is constantly at work, generation after generation, perpetually causing the destruction of the less fit members and the survival of the more fit, is the agent by whose operation all organic progress has been achieved, and through whose silent, but imperative, compulsion organic beings have slowly evolved from lowly and simple forms up to higher and more complex forms. Science, therefore, affirms as a matter of theory that, all other considerations apart, the first vegetable and animal cells which came into existence on our planet, containing, as they did, within themselves a reproductive capacity

which, in course of time, would necessarily culminate in what Naturalists call "over-multiplication," thereby contained also within themselves, as a necessary corollary, the seeds of death.

Such is the universal process of Nature. Evolution, to borrow the words of Mr. Russel Wallace, "works by life and death." Upon those fortunate individuals to whom Nature has given superior gifts of hardihood or strength, of courage or craft, the good things of life are showered; while from the weaklier and less highly endowed members, even existence itself is taken away. In the Natural, no less than in the Supernatural, sphere the great doctrine of Religion holds good: "To him that hath shall be given, and he shall have abundance, but from him that hath not shall be taken away even that which he hath."

When from pure theory we turn to practical demonstration, we find in Palæontology irresistible evidence to support the conclusion that the struggle for existence which we see around us now, with its involved phenomenon of death, has always been the law of our planet.

Speaking of the ancient fishes of the Carboniferous period, Mr. Hugh Miller writes:—

"The ancient fishes seem to have received their fullest development during the Carboniferous period. Their number was very great; some of them attained to an enormous size, and, though the true reptile had already appeared, they continued to retain till the close of the system the high reptilian character and organization. Nothing, however, so impresses the observer as the formidable character of the offensive weapons with which they were furnished, and the amazing strength of their defensive armature. I need scarce say, that the Palæontologist finds no trace in nature of that golden age of the world of which the Poets delighted to sing, when all creatures lived together in unbroken peace, and war and bloodshed were unknown. Ever since animal life began upon our planet, there existed, in all the departments of being, carnivorous classes, who could not live but by the death of their neighbours, and who were armed, in consequence, for their destruction, like the butcher with his axe and knife, and the angler with his hook and spear."[1]

Recognizing, then, the undoubted testimony of Science,

[1] *Testimony of the Rocks*, p. 66 (1889 ed.).

that death has been busily at work upon our planet ever since animal life began, and untold millions of years before man first made his appearance, what are we to say to the Bible narrative, which represents that death was first introduced into the world by one man's sin, not more than some few thousand years ago? Have we, after finding so many points of exact congruity between the Bible and Science, at last stumbled upon a fatal discrepancy? Admitting, as we do, that Science is here entirely right, must we admit that upon this vital matter Religion is wrong?

Without a moment's hesitation we answer, No. The argument which, upon this point, seeks to vitiate the Bible is itself vitiated by the familiar fallacy of an "*ambiguous middle*." Before we condemn the utterances of Religion upon the subject of death, let us make quite sure that we really know what those utterances are. A little closer attention to the subject than that which critics have hitherto been in the habit of bestowing upon it, will establish two propositions beyond doubt: first, that the Bible, both impliedly and expressly, asserts that physical death was in the world before Adam's Fall; and, second, that the death which Adam is represented to have introduced, was not the physical death known to Science, but another kind of death altogether. Just as man, as defined and classified by Religion, is not the physical man recognized by Science, but a spiritual man peculiar to Religion; so the death which resulted from Adam's disobedience is represented, not to have been the physical death of which alone Science takes note, but a spiritual death of which Science, professedly ignorant of spiritual phenomena, can know nothing. Let us verify these two propositions step by step.

In order to deal exhaustively with this all-important subject, it will be well to treat the first chapter of Genesis in either of the two ways in which it is possible to regard it. It will first be shown that, if we regard the chapter as an isolated whole, separate and distinct from the rest

of the Bible, it is clear that its author intended that physical death formed part of the original scheme of creation. And it will next be demonstrated that, if we read the chapter as a connected part of the Bible, forming a dependent portion of the integral scheme of Religion, there is, upon this point, no conflict between it and the rest of the Bible; for that a comparison of various passages of the Bible renders it still further clear, that Religion has always recognized physical death as a concomitant, from the very first, of vegetable and animal life.

Regarding, then, the first chapter of Genesis, first, in the former of the two ways just indicated—namely, as an independent and isolated narrative—note, first, that it nowhere states, or even suggests, that physical death did not exist in the world from the commencement of organic life.

Note, next, the exact unanimity of the views of Religion and Science upon the phenomenon known as "over-multiplication." We have already seen how prominent a position this principle holds in the design of Nature as interpreted by Science. Says Mr. Russel Wallace:—

"Exactly the same thing goes on with every species of wild animal and plant from the lowest to the highest. All breed at such a rate, that in a few years the progeny of any one species would, if allowed to increase unchecked, alone monopolize the land."[1]

So, too, Professor Huxley:—

"Man shares with the rest of the living world the mighty instinct of reproduction and its consequence, the tendency to multiply with great rapidity. . . . One of the most essential conditions, if not the chief cause, of the struggle for existence, is the tendency to multiply without limit, which man shares with all living things."[2]

With these utterances of Science compare the corresponding doctrine of Religion. We find, as has been already pointed out, that in the first chapter of Genesis the one and only feature, upon which especial emphasis is laid, is this particular fact.

[1] *Darwinism*, p. 27 (1890 ed.).
[2] *Collected Essays*, vol. ix. pp. 20, 205 (1894 ed.).

Not only is the one characteristic, mentioned with reference to the vegetable kingdom, the fact that it was specially designed for reproduction—"herb *yielding seed*, and fruit-tree *bearing fruit after its kind, wherein is the seed thereof*"—but it is prominently stated that the reproductive capacity of water animals was to be so prolific, that they were to "be fruitful and *multiply and fill the waters* in the seas," and fowl was to "*multiply* in the earth." And the same fact is emphasized with reference to mankind; "And God said unto them, *Be fruitful, and multiply, and replenish the earth.*" Clearly the prominent characteristic of the organic world in the mind of the author of the first chapter of Genesis—in fact, the only characteristic which he thought worthy of special mention—was that every individual was designed to reproduce its own species; and, further, that as regards the animal kingdom, this reproduction was to be very abundant. Animal organisms were to "fill the waters in the seas," and to "multiply and replenish the earth."

We must here draw special attention to two points: first, that the narrative particularly emphasizes the fact that the most prominent characteristic in the original scheme of creation, as regards both the vegetable and the animal kingdoms, was the reproductive faculty; and, secondly, that as regards abundance, more emphasis is laid upon the reproductive activities of the animal kingdom, than upon the reproductive activities of the vegetable kingdom.

Now, a moment's reflection should satisfy us that an author, who has represented that the most prominent feature in the design of the organic kingdoms was a reproductive activity so prolific as to "fill the waters in the seas," and to "replenish the earth," can scarcely have intended to exclude physical death from his scheme. A system of Nature based upon the principle that every organism should reproduce its own species in large numbers, but which provided no means for the removal of any members, would obviously very speedily stock the Earth with such quantities

of individuals, that existence would rapidly become, first intolerable, and then impossible, from the mere inability of the limited dimensions of our planet to provide standing room, not to mention food, for the constantly increasing, and never diminishing, number of organisms. What, then, was to happen as soon as the waters in the seas should have been "filled," and the Earth "replenished"? Clearly, if existence were to continue for any considerable length of time, some safety-valve must necessarily have been provided for the relief of the congestion which would speedily have ensued in the conditions supposed.

What gigantic proportions the difficulty which we are considering really presents is, perhaps, seldom realized by those who have not studied the subject; but the accounts which naturalists give us of the enormous increase of numbers to which a reproduction, unchecked even for a very short period, would give rise, especially amongst the lower organisms, convey some idea of how absolutely essential it is, that some mode of counterbalancing the effects of increase of population should have been provided.

"In the lower orders," writes Mr. Russel Wallace, "this increase is especially rapid, a single flesh fly (*Musca carnaria*) producing twenty thousand larvæ, and these growing so quickly that they reach their full size in five days; hence the great Swedish naturalist, Linnæus, asserted that a dead horse would be devoured by three of these flies as quickly as by a lion. Each of these larvæ remains in the pupa state about five or six days, so that each parent fly may be increased ten thousand-fold in a fortnight. Supposing they went on increasing at this rate during only three months of summer, there would result one hundred millions of millions of millions for each fly at the commencement of summer,—a number greater probably than exists at any one time in the whole world. And this is only one species, while there are thousands of other species increasing also at an enormous rate; so that, if they were unchecked, the whole atmosphere would be dense with flies, and all animal food and much of animal life would be destroyed by them. To prevent this tremendous increase there must be incessant war against these insects, by insectivorous birds and reptiles as well as by other insects, in the larva as well as in the perfect state, by the action of the elements in the form of rain, hail, or drought, and by other unknown causes; yet we see nothing of this ever-present war, though by its means alone, perhaps, we are saved from famine and pestilence."[1]

[1] *Darwinism*, p. 25 (1890 ed.).

But, without assuming that the author of the first chapter of Genesis was aware of the extraordinary results which increase in geometrical progression necessarily entails, he clearly must be taken to have been aware of the self-evident fact, that a system of unchecked reproduction must sooner or later have led to a congestion, which must have been fatal either to further reproduction, or to life itself.

If to this objection it be answered, that it may be assumed that the author intended that some new provision to meet the difficulty would have been made, as soon as the difficulty arose—as soon, that is to say, as the world should have become so filled with organisms as to render desirable a cessation of the exercise of the reproductive faculty—we reply that such an assumption is illegitimate on several grounds. In the first place, it is utterly unsupported ; there is not a hint in the narrative of any such prospective provision having been intended. In the second place, it is an improbable assumption. It is not likely that an author, who has so emphatically represented a universal reproductive activity as the most prominent feature in the original scheme of creation, would have passed over without notice so violent a modification of that scheme as a contemplated complete cessation of the reproductive activity, if he had intended that such a prospective cessation formed part of the original scheme. And thirdly, the assumption is still further discredited by the fact, that it implies that the original plan of the creation was imperfect, inasmuch as it supposes that that plan would, in the ordinary course of events, soon have necessarily required a violent modification—and that, in respect of the very feature of the plan upon which such particular stress is laid, as being its most characteristic feature. So that the supposition of the universal absence of death, so far from being a supposition of a perfect plan of creation, proves, upon examination, to be merely an attempt to avoid one supposed imperfection, death, by substituting quite gratuitously, and against the language of the Bible, another, and at least equal, imperfection.

Observe next, that the 29th and 30th verses of the first chapter allege that it was part of the original scheme that the animal kingdom should feed upon the vegetable kingdom :—

"29. And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat. 30. And to every beast of the earth, and to every fowl of the air, and to everything that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was so."

Hence it is clear that the original scheme of creation, as formulated by the author of the first chapter of Genesis, did involve death as a phenomenon present in the vegetable kingdom. Vegetable life was to be subject to death; and the history of vegetable organisms was to include their production, their reproduction, and their death.

Now observe—for in this connection it is by no means unimportant—that the words by which God called into existence vegetable life, and animal life in each of its two great divisions (namely, water-life and land-life)—which words, as we have seen, are represented to have been the sole and only operative agents in the production of these various organisms—are similar in effect. "*Let the earth bring forth*" (or, "put forth"—דָּשָׁא, *dasha*) "grass"; "*Let the waters bring forth abundantly*" (Heb. "swarm with swarms"—שָׁרַץ, *sharats*) "the moving creature that hath life"; "*Let the earth bring forth*"—יָצָא, *yatsa*[1]) "the living creature." In either case, too, similar provision was made for reproduction; the vegetable kingdom was to yield seed "after his kind," and the animal kingdom was to be fruitful and multiply "after his kind."

Hence it appears that the mode of genesis of vegetable life was similar to the mode of genesis of animal life; that the provision made for reproduction was in either case similar; and that vegetable life was liable to death. And in face of all this we are asked to assume, not only without any evidence whatever in favour of the assumption, but in face of strong

[1] This word is also used in the 12th verse :—"And the earth brought forth grass."

reasons for believing the contrary, that the author intended that animal life was not subject to death. If, in respect of the two vital matters of genesis and reproduction, the two kingdoms were similar, are we at liberty, not only in the absence of any supporting evidence, but even in face of opposing probabilities, to assume that the author intended that in the corresponding, and equally essential, matter of death, the two kingdoms radically differed? We submit that such an assumption would be utterly unjustifiable, even if the case ended here.

But the case does not end here. For it so happens that the chapter contains statements which will be found on examination to assert, not only impliedly, but also expressly, that death was present in the animal kingdom.

We have seen that the original scheme of creation, as formulated in the first chapter of Genesis, comprises physical death as a concomitant of vegetable life. Hence it is clear that the words in which the reproductive activities of the members of the vegetable kingdom are described, are intended to express a reproductive activity sufficiently prolific, not only to increase the number of vegetable organisms so as to clothe the earth with vegetation, but also to fill up the vacancies caused by death. The reproductive faculty had, therefore, in the case of the vegetable kingdom, a two-fold task to fulfil. It had both to *multiply*, and to *replenish*. And both these functions are evidently intended to be covered by, and included in, the language in which the reproductive activities of vegetable organisms are described.

Now, it is obvious that, if there had been no death in the vegetable kingdom, no "replenishing" would have been necessary, or even possible. And, consequently, a smaller reproductive activity would, in that case, have sufficed for effecting the required "multiplying" of organisms than that which was rendered necessary by the presence of death, entailing, as this phenomenon did, a consequent necessity for "replenishing." And, for the same reason, if the author's meaning was that there was no death in the animal kingdom,

we should naturally have expected to find that the language in which he described the reproductive activities of animal organisms would have been less emphatic—would have expressed a less active reproduction—than that in which he described the reproductive activities of vegetable organisms. For, on this supposition, the reproduction of animals would be required only for the purpose of "multiplying," without any necessity for "replenishing." But as we have already pointed out, the very opposite is the fact. The reproductive activities of animals are described in even more emphatic language than that in which the reproductive activities of vegetable organisms are described. Hence it follows that the assumption that the author intended that the animal kingdom was originally free from death, discredited, as it already is, by the other considerations which have been pointed out, is further discredited by the fact that it necessarily involves a distortion of the language employed. The *special emphasis* which the text throws upon the reproductive activities of animal organisms, as compared with the reproductive activities of vegetable organisms, is directly opposed to the assumption ; and therefore *impliedly* asserts that death, which formed part of the original scheme of creation so far as regards vegetable organisms, formed part of the scheme as regards animals also.

[But, further than this, the text *expressly* states that as regards a portion—and, indeed, the most important portion—of the animal kingdom, death did form part of the original scheme, and that, consequently, the reproductive activity was required for the purpose of meeting both the requirements of "multiplying" and "replenishing." It is strange that this fact should have been so universally overlooked, for the language employed is upon this point clear beyond all doubt :—

"So" (Revised Version, "And") "God created man in His own image, in the image of God created He him ; male and female created He them. And God blessed them, and God said unto them, *Be fruitful, and multiply and replenish the earth. . . .*"[1]

[1] Gen. i. 27, 28.

The words which we have italicized in this quotation are as clear as it is possible for language to be. The objects for which mankind was to "be fruitful" are here stated to have been two: first, to "multiply"; and, second, to "replenish." It is universally taken for granted that these two terms are synonymous. But such an assumption involves an obvious violation of language. "Multiply," according to the lexicographer, means "to become greater in number; to become numerous." "Replenish," on the other hand, according to the same authority—and the simple and obvious derivation of the word precludes the possibility of there being here any error—means "to fill again after having been diminished or emptied; to stock anew."[1] Assuming then, that the two words "multiply" and "replenish" correctly represent the Hebrew words רָבָה (*rabah*) and מָלֵא (*male*)—and as they are adopted in both the Authorized and Revised Versions we are clearly justified in making this assumption—nothing can be clearer than that they are entirely distinct in meaning. "Multiply"

[1] It is true that Webster adds "hence, to fill completely; to cause to abound"; but as the only authorities which he cites in support of his alleged derivative meaning are the text just quoted and a corresponding passage in Milton's *Paradise Lost*, it is pretty clear that, in thus departing from the literal and obvious meaning of the word, he is drawing upon his own preconceived ideas as to what the Genesis narrative *ought* to mean.

The truth is that Webster's derivative meaning of the term "replenish" owes its existence solely to his desire to make the narrative fit in with his notions of what it ought to have said. Like many another theologian, he thought that the Bible elsewhere alleged that prior to the Fall there was no physical death in the world. The word "replenish" abruptly contradicted this supposed allegation. Hence, in order to make "replenish" harmonize with the supposed allegation, he endeavoured (somewhat dishonestly, it must be admitted) to give the fancied inconsistency the slip, by attributing to the term "replenish" a meaning which the plainest dictates of Philology absolutely preclude.

The result curiously illustrates the fatal effects of dishonesty. In seeking by a dishonest method to avoid a supposed self-inconsistency, which had no existence in reality, he has assisted in propagating a misinterpretation which, unless it could be shown to be a misinterpretation, would land Religion in a real and fatal inconsistency with Science.

But, in any case, whether or no "replenish" be really capable of supporting the derivative meaning suggested by Noah Webster—which

imports only *increase in numbers*, without any reference to loss or diminution; "replenish," on the other hand, has no reference to increase in numbers, but refers only to the *replacing of something that has been lost.*

Now, a recognition of this distinction necessarily involves the conclusion that the word "replenish" expressly asserts the presence of physical death among mankind. Expressly alleging a loss which can only be attributed to physical death—for, in the absence of physical death, how can the alleged loss possibly have arisen?—"replenish" clearly alleges the existence of death as the only conceivable cause of the alleged loss. The fact that the author of the first chapter of Genesis has used this word in this connection proves conclusively that he must have had death present in his mind when he wrote. And hence it follows that, according to his idea of the original scheme of creation, physical death in the animal kingdom formed part of that scheme.][1]

we may certainly be permitted to deny—it is obvious that we are taking an unjustifiable liberty with the word if, without any valid reason, and in face of strong reasons to the contrary, we depart from its ordinary and natural meaning of "*fill again*" (*re-plenus*); and we may again insist—as we insisted when dealing with the word "moved" in the 2nd verse—that, in seeking the meaning of this primitive narrative, we are not only entitled, but bound, to give to each word its primitive and original meaning, resorting to derivative meanings only in cases (if any) where it can be shown from the context that the original meaning is inadmissible.

[1] The argument which I have here deduced from the word "replenish" is, I think, sufficiently justified by the fact that the Hebrew word מָלֵא (*male*) is so rendered in both the Authorized and Revised Versions. The late Professor Huxley, in criticizing the first chapter of Genesis, considered himself justified in "supposing that in the Revised Version the ultimate results of critical scholarship are embodied";* and if that assumption was justified, still more am I entitled to assume the correctness of an interpretation upon which both the Authorized and Revised Versions are agreed.

That מָלֵא is capable of bearing the meaning of "fill again after having been emptied," is proved by the fact that it is so used in Zechariah viii. 5—"And the streets of the city shall be full (again) of boys and girls playing in the streets thereof"—whence it is clear

* *Essays on Controverted Questions*, p. 119 (1892 ed.).

If, therefore, we regard the first chapter of Genesis as an isolated whole, and interpret it by the light of its own internal evidence, without reference to other parts of the Bible, we find ourselves compelled to conclude that the author intended that physical death formed part of the original scheme of creation. For not only do we find this conclusion nowhere contradicted, but we find it rendered probable by the stress laid upon the reproductive activities (for which no cessation or modification is provided) of all organic beings; and rendered certain by assertions, both implied and express, with reference both to the vegetable and animal kingdoms.

When we turn to enquire whether the Bible, regarded as a whole, has endorsed this view, we find, as so often before, that the very passages which are popularly supposed to negative our conclusion, in reality serve only to strengthen and confirm it.

In the second chapter of Genesis occurs the following well-known passage :—

"And the Lord God commanded the man, saying, "Of every tree of the garden thou mayest freely eat: but of the tree of the knowledge of good and evil, thou shalt not eat of it: *for in the day that thou eatest thereof thou shalt surely die.*"[1]

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that "replenish" is at least a permissible, if not an imperative, rendering of the word. At the same time it is only fair to add that, as the prefix "re-" of "replenish" has no counterpart in the Hebrew term מָלֵא, a conclusion deduced from the presence of the prefix in the English version may be thought to be open to the criticism, that it is not sufficiently warranted by the premises, inasmuch as the authors of the Authorised and Revised Versions, though entitled, were not bound, to render מָלֵא by the word "*re*plenish." For this reason I have enclosed in square brackets so much of the argument as may be open to this criticism, in order that those, to whom, for the above-mentioned reason, it may seem inconclusive, may omit it altogether from the argument.

It will, of course, be observed that the omission of the bracketed passage will in no way vitiate the remainder of the argument. Its value is confirmatory only. It serves merely to accentuate a conclusion which, whether the bracketed passage be retained or rejected, is, for the reasons set out in the remainder of the argument, absolutely unavoidable.

[1] Gen. ii. 16, 17.

Every one is familiar with these words ; and every one knows the history of the Fall. But what is habitually ignored is the fact that there is an apparent discrepancy in the narrative ; for apparently Adam did not die *on the day on which he ate* of the tree of the knowledge of good and evil. In the subsequent narrative he is represented to have lived many years after the Fall : "All the days that Adam lived were nine hundred and thirty years : and he died."[1]

What is the explanation of this apparent discrepancy? There are but two alternatives. Either we must suppose that the Redactor of Genesis admitted into the narrative a self-inconsistency so glaring as even the most clumsy mythologist would have avoided ; or else we must conclude that the narrative does represent that the threat was duly fulfilled, and that Adam did, in fact, die on the day on which he ate of the forbidden fruit ; but that the death which he then died was some other death than that which he is represented to have died at a later date.[2]

Of these two alternatives the former is clearly untenable, if only the latter can be supported by satisfactory evidence. If it can be shown that Religion recognizes two kinds of death, one of which—physical death—is represented to be common to all organic beings, and to have existed in the world prior to Adam's Fall ; while the other—spiritual death

[1] Gen. v. 5.

[2] The commonly accepted explanation, that the threat "in that day thou shalt surely die" means only "in that day thou shalt become liable to die on some future day," involves such a violation of language as ought to be sufficient to ensure its rejection. The words are express ; and their whole point lies in the fact that the threatened death was to take place on the day of the disobedience.

It is curious to observe that theologians, who are usually accused of distorting the language of Scripture in order to make it harmonize with Science, seem determined, in this particular case, (as in a good many others,) to distort the language of the Bible, in order to make it incongruous with Science. No fact in Science is more certain than that physical death existed in the animal kingdom ages and ages before the human period. And no fact can be more conclusively established on critical grounds than that the Bible narrative is here speaking not of physical death.

—is represented to be peculiar to man, and to have first come into existence on the day of his Fall; and if it can be further shown that these two kinds of death are, in the case of man, represented to be so separate and distinct from each other that either may at any time take place without involving the other: then we shall have found an interpretation which not only reduces to harmony the apparent inconsistency, but also disposes of the scientific difficulty as to the presence of physical death in the world prior to Adam's Fall. Let us now enquire whether these propositions can be supported.

As a preliminary remark, it should be here mentioned that such an interpretation will exactly fit in with, and therefore both support and be supported by, the interpretation which we have advanced in the preceding pages as to the "creation" of man. We there saw that man is defined by Religion as "made and created in the image of God"; and further that in this definition the term "created" refers to neither his bodily form, his vitality, nor his consciousness, but to his new and distinguishing spiritual part, which, completing his resemblance to God, is represented to have been first implanted in him by an act of creation. Clearly, then, an interpretation which represents that man possesses a spiritual part, so distinct from his physical part as to be traceable to an entirely different mode of origin, will exactly harmonize with an interpretation which represents that that spiritual part is subject to a mode of death, so separate and distinct from the death to which his physical part is subject, that either form of death may take place independently of the other. And, consequently, when it is represented that Adam's physical part did not die on the day on which it is emphatically stated that he should die, our interpretation of the creation of man lends a strong *a priori* probability to the view, that the meaning of the narrative is that he did die on that day so far as his spiritual part was concerned —that the death which he suffered on that day was not

physical, but spiritual, death. And, on the other hand, if it can be shown *aliunde* that this is the meaning of this portion of the narrative, this fact will go far to confirm our interpretation of the "creation of man." This is not mere reasoning in a circle. The very fact that an interpretation gives coincidence and coherence to two portions of the same narrative, furnishes strong *a priori* evidence in favour of that interpretation. And if it can be further demonstrated that the same interpretation brings into harmony other, and independently-written, portions of the Bible, the argument becomes practically conclusive.

That such a demonstration can be adduced is certain No one will dispute that the central doctrine of Religion is to the effect that the object of Christ's mission on Earth was to undo what Adam had done; to give back the life which he had forfeited; to save mankind from the death which his disobedience had entailed. Are we asked to justify this assertion? Its proof is easy. We need but refer to the well-known passage, "As in Adam all die, even so in Christ shall all be made alive." For what do these words mean? Clearly, they are only another way of saying, that the death which Adam introduced into the world *is the same death as that which Christ overcame.* "As in Adam . . . so in Christ." It is impossible to attach any other meaning to these words. They are clear beyond dispute. If, then, it can be shown that the death which Christ overcame is represented to be not physical, but spiritual, death; it must follow that, as the passage just cited identifies this death with the death which Adam incurred, the death which Adam incurred must also have been spiritual, and not physical, death.

That this is Religion's meaning can once more be established beyond all doubt. Take Christ's well-known promise, "Whosoever liveth and believeth in Me shall never die." No one with whose opinion we need concern ourselves will for a moment contend that this promise of exemption

from death refers to physical death, or to any other kind of death than spiritual death. For observe: the promise is not "Whosoever liveth and believeth in Me shall die, but shall afterwards live again." The promise is, "He shall never die." The life which is spoken of is to continue, without any interruption by death; it shall never cease. If Christ were here speaking of physical life, or physical death, it is clear that His promise has not been fulfilled; for it is a matter of universal experience that "believing in Christ" is no prophylactic against physical death. Nor has Religion ever pretended that it is. It is, and always has been, her consistent doctrine, that Christ's mission was to save man, not from physical, but from spiritual, death.

It is clear, therefore, that if we regard the Bible as a consistent whole—if, in other words, we seek to explain Religion's doctrine as to the origin of death by comparing her opening utterances—

"In the day that thou eatest thereof thou shalt surely die,"

and

"All the days that Adam lived were nine hundred and thirty years: and he died"—

with her later utterances,

"Whosoever liveth and believeth in Me shall never die,"

and

"As in Adam all die, even so in Christ shall all be made alive,"

we are forced to the conclusion that the meaning of the opening chapters of Genesis is, that Adam did in fact die on the day of his disobedience; but that the death which he then died, and which he then introduced into the world, was spiritual death. For the former of the two last cited texts shows that the death which Christ overcame was not physical, but spiritual, death; and the latter identifies the (spiritual) death which Christ overcame with the death which Adam introduced. And, finally, this identification

harmonizes the apparent discrepancy between the two first of the four passages just cited.

The same conclusion is forced upon us by yet further considerations. The second chapter of Genesis represents, as we have just seen, that in the garden of Eden stood two trees—the tree of life, and the tree of the knowledge of good and evil.

"And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it. And the Lord God commanded the man, saying, Of every tree of the garden thou mayest freely eat: but of the tree of the knowledge of good and evil thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die."[1]

Then came the Fall; and then follows this significant statement:—

"The Lord God said, Behold, the man is become as one of us, to know good and evil: and now, lest he put forth his hand, and take also of the tree of life, *and eat and live for ever.*"[2]

"Lest he eat, and live for ever"! Then, unless he ate, he would not live for ever. In the ordinary course Adam would not have lived for ever—would have died—*unless he ate of the tree of life.* Death, then, was the rule; immortality the exception, to be granted to those only who should eat of the tree of life; and, in the events which happened, actually granted to none. We are not, of course, concerned to enquire here what is the meaning of "eating of the tree of life." Whether this term is to be understood literally, or imports some figurative meaning, is a question which does not affect the present argument at all. All that is necessary for our present purpose is to observe that the narrative asserts that a certain process, described as eating of the tree of life, had to be undergone, in order to enable any being to live for ever. And from this assertion follows, by necessary implication, the converse assertion that, unless in any case this specific process were undergone, death would naturally, and in the ordinary course, ensue.

[1] Gen. ii. 15–17. [2] Gen. iii. 22.

From this interpretation of the passage there is no escape. For it is obvious that the narrative is here speaking, not of spiritual life or death, but of physical life and physical death. The most cursory analysis of the fundamental doctrines of Religion will make this clear in an instant.

That the immortality which it is suggested that Adam would have acquired by eating of the tree of life was not spiritual immortality—was not the re-acquisition of spiritual life—is evidenced by the fact that such a suggestion would be utterly opposed to the whole doctrine of Religion as to the Atonement. It is the consistent theory of the Bible that spiritual life, having once been lost, could only be re-acquired through the sacrifice of Christ, whose life and sufferings and final death upon the cross are represented to have been necessary conditions to the restoration to man of his spiritual vitality. But if the same effect could have been produced equally as well by one taste of the tree of life, the whole doctrine of the necessity for the Atonement at once falls to the ground. The sacrifice upon the cross becomes then, not only unnecessary, but meaningless. Clearly, the text is not intended to represent that the restitution, which is constantly alleged to have been effected, and only effected, by Christ's death, could have been equally well effected by Adam's eating of the tree of life.

Moreover, if such had been the meaning of the text, why should the Deity, who is represented to have purposed to restore to man his spiritual vitality, and who, in the 15th verse of the third chapter, utters a declaration which is universally understood to be an express promise of such restitution, have raised any objection to Adam's eating of the tree of life, if the result of his so doing would have been to effect the very end which the Deity is represented to have had in view, and which was ultimately effected by the sacrifice of His only Son? Clearly, it is not meant that such would have been the effect of Adam's eating of the tree of life.

It should, moreover, be noted that the words do not suggest that Adam, by eating of the tree of life, would be "born again," or that he would revive the life which he had then already lost, or would even acquire a new life. The words simply imply that whatever life he then possessed would continue for ever. The life which he would have after eating would be the same life as that which he possessed immediately before eating, with the single alteration that it would last for ever. And as it is, as we have seen, represented that he had, at the time when the words were spoken, already lost his spiritual life, and therefore possessed then only his physical life, it follows that the meaning of the text is that the result of his then eating of the tree of life would have been, that he would thereafter have been spiritually dead, but physically immortal.

Thus the interpretation for which we contend, and which proves on analysis to express the only meaning which the language of the text will bear, also brings the passage into synthetic harmony with other passages of the Bible, and with Religion's fundamental doctrine of the necessity for the Atonement. And hence we conclude that Religion represents that physical death existed in the world from the beginning; and that the death which Adam died on the very day of his disobedience was the death, not of his physical attributes—which he had acquired by the processes described as "formed," "inspired," and "made,"—but of that spiritual attribute which is represented to have been implanted in him by an act of creation.

And now observe the strong confirmation which the foregoing conclusions lend to our interpretation of the narrative of the creation of man. For have we not here the strongest possible proof that the distinction which we then drew between the different parts of man, is not a fanciful distinction of our own invention, but is *the* distinction which Religion intended? For, on examining the allegation that Adam died on the day

of his first sin, we find that this death is represented to have affected not his body, not his vitality, not his consciousness, but—his spirit. That spiritual part which alone distinguished him from the brutes, by making him capable of sinning, and which, of all his parts, was alone the subject of a cotemporary act of "creation," is represented to have been the only part of him which was affected by the consequences of sin, and which was thereby rendered subject to death. Thus the narrative falls into complete consistency, not only with Science, but also with itself. It is true to Science, in representing that physical death was present from the first, as the natural and necessary concomitant of the reproductive principle. It is true to itself, in representing that, as man possesses a spiritual part so separate and distinct from his physical part as to be traceable to a separate and distinct mode of origin, so this spiritual part is liable to a mode of death so distinct from physical death, that either kind of death may occur separately from, and independently of, the other.

CHAPTER XX

DISSOLUTION

"An entire history of anything must include its appearance out of the imperceptible and its disappearance into the imperceptible."—HERBERT SPENCER.

IN discussing the 2nd verse of Genesis, attention was drawn to the *strangeness* of the word "moved" which occurs in that verse; and it was further shown that that strangeness is accentuated by the fact that the word employed denotes a particular kind of motion—molecular motion, as opposed to molar motion—which possesses a peculiar scientific significance. It is obvious that, although this peculiar word, so strangely and unexpectedly introduced into the context, must possess a special importance in the narrative, it was very unlikely that its full significance would be appreciated, until the enormous value which Science attributes to Motion, as one of the four primary manifestations of Force, and, in particular, to Molecular Motion, as the primordial form of Motion, had been duly realized.

It will be very generally admitted that this probability has been borne out by the event, and that the full force of the word "moved," as introduced in the 2nd verse of Genesis, has hitherto been seldom—if ever—recognised by students of the Bible. Nor are biblical students solely—or, indeed, very much—to blame for this oversight; for it so happens that Science has fallen into precisely the same error. Just as the theologian, while insisting that "in the beginning God created the heaven and the earth," has insufficiently

emphasized the statement that "the Spirit of God moved;" so, in times past, the philosopher, lost in the contemplation of the mysteries of Matter, has failed to attach a due value to the not less mysterious, or less ubiquitous, phenomena of Motion.

It is not merely that the science of to-day has discovered that certain phenomena, to which scientists formerly attributed *material* existences, are in reality merely manifestations of Motion; that Sound, Light, and Heat, and, probably, Electricity and Magnetism, are all now recognized to be nothing else than "modes of motion." These discoveries illustrate the increasing recognition of the importance of Motion at the expense of Matter; but they form only a part of the phenomenon here alluded to. During the last few years a mighty change has been passing over the attitude of the whole of the intellectual world. Not in the exact sciences only, but in every sphere of thought, the province of Matter has been giving way before the encroachments of Motion. Referring to this change, M. Ernest Renan writes:—

> "The great progress of modern thought has been the substitution of the category of '*evolution*' for the category of '*being*'; of the conception of the relative for the conception of the absolute; *of movement for immobility.* Formerly everything was considered as 'being' (an accomplished fact); . . . at present everything is considered as in the process of formation."[1]

These words of M. Renan exactly illustrate the fact which it is here desired to emphasize. The Science of yesterday took things as it thought they were, and studied them in the condition in which it found them; the Philosophy of to-day has overleapt the narrow bounds which our fathers circumscribed to the realm of intellect. Not content with the contemplation of What is, we make bold to enquire, How did it become so? And in endeavouring to answer this question we have lighted upon a stupendous truth—the truth that things not only *have become*, but *are still becoming*; that everywhere, throughout the Universe, two mighty forces

[1] *The Future of Science*, p. 168.

are ever contending in absolute and everlasting[1] antagonism, —the one, a restless, relentless activity, ever striving to do or to undo, ever bent upon making or marring ; the other, a dull inactive resistance, ever clogging the efforts of her mightier opponent. These contending forces—or, to speak more correctly, these contending modes of Force—we call respectively Motion and Matter ; and the contemplation of their everlasting conflict is the study of to-day.

That study has not gone unrewarded. At length Philosophy has wrested from reluctant Nature the mysterious secret, that in this perpetual struggle Motion is ever the victor. Matter, like the Sibyl's rhymes of old, is ever the sport of Motion :—

"Turbata volant rapidis ludibria ventis."

Motion seizes upon her materials, and, with a heaven-born skill, builds them into forms of sublime grandeur, or moulds them into shapes of exquisite design. But she never rests. No sooner is the work of construction completed than the work of demolition begins. With a cruel persistence, this restless force constructs only to destroy. She fashions into shapes of consummate grace, and then—even then, like a spoilt and petulant child, she shatters the playthings she has made. This is no temporary, no local, law : throughout the whole Universe it reigns supreme. It is discernible in the structure of stars and nebulæ ; it is seen in the past history of our planet. It holds good, moreover, among all phenomena, psychical as well as physical. In the fading vitality of a senile nation, no less than in the ever-changing bed of the mountain torrent, we discern the terrible reality, that the footsteps of Evolution are ever dogged by her fell sister, Dissolution. And even here there is no intermission ; that which destroys

[1] It is, of course, here assumed that the quantity of molecular motion radiated into space by each star in the course of its formation from diffused matter, either does not escape from our Sidereal System, or is compensated by an equal quantity of molecular motion radiated from other parts of space into our Sidereal System. See *First Principles*, p. 535 (5th ed.).

at the same time renovates ; and the very dissolution of the old inaugurates the evolution of the new.

Thus the history of every aggregate displays an indestructible material, ever subjected to perpetual change of arrangement. Ceaseless change of position, ceaseless motion, constitutes the life-history of the Universe.

Now it was shown, when we were discussing "Fundamental Truths," that, in Mr. Spencer's view, "an entire history of anything must include its appearance out of the imperceptible, and its disappearance into the imperceptible" ; and that it is the province of Philosophy "to formulate this passage from the imperceptible into the perceptible, and again from the perceptible into the imperceptible." We further saw that "Science, tracing back the genealogies of various objects, finds their components were once in diffused states, and pursuing their histories forwards, finds diffused states will be again assumed by them" ; and that, in recognizing this truth, "we have recognized the fact that the formula must be one comprehending the two opposite processes of concentration and diffusion."

"The change from a diffused, imperceptible state, to a concentrated, perceptible state, is an integration of matter and concomitant dissipation of motion ; and the change from a concentrated, perceptible state, to a diffused, imperceptible state, is an absorption of motion and concomitant disintegration of matter. . . . When taken together, the two opposite processes thus formulated constitute the history of every sensible existence, under its simplest form. Loss of motion and consequent integration, eventually followed by gain of motion and consequent disintegration." [1]

These two opposite processes are respectively called Evolution and Dissolution :—

"Evolution under its simplest and most general aspect is the integration of matter and concomitant dissipation of motion ; while Dissolution is the absorption of motion and concomitant disintegration of matter." [2]

These two antagonistic processes are always in every

[1] *First Principles*, p. 281 (5th ed.).
[2] *Ibid.*, p. 285.

aggregate progressing simultaneously, each modifying the other ; and whether any particular aggregate is, during any given period, evolving or dissolving, depends upon which of the two processes predominates over the other during that period. As long as any aggregate is evolving, the process of evolution at work within it is in the ascendancy over the process of dissolution, which is also at work within it. This process always continues until the forces which tend to the aggregate's evolution arrive at an exact equilibrium with the forces which tend to its dissolution. Sooner or later in the history of every aggregate this equilibrium must be reached ; and then, slowly or quickly, Dissolution will ensue, and the aggregate will dissolve.

"When Evolution has run its course—when the aggregate has at length parted with its excess of motion, and habitually receives as much from its environment as it habitually loses—when it has reached that equilibrium in which its changes end ; it thereafter remains subject to all actions in its environment which may increase the quantity of motion it contains, and which in the lapse of time are sure, either slowly or suddenly, to give its parts such excess of motion as will cause disintegration. According as its equilibrium is a very unstable or a very stable one, its dissolution may come quickly or may be indefinitely delayed—may occur in a few days or may be postponed for millions of years. But exposed as it is to the contingencies not simply of its immediate neighbourhood, but of a Universe everywhere in motion, the period must at last come when, either alone or in company with surrounding aggregates, it has its parts dispersed." [1]

This process of Dissolution, being of universal application, applies to every aggregate, whether inorganic, organic, or superorganic. It must, therefore, apply to our planet. Sooner or later, slowly or suddenly, the Earth, with all its inhabitants, will be dissolved—will pass out of the perceptible into the imperceptible. This is a truth of the utmost certainty to Science. She has not the smallest doubt about it. Further than this, she knows exactly how, and why, the process will be effected. Even now she can trace out the hidden force which is secretly at work, and which will eventually drag our planet to destruction.

[1] *First Principles*, p. 519 (5th ed.).

This truth, therefore, of the future dissolution of the Earth, is a truth which we may employ with perfect confidence in testing the truthfulness, or untruthfulness, of Religion. If Religion and Science disagree on this point, we may be sure that Religion is wrong. If, on the other hand, they are agreed upon it, Religion will be entitled to the credit of having anticipated, by some thousands of years, one of the most recondite discoveries of modern Science.

We have seen that Religion has precisely complied with Mr. Herbert Spencer's requirements as regards the past history of our planet. Not only has she, in attributing to an act of creation the material of which the Earth is composed, commenced her history of the Earth at the required point of its "appearance out of the imperceptible," but, as has been shown, her detailed account of the various stages through which this created Matter passed, in the early history of the formation of our planet, is exactly scientific. In order to complete her history of the Earth, all that remains is that she should trace the Earth's "passage again from the perceptible into the imperceptible." Let us see what is the account which Science gives of this approaching catastrophe.

"In his essay on 'The Inter-action of Natural Forces,' Professor Helmholtz states the thermal equivalent of the Earth's movement through space, as calculated on the now received datum of Mr. Joule. 'If our Earth,' he says, 'were by a sudden shock brought to rest in her orbit—which is not to be feared in the existing arrangement of our system—by such a shock a quantity of heat would be generated equal to that produced by the combustion of fourteen such Earths of solid coal. Making the most unfavourable assumption as to its capacity for heat, that is, placing it equal to that of water, the mass of the Earth would thereby be heated 11,200 degrees; it would therefore be quite fused, and for the most part reduced to vapour. If then the Earth, after being thus brought to rest, should fall into the Sun, which of course would be the case, the quantity of heat developed by the shock would be four hundred times greater.' Now though this calculation seems to be nothing to the purpose, since the Earth is not likely to be suddenly arrested in its orbit and not likely therefore suddenly to fall into the Sun; yet . . . there is a force at work which it is held must at last bring the Earth into the Sun. This force is the resistance of the ethereal medium. From ethereal resistance is inferred a retardation of all moving bodies in the Solar System—a retardation which certain astronomers contend even now shows its effects in the relative nearness

to one another of the orbits of the older planets. If, then, retardation is going on, there must come a time, no matter how remote, when the slowly diminishing orbit of the Earth will end in the Sun; and though the quantity of molar motion to be then transformed into molecular motion, will not be so great as that which the calculation of Helmholtz supposes, it will be great enough to reduce the substance of the Earth to a gaseous state." [1]

Such being, according to Science, the future fate of the Earth, and, indeed, of all the members of our Solar System, each of which must eventually fall into the Sun with a momentum that will produce heat of such extreme intensity as to dissolve it into a gaseous state, Mr. Spencer turns next to the consideration of the other heavenly bodies that constitute our Sidereal System. Having shown that the stars are in motion; that they move in conformity with the law of gravitation; and that, distributed as they are, they cannot move in conformity with the law of gravitation without undergoing re-arrangement; he concludes that this re-arrangement must result in "a progressive concentration."

"What must be the limit of such concentrations? The mutual attraction of two stars, when it so far predominates over other attractions as to cause approximation, almost certainly ends in the formation of a binary star. . . . Between small clusters, too, having also certain proper motions as clusters, mutual attraction may lead, not to complete union, but to the formation of binary clusters. As the process continues, however, and the clusters become larger, they must move more directly towards each other; thus forming clusters of increasing density. While, therefore, during the earlier stages of concentration, the probabilities are immense against the actual contact of these mutually-gravitating masses; it is tolerably manifest that, as the concentration increases, collision must become probable, and ultimately certain." [2]

What will be the effect of this "ultimately certain" collision?

"Already we have seen that were the Earth arrested, dissipation of its substance would result. And if so relatively small a momentum as that acquired by the Earth in falling to the Sun, would be equivalent to a molecular motion sufficient to reduce the Earth to gases of extreme rarity; what must be the molecular motion generated by the mutually-

[1] *First Principles*, pp. 527–8 (5th ed.).
[2] *Ibid.*, p. 532.

arrested momenta of two stars, that have moved to their common centre of gravity through spaces immeasurably greater? There seems no alternative but to conclude, that it would be great enough to reduce the matter of the stars to an almost inconceivable tenuity—a tenuity like that which we ascribe to nebular matter."[1]

Recollecting that "molecular motion" is merely another name for "heat," we see from the foregoing extracts from *First Principles* that the fate which Science predicts, not merely for the Earth, but also for all the heavenly bodies, is a *rushing together* with a momentum which will generate a *heat so intense* as to *dissolve* them into gases of extreme rarity.

With the future thus predicted by Science in the nineteenth century A.D., compare the following passages, occurring in "the Epistle general of Peter," and written nearly two thousand years previously :—

"The heavens shall pass away *with a rushing motion*,[2] and the elemental matter[3] *shall be dissolved with intense heat*, and the Earth and the works that are therein shall be burned up,"

and

"the heavens being on fire *shall be dissolved*, and the elemental matter[3] *shall melt with intense heat*."[4]

It is scarcely possible to conceive a description more entirely scientific than that comprised in these pregnant sentences. Ῥοιζηδὸν ("with a rushing motion") is an exact and graphic description of the Earth falling into the Sun, and the stars colliding; the "intense heat" correctly describes the effect of those collisions; and, to complete the identity, the "shall be *dissolved*" (λυθήσεται) forestalls the conclusions of Science by an exact identity even of terminology. Here, at least, is a point upon which Religion and Science are absolutely at one—the nature of the final Dissolution of the Earth and the heavenly bodies.

[1] *First Principles*, p. 533 (5th ed.).
[2] ῥοιζηδὸν = "with a rushing motion."
[3] στοιχεῖα = "primary matter," "elements," or, perhaps, "the heavenly bodies."
[4] 2 Peter iii. 10, 12.

Nor is the above passage Religion's earliest utterance upon this momentous question. Eight hundred years earlier the self-same truth was proclaimed from the lips of Isaiah in almost identical terms :—

"And all the host of heaven shall be *dissolved* (נָמַק), and the heavens shall be rolled together as a scroll : and all their host shall fade away, as the leaf fadeth from off the vine, and as a fading leaf from the fig-tree." [1]

Here once more is the doctrine that the end, not of the Earth only, but of "all the host of heaven," will be *Dissolution* ; and the mode of that Dissolution is described, with a scientific accuracy of extraordinary exactness, as a "rolling together."

In order to do full justice to the value of these utterances of Religion, we must realize how advanced a scientific knowledge they involve, and how utterly improbable they must have appeared to a scientist living at either of the respective dates at which they were written. As will be fully shown hereafter, until within quite recent times the scientific world was under the impression that the Earth is the fixed and stationary centre of the Universe. The stars (as distinguished from the planets known to the ancients) were also regarded as fixed and stationary. The belief that all the stars are possessed of proper motions of their own, though now well established amongst astronomers, is of quite recent origin. Who, then, holding the belief that the Earth and the stars are stationary, could have conceived it probable, or even possible, that "the heavens would pass away with a rushing motion"? And even supposing such a notion to have been conceivable in the then state of scientific knowledge, what scientist, living at the date when the second Epistle of Peter was penned, would have further supposed that this "rushing motion" would have given rise to an "intense heat"—a heat sufficient to "dissolve the elemental matter" (or "the heavenly bodies"),

[1] Isaiah xxxiv. 4.

and to "burn up the Earth and the works that are therein"? We have already seen that in the first chapter of Genesis Religion correctly recognized the scientific distinction between molar motion and molecular motion. Here we find her recognizing a complementary truth of so obscure and recondite a nature, that it was not discovered by Science till quite recently—the truth that molar motion is convertible into molecular motion; that the molar motion (ῥοιζηδὸν) of the Earth and the heavenly bodies will give rise to the molecular motion of "intense heat."

That Religion should have foretold, some two or three thousand years ago, the future "Dissolution" of "all the host of heaven," is a noteworthy fact. That she should have correctly predicted the exact nature of that dissolution —namely, a dissolution induced by the molecular motion of intense heat, caused by molar motion—is a fact which can only be described as wonderful.

CHAPTER XXI

RECAPITULATION AND FINAL STATEMENT OF THE ARGUMENT

"Men's minds rose to a conception of the celestial and universal atmosphere through the study of the terrestrial and local one. From the phenomena of sound, as displayed in the air, they ascended to the phenomena of light, as displayed in the ether."—TYNDALL.

IT will be recollected that in the opening chapters it was pointed out, that the only possible means by which the reality of Religion's alleged Spiritual Life can be logically proved, lie in a composition of the respective forces of Religion and Science; and upon an examination of the natural inter-relations of Religion and Science and their respective forces, and a comparison of them with their respective homologues in the physical Universe, it was found to be in the highest degree likely that such a composition could be effected in the manner employed by the astronomer in his dealings with the physical universe, and that such a composition, so effected, would produce results analogous to those obtained by physical astronomy. It became clear, therefore, that the problem of Eternal Life could only be solved by putting in practice a species of spiritual astronomy.

What must be the method to be employed in this spiritual astronomy? In the sixth chapter it was pointed out that the method employed by the physical astronomer, in order to intensify his sight, lies in the utilization of the conflict which mutually exists between the natural force which impels light-rays in parallel directions, and the refracting force of his telescopic lenses. It is by means of this conflict,

that the rays are distorted from their parallel paths into concurrent paths, so as to focus at a single point, where they may be utilized for the purpose of intensifying the observer's visual impressions. And it is the admission into the pupil of the eye of the light-rays, thus artificially concentrated by the joint action of conflicting forces, that produces that intensification of sight, upon which all astronomical research is based.

Hence we concluded that, for the purpose of prosecuting that method of examination, to which we ventured to give the name of spiritual astronomy, an analogous process must be adopted; and that, consequently, just as the Conflict of Truth has effected the severance of the forces of Religion and Science, so the re-composition of those forces into a composite force, capable of solving the problem of Eternal Life, must also be effected by the Conflict of Truth, in a manner homologous to the method adopted by the physical astronomer.

We noted, moreover, that the process thus advocated is absolutely reliable in respect of its results, provided only that we take good care to avoid the "phantom" image by which the physical astronomer's observations are occasionally disturbed. All that our method of examination enables us to see, we may fearlessly accept; knowing that to intensify the truth is not to distort it. Our process of enquiry, if duly adjusted, is not open to the criticism that its results are fallacious. It is not true that, in pursuing it, we shall be reading into the Bible meanings which are not there: though it is true that, in pursuing it, we shall find in the text meanings *which we did not see there before.*

In pursuance of this method of enquiry, we proceeded to examine, under the magnifying power of Science, certain of Religion's allegations concerning the physical Universe. After observing, in the seventh chapter, that the fullest attainable knowledge of Religion can only be acquired by investigating her scheme both as a whole, and also in respect of its

constituent parts, and by comparing in this dual manner her scheme with that of Philosophy, so as to study the comparative anatomy of both, we concluded that such a dual comparison was likely—as had actually been the case in respect of the *pineal gland*, and the *mammæ* of male mammals—to throw a fresh light upon the meaning and functions of any apparently atrophied part which might be found in the scheme of Religion, besides giving us a truer and a clearer conception of the nature of Religion's scheme as a whole. We then, in the eighth chapter, deduced from the phenomena of Segregation a law to the effect that, other things being equal, like segregations imply like forces.

We next observed that the scheme of Religion, like that of Philosophy, leads up to the highest spiritual dicta, with which it closes, by commencing with a Cosmogony. Just as Philosophy prepares us for her highest ethical truths by first presenting to us the sciences of Astrogeny and Geogeny, so Religion introduces her most impalpable spiritual truths by a preliminary discussion of the "genesis of the heaven and the earth." We saw, too, that the explanation of this remarkable parallelism was in either case identical; it is the method of Religion, as of Philosophy, to explain her highest specialized truths in terms of her wider truths, and ultimately in terms of her widest truth.

Upon enquiring what is the widest, and therefore Ultimate, Truth of Religion, we found it to be identical with the Ultimate Truth of Philosophy. Religion deduces all phenomena from an Unknowable God; Philosophy traces all phenomena back to an Unknowable Force. And Mr. Spencer himself confirms the identification of these two Ultimates, by telling us that by this Ultimate Force he means that Ultimate Power which Religion calls God.

We found, further, that of this Unknowable Power Religion and Philosophy agree in predicating two, and only two, attributes. The one is "Force" ("Elohim"); the other is "Persistence" ("Jehovah").

Pursuing, then, our examination of the opening verses of Genesis, we observed that the factors out of which Religion represents all phenomena to have been produced, prove, when translated out of their theological terminology, to be identical with Philosophy's five factors—namely, Time, Space, Matter, Motion, and Persistent Force. Of these factors, while Time and Space are necessarily unconditioned, we saw that the earliest conditions of Matter and Motion are represented by Religion to have been exactly those conditions which Science claims as their primordial conditions—namely, as regards Matter, "without form and void," words which we found to be identical in meaning with what Mr. Spencer terms "indefinite, incoherent, and homogeneous"; and, as regards Motion, molecular as opposed to molar. Clearly, therefore, the Fundamental Truths of Religion are identical, even down to their minutest details, with the Fundamental Truths of Philosophy.

When, from the consideration of these fundamental truths, we passed on to the examination of the account which Religion gives of the manner in which, out of these primordial factors, all material phenomena have been produced, we found that the harmony with Science was still maintained. We saw that the theory of Evolution is foreshadowed by the assertion that phenomena have been produced, not instantaneously, but in obedience to a *succession of laws*. We observed also that such laws are represented to have been pronounced, not continuously, but at intervals; and further, that the order in which the laws are stated to have been uttered agrees with the order of sequence in which Science believes the corresponding phenomena to have appeared.

Descending to details, we noticed that Religion's account of the genesis of inorganic phenomena exactly accords with that special branch of Evolution known as the Nebular Hypothesis—an Hypothesis which Mr. Spencer regards as a practically proved and established theory. We found this accordance exhibited by the facts that Religion, like Science,

represents the earliest condition of Matter to have been gaseous ; and in this connection attention was drawn to the remarkable fact that, though the exigencies of language precluded Religion from employing the actual term "gas," inasmuch as this term was not invented until the seventeenth century A.D., when it was first coined by Van Helmont, yet Religion has described the required conditions with exact accuracy, by mentioning every one of the three distinguishing characteristics of gaseous matter, when at the temperature postulated by the Nebular Hypothesis—namely, invisibility ("darkness"), formlessness ("without form"), and molecular mobility ("moved").

We saw, too, that each of the three stages in the history of light and darkness is correctly given—namely, first, a stage of ubiquitous darkness ; next, a stage of ubiquitous light ; and, thirdly, a separation of light from darkness by a division which separates Day from Night. We noticed also that this division of light from darkness is represented to have been effected by means of an expanse, which finds its exact counterpart in the corresponding step postulated by the Nebular Hypothesis ; and, finally, we observed that light is correctly represented to have preceded the formation of the Sun, though it is (equally correctly) not represented to have preceded the creation of the Matter out of which the Earth and the Sun were formed.

Further, it was pointed out that every one of these allegations concerning the history of light and darkness, though now proved to precisely tally with the corresponding condition supposed by the now-established Nebular Hypothesis, is so apparently improbable in itself, and so utterly unlike any now-existing phenomenon, as to render it inconceivable that it can have been suggested to the mind of the author of the narrative by any facts falling within his own knowledge or experience.

Passing from the Inorganic to the Organic, we found the same scientific accuracy exhibited in the order of sequence

of the Laws ; life of a vegetable type having (in all probability) preceded life of an animal type ; and water-animal life having (certainly) preceded land-animal life ; while the lateness of the date assigned to the creation of man, coupled with the assertion that he was both "created" and "made," and the account of his spiritual death, was shown to bring Religion's doctrine as to "spiritual man" into exact harmony with the requirements of Evolution.

We found, moreover, that the indications which the text affords of the "struggle for existence" possesses the peculiarly scientific significance, that it represents that struggle to have been particularly severe in the case of the water population ; while physical death, which Science postulates as the principal factor in the struggle for existence, and as a necessary concomitant of all organic evolution, is (contrary to the opinion popularly entertained by careless readers of the text) represented to have been universally prevalent from the first, in both the vegetable and animal kingdoms.

Turning from Religion's history of our planet in the past to her predictions as to its fate in the future, we met once more with the same scientific accuracy, descending again to actual details of terminology. Mr. Spencer alleges that the history of every aggregate includes, first, its Evolution, and, secondly, its Dissolution. This dissolution, in the case of our planet, as well as in the case of every member of our Solar System, will be caused by their falling into the sun with a force which will generate sufficient heat to dissolve them into gases of extreme tenuity ; while a similar fate, in all probability, awaits every member of our Sidereal System. With this doctrine we compared Religion's assertion that "the heavens shall pass away *with a rushing motion* (ῥοιζηδόν), and the heavenly bodies *shall be dissolved* with *fervent heat*, and the Earth and the works that are therein *shall be burned up*." We observed that it was impossible to imagine a

closer correspondence between Religion and Science than that exhibited in these lines. In her "rushing motion"; in her "fervent heat"; and, finally, in the employment of the very term "dissolution," we saw that Religion here exhibits a really wonderful anticipation of the discoveries of modern Science.

Reviewing these many points of congruity between Religion and Philosophy, one conclusion, at all events, is fairly forced upon us—that whatever we may think of her doctrines as to spiritual phenomena, her account of material phenomena, at least, is true. She is scientifically correct as regards her Fundamental Truths. She is scientifically correct as regards the past history of material phenomena, both inorganic and organic. And she is scientifically correct as regards the future fate of material phenomena. Clearly, so far as regards the phenomena with which we have hitherto been dealing, the science of Religion and the science of Philosophy are one.

But now, how far does this conclusion, indisputable though it may be, carry us towards the required proof of the reality of spiritual life? Granted that every one of Religion's utterances, concerning the past and future history of physical phenomena, exhibits a prescience which, as being truly pre-scientific, we can only call divine; to what extent does this discovery assist us in the solution of the problem which we have undertaken? Surely, it may be urged against us, any number of such discoveries cannot advance us a single step in the required direction. Even if it can be shown that every single point of contact between Religion and Science is a point of coincidence, in what way would such a demonstration affect those points in Religion's scheme which, being professedly supernatural, are consequently ultra-scientific, and at which, therefore, there can be no contact at all? Admitting that the scientific prescience displayed by the author of Religion's cosmogony is only explicable on the supposition that that cosmogony is a divinely imparted

inspiration, yet how does this admission help us? To prove that the first chapter of Genesis is inspired is no proof that St. John's Gospel is true, or that the spiritualistic doctrines of Peter, or of Paul, have any basis in reality. Undoubtedly the proof of Religion's scientific truthfulness has an immense negative value, in removing a reproach which, if substantiated, would no doubt seriously prejudice her credibility in other matters; but in what way has it any positive value for ulterior purposes?

The answer to these questions lies in the fact that they ignore the all-important considerations discussed in the seventh chapter, as to the inter-relations of whole and part. They overlook the distinction between analysis and synthesis. So long as we persist in regarding a part as if it were an isolated whole, we cannot, as was shown in the seventh chapter, possibly learn more than a small fraction of the whole truth which that part contains. By no process of intellectual ingenuity, by no feat of mental gymnastics, could the supposed inhabitant of the "birdless isle" discover one-tenth of the truth which is embodied in a single feather from a pheasant's wing. No analytical examination, however minute, could possibly help him here. For he is confronted by a problem which will yield only to synthetic treatment. In order to read its riddle, he must regard the object under observation, not as an isolated whole, but as a subordinate part. Let him place the feather by its companion feathers; let him study it in its relations to its parent bird; and its secrets are secrets no longer. Its structure, its shape, its colour, become then readily intelligible. He sees a meaning in every attribute which it possesses.

Just so with the phenomena now under consideration. Whatever may be their negative value—and it is immense—we cannot, by any process of examination which is confined to analytical treatment, extract from them any positive resultant which will enable us to prove the reality of Eternal Life. Treated analytically, each point of correspondence

proves itself, but proves nothing more. But let us treat them synthetically ; let us build them up into that synthetic whole of which each is a constituent part ; let us study them in their relations to that whole and to one another ; and, in so doing, let us group them together in such a way as will bring them into parallelism with one another ; and we shall then find that they will yield to this treatment a synthetic value which, for the purpose which we have in view, is out of all proportion to any analytical value—great though that value is—which they may severally and independently possess.

And here it is curious to observe that this dual method of enquiry, which is thus essential to the process of investigation which we have ventured to call "spiritual astronomy," brings that process into exact homology with the process of investigation employed in physical astronomy. A telescope contains, not one lens, but two lenses—or, rather, two sets of lenses. Of these, the one is known as the object-glass ; and its function is to concentrate, by virtue of its refractive force, all the rays of light which it receives, by diverting them from their parallel paths into concurrent paths, which meet at a single focal point.[1] But experience proves that the human eye is incapable of utilizing, for visual purposes, any rays of light, unless they are travelling in parallel directions at the time when they enter the pupil of the eye. Hence, if the observer were to place his eye at the focal point of the object-glass, he would receive from the concurrent rays, which meet at that point, no clear visual impression at all. Consequently, at its focal distance from the focal point of the object-glass is placed a second set of lenses, called the eye-piece, whose function it is to receive the concentrated concurrent rays, and re-divert them, from their convergent paths, once more into parallel paths. And these concentrated rays,

[1] This is so in a refracting telescope. In a reflecting telescope, the speculum produces, by reflection, the same concentrating effect as that which the object-glass of a refracting telescope produces by refraction.

thus entering the pupil of the eye in parallel directions, excite in the eye a clear and distinct sensation of vision.

Thus we see that in a telescope there is a two-fold conflict of forces. First, the concentrating force of the object-glass. And, secondly, the parallelizing force of the eye-piece.

Just so with spiritual astronomy. The analytical method of enquiry, as applied to the phenomena of Religion, is a concentrating process. Both its object, and its effect, are to present to the enquirer all the essential parts of Religion's phenomena in a concentrated form. It is a process, by which the salient features in the phenomena under discussion are brought, as it were, to a focus, before the observer's gaze ; and in this respect it obviously corresponds to the concentrating action of the object-glass.

The synthetic method of enquiry, on the other hand, is a parallelizing process. In tracing out homologies, and presenting them to the observer as a synthetic whole, its object and effect are to bring the various phenomena under examination into parallelism with one another. Its function, therefore, corresponds to the action of the astronomer's eye-piece. And this being so, it is a circumstance by no means undeserving of attention, that the failure which has so constantly attended attempts at reconciliation between Religion and Science, is attributable to the fact that the reconciler has employed only the analytic method of examination, leaving the synthetic method out of consideration altogether. In thus confining his observation to the analytical process of examination, he is doing precisely what the physical astronomer would be doing, if he were to place his eye at the focal point of his object glass, and then complain that the convergent rays, which his eye received, aroused no clear visual sensation. As we have seen, in order that they may give rise to vision, it is necessary that these concurrent rays be parallelized, before they enter the eye. And in the same way, the convergent rays of spiritual light, induced by the analytic method of examination, must be parallelized by synthetic

treatment, before they can arouse the sensation of spiritual sight.

And thus we see how doubly important is the *Conflict of Truth*, for the purpose of examining Religion's spiritual phenomena. In this connection it has a two-fold function to perform. It is a necessary ingredient—in fact, the essential element—in the joint process of analysis and synthesis, of which spiritual astronomy, like physical astronomy, is necessarily composed.

Thus regarding the phenomena with which we are dealing, we find that the various points of correspondence which we have been observing group themselves into a series of correspondences, which exhibit a regular and orderly progression from simplicity towards complexity. Commencing with the simplest and widest truths, into which all higher truths are resolvable—Time, Space, Matter, Motion, and Force—the series deals first with those simplest applications of these fundamental data which find their expression in the Inorganic. It passes next to the more complex phenomena of the Organic; and, here, it treats first of the simplest form of the Organic—the Vegetable kingdom—passing thence to that more complex form of the Organic which constitutes the Animal kingdom. And in this latter kingdom, again, the same order of succession is carefully preserved, the least complex form of animal, the water-population (together with their anatomically near relations, the air-population), being dealt with first; the more complex land-population being dealt with later. And, finally, man, the highest and most complex of all, takes the last place in the series.

A glance at the foregoing series will show that already the synthetic treatment has yielded an additional piece of knowledge of great importance: for it shows that, not only is each of the individual statements of which the series is composed itself scientific, but also that Religion's grouping of those statements is equally scientific. It accords with

the order of succession observed by Science. And further than this, we now perceive that the series is, both from the religious, and from the scientific, points of view, complete in itself. It embraces the whole gamut of human knowledge. It comprises everything in heaven and earth.

Now, although there is not a single step in this series which is unscientific, there is one step which has hitherto been universally taken to be ultra-scientific. From gaseous matter, at the one end of the series, up to man, at the other, the schemes of Religion and Science exactly coincide. But here the coincidence stops. Man intellectual—*homo sapiens*—is a being well known both to Religion and to Science. But, as we saw when discussing Religion's theory of the *creation* of man, and (still more clearly) when dealing with her doctrine as to the introduction of death, Religion represents man as possessing a spiritual capacity ; and in so doing she introduces a new term—spirit—of which hitherto Science has professed to know nothing.

Thus a synthetic comparison of the two schemes shows that, though they nowhere disagree, they are not quite coincident. At the one end—the lower end—they precisely tally ; and from that point upwards they coincide, without break or exception, until they arrive at the highest point which Science has hitherto reached—the point of intellectuality. At that point the coincidence ceases. Religion and Science here part company—not because of any difference of opinion, but because of a supposed difference of capacity ; not because Religion is unscientific, but because she is (as alleged) ultra-scientific.

But now, in what sense is it true that Religion is here ultra-scientific? In what sense is it correct to say that Religion and Science part company at the point where spirit is reached? It certainly is true that, up to the present time, Science has steadily refused to seriously discuss Religion's allegations concerning spirit. It undoubtedly is the fact that Philosophy is firmly convinced that all

so-called spiritual phenomena, if they exist at all (which she seriously questions), are things quite beyond her reach. But when we come to think of it, this view contains a fallacy of the very first magnitude. Let us once again examine it from the astronomical point of view. Let us once more make use of a method of investigation which has already served to explain so much. In what sense is it true that the Sun is beyond the reach of Science? Undoubtedly the scientist cannot treat the Sun in the way in which he treats the terrestrial materials which he investigates. He cannot take a sample of the Solar photosphere, and analyze its ingredients in his test-tube, or his retort. He cannot set to work in his laboratory to solidify the Solar gases, by subjecting them to the rigour of an artificial frost. All these things, which he can do to the materials of the Earth, he can by no possibility do to the materials of the Sun. In this sense, certainly, the Sun, as a subject of investigation, is ultra-scientific—for it is utterly beyond the reach of Science. But is it therefore true that Science can learn nothing about the Sun? Can it be truly said that the study of the Sun is a subject which is really ultra-scientific? Against such a conclusion the whole science of Astronomy rises up in vigorous protest. The telescope and the spectroscope have sufficiently proved that the reach of Science is not to be measured by the length of her arm. Indirect methods may accomplish what direct methods cannot effect. Where the chemist would fail, the astronomer and the chemist together succeed.

And just so with spirit. Science cannot, it is true, lay her hand upon the phenomena of the spiritual world, as she lays her hand upon the phenomena of the physical world. She cannot weigh them in a balance, or measure them with a span. In this sense, certainly, they are beyond her reach; —but in this sense only. In every other sense it is no more true to say that their study is beyond the capacity of Science, than it is true to say that the study of the Sun is ultra-

scientific, merely because the chemist cannot test its substance in his crucible, or its weight in his scales.

Regarding, then, the phenomena of spirit in this light, namely, as a possible subject of scientific examination, by a process of investigation analogous to that of physical astronomy, we have first to note that Religion has placed these phenomena at precisely that point in her scheme which Science must approve, as the place to which they are scientifically entitled. The scientific order of sequence throughout the scheme being from the more material to the more immaterial—from the more perceptible to the less perceptible—it will be readily conceded that the phenomena of spirit, if they exist at all, are rightly placed at the latter end of the series, as being the least material, and the least easily perceptible, of all phenomena—so imperceptible, in fact, that their very existence is habitually called in question.

Note next, that this order of sequence from the more perceptible to the less perceptible, is the natural order of sequence in which all scientific knowledge has progressed. We have already seen that both with Religion, and with Science, the Material is a necessary interpreter of the Immaterial ; that, in either case, the higher truths can only be interpreted in terms of the lower truths, and are therefore to that extent dependent upon those lower truths. Observe now how close and rigorous, in the case of scientific knowledge, at all events, this dependence is. Consider the course which from the very beginning the progress of human thought has invariably taken. Scientific knowledge is no ready-made nostrum miraculously vouchsafed to mankind ; no divinely-manufactured revelation dropped from the skies. Toilfully and painfully, step by step, the scientist has struggled onwards and upwards, feeling his way from truth to truth ; and the sequence of discovery has always lain from the more material phenomena to the more immaterial —from the more palpable to the more obscure.

Let us emphasize this allegation by an illustration.

Ignorant of the science of acoustics, I observe that the sound of a woodman's axe does not reach my ear at the moment when I see the stroke descend ; an interval intervenes between the stroke and my perception of the sound. Listening to the ring of a bell, I notice that the sound, as it reaches me, is not continuous, but comes in throbs or rhythms. I observe also that all sound travels, not in one direction, but in all directions ; that the disturbing cause is a centre from which the sound radiates on all sides.

While pondering over these phenomena, and wondering what is their explanation, I chance, when rambling by a river, to throw a stone into the stream. I notice that a message passes from the spot where the stone disappeared, and, travelling in all directions, by and by communicates the disturbance to the water-lilies that slumber by the bank. I observe three facts in connection with this message. First, that it reaches the lilies, not at the moment when the disturbance took place, but after an interval ; second, that it travels in rhythmical waves ; and, third, that it is propagated in all directions in a circle, of which the falling stone is the centre.

Suddenly the thought flashes through my brain that here is a possible explanation of my observed phenomena of sound. Can the air be the medium for transferring sound, just as the water was the medium of communication between the stone and the water-lilies ? If, I reason to myself, there had been no water where the stone fell, the lilies would have been unaffected by its fall. If, therefore, my theory is correct it ought to follow that, in the absence of air, my ear would receive no sound.

I return to my laboratory, determined to put my theory to the test. Fixing a small bell in a glass globe, I exhaust the air in the globe by means of an air-pump, and agitate the bell. Not a sound reaches me. I admit a little air, and repeat my experiment ; and now a thin and ghostlike tinkle is faintly perceptible. On admitting more and more air I

find that the sound of the bell proportionately increases in strength and volume ; diminishing once more as the air in the globe is again gradually withdrawn.[1] And thus I establish to my satisfaction the fact that, just as the water was the medium of communication between the stone and the water-lilies, so the air is the sound-transmitting medium between the woodman's axe and my ear. In both cases there are these points of likeness ;—in either case, a certain space of time is required for the transmission of the message ; in either, the message is transmitted in a rhythmical form, and in all directions ; and in either, if the medium be withdrawn, no message is transmitted.

From the phenomena of sound to the phenomena of light is a natural transition of thought. From telescopic observations of the eclipses of the moons of the planet Jupiter I ascertain that those eclipses occur 16m. 36s. later when Jupiter is in conjunction with the Sun than when he is in opposition. Knowing that Jupiter, when in conjunction, is some 186,000,000 miles further away from the Earth than when in opposition, I easily calculate from these facts that light travels at a rate somewhat exceeding 186,000 miles a second.

I notice, too, that light, like the water-waves, and like the aerial sound-waves, travels in all directions, in circles of which the light-producing body is the centre. And thus I perceive that light exhibits these two important points of resemblance to the other phenomena just discussed :— that it is transmitted, not instantaneously, but at a fixed and definite rate of velocity ; and not in one direction, but in all directions.

Having thus established these two primary points of similarity, the questions at once naturally arise, Does not light travel in waves, similar to the water-waves and the air-waves ? And, if so, does not light require for its

[1] The medium of the transmission of sound is usually the air ; but all gases, vapours, and liquids also transmit sound.

transmission some transmitting medium, analogous to the water in the one case, and the air in the other?

For reasons too lengthy for discussion here, I find that affirmative answers to these questions are unavoidable. I ascertain from experiments made in my laboratory, that the required luminiferous medium (the real existence of which I cannot doubt, since in its absence the phenomena exhibited by light are inexplicable) is neither water, nor air, since light travels freely through spaces from which both water and air have been excluded. And thus, by a process of reasoning from which there is absolutely no escape, I am finally led to the discovery of that impalpable substance known to Science as ether.

Now, the two points to which attention is here drawn in connection with the foregoing well-known facts are, first, the order of sequence of the discoveries referred to; and, second, the dependence of each successive discovery upon its predecessor. In the first place, it is to be noted that the discovery of the impalpable ether came last of all. The order is as follows:—First, the observation of the easily perceived water-waves; next, the discovery of the less perceptible air-waves; and, last of all, the discovery of the least perceptible—in fact, the utterly impalpable—ethereal waves. And, in the second place, it is to be observed that each of these successive discoveries is dependent for its very existence upon its predecessor. It is more than doubtful whether the aerial transmission of sound-waves would ever have been discovered, had it not been first suggested by the previous observation of aquatic waves. It is certain that the discovery of the existence of the luminiferous ether, and the study of ethereal phenomena, is due solely to the previous discovery of aerial phenomena. If the properties of the terrestrial atmosphere had not first been studied, the very existence of ether would, in all probability, have remained to this day a secret locked in Nature's jealous breast. In the words of Professor Tyndall, "Men's minds rose to a conception of

the celestial and universal atmosphere (*i.e.* ether) through the study of the terrestrial and local one. From the phenomena of sound, as displayed in the air, they ascended to the phenomena of light, as displayed in the *ether*."[1]

Here, then, we come in sight of the exact nature of the relations which exist between Religion's material and immaterial phenomena. When we examine scientifically her material phenomena, regarding them, not as isolated co-ordinate wholes, but as mutually dependent subordinate parts, we see that those phenomena stand to her highest and most immaterial phenomena in the very same relationship as that in which the lowest and most palpable phenomena of Science stand towards *her* highest and most impalpable phenomena. In either case, the former exercise towards the latter a two-fold function—the one, to explain; the other, to prove. Not only do the comparatively palpable air-waves, and the still more palpable water-waves, explain the less palpable ethereal waves; but they also play an important part in the proof of the reality of the existence of the ethereal waves. No man has ever consciously seen an ethereal wave. No man has ever consciously seen ether. How, then, do we know that ether, and ethereal waves, are actual realities? Because the phenomena of light are only explicable on the hypothesis of that reality; and because this hypothesis brings the phenomena of light into exact parallelism with the corresponding phenomena of sound-waves, and of water-waves. And exactly in the same way, if it can be shown that certain phenomena presented to us by Religion are explicable only on the hypothesis of the truth of certain of Religion's doctrines, and further, that this hypothesis brings the phenomena which are the subjects of these doctrines into exact parallelism with the corresponding phenomena of Science, we may—we must—accept the truth of those doctrines, as resting on a proof no whit less reliable

[1] *Fragments of Science*, vol. i. p. 4 (1889 ed.).

than that on which we base our indestructible belief in the actual existence of the unseen ether, and the reality of the imperceptible ethereal waves.

If the case rested here, it would not be difficult to prove the reality of spiritual life. It would not be difficult to find —indeed, in the ensuing chapters we shall find—indisputable phenomena, connected with Religion's alleged spiritual Universe, which are inexplicable, except on the assumption that the explanation of them which Religion offers is true. But it so happens that the case for Religion is immeasurably stronger than the case for Science. Her highest truths are based upon the same proofs as those which support the highest truths of Science ; but they rest also upon something more. This additional evidence, the full strength of which has seldom been estimated at its real worth, will be found, on analysis, to resolve itself into a question of dates. Let us explain.

So far as scientific knowledge is concerned, it has been shown that progress from the palpable to the impalpable is a law of human discovery. Men do not leap suddenly from total ignorance, to the perception of obscure and impalpable truths. The process of learning is gradual. One discovery leads to another. And the direction of progress is always from the obvious to the obscure. The palpable is discovered first ; the impalpable last. The Seen is used as a working model by means of which to decipher the Unseen.

But when from Science we turn to Religion, we find this, the natural order, precisely reversed. Two thousand years before Science dreamed her first dream of the true constitution or conditions of Solar light, Religion had formulated a complete theory of the constitution and conditions of her alleged spiritual light. Two thousand years ago Religion gave to the world her views as to the nature and functions of this most impalpable of all phenomena. She told of its source, of its constitution, of the method of its transmission. She told also of its functions in the economy of the spiritual

sphere, of its action in the production of spiritual growth, of its *rôle* in the awakening of spiritual sight. And having thus, once for all, fearlessly propounded her theory, Religion became dumb. From that day to this she has not added, or altered, a word. Spiritual light is to Religion at the close of the nineteenth century, exactly what she pronounced it to be at the opening of the first.

In marked contrast with this spontaneous method, Science has been slowly and painfully evolving her theories of physical light. Experiment has succeeded experiment. Discovery has led to discovery. And the extraordinary feature in this process of gradual advance, by which new truths have been slowly added, and old errors eradicated, is, as will be fully shown in the ensuing chapters, that every change in the scientist's theories of the constitution and functions of physical light, has served only to bring those theories into a closer and closer harmony with Religion's two-thousand-year-old doctrines of spiritual light.

Now, the question which Science is now called upon to face is this : How did Religion acquire this mysterious knowledge? That the scientific world possessed two thousand years ago an accurate knowledge of the constitution and functions of physical light, is a proposition which few will assert. Such an allegation would be in direct contradiction to what is known to be the fact. It is, therefore, impossible that, in formulating her doctrines of spiritual light, Religion can have been drawing upon a knowledge supplied to her by Science. Let us, then, pause here for a moment to observe the effect which the presence of this mysterious knowledge on the part of Religion, acquired by her in circumstances so anomalous, must have upon our minds, when we endeavour to form a reliable conclusion as to the reality of that spiritual light, about which, on the assumption of its non-reality, she can have known nothing.

When the Bible asserts the existence of a spiritual life, it is—as is obvious from the very employment of the term

life—asserting an alleged existence analogous to physical life. Hence, in critically examining the allegations contained in the Bible with reference to this alleged spiritual life, our first enquiry will be directed towards ascertaining whether it is represented to conform to those ascertained laws to which all known forms of life have been found to conform. We shall enquire whether the conditions of the alleged spiritual life are represented to be homologous with the known conditions of physical life. If they are not, then the doctrine will at once stand discredited as being a violation of the principle of the Continuity of Law.

No less obvious is it that, so long as the alleged conditions of spiritual life correspond only with conditions of natural life which are self-evident, and such as must have been well known to the author or authors of the doctrine of spiritual life, the establishment of such correspondences will not carry the argument in support of the reality of spiritual life very far. The existence of an imaginary life so conditioned *might* easily have been invented by any fairly imaginative speculator, out of no more substantial materials than those furnished by his own imagination ; and such obvious and patent details of correspondence are just the correspondences which such an inventor, desiring to give to his invention some appearance of reality, would be likely to fill in from his own experiences of the conditions of physical life. Thus, for instance, it will strike us with no surprise to find among Religion's allegations concerning spiritual life the homologues of such obvious conditions of natural life as growth, assimilation, death, and the like. The presence of such self-evident details is by no means inconsistent with the view that the whole doctrine may have been the pure invention of its author ; and they may therefore be left out of consideration for the purposes of the present enquiry.

But if, in critically examining Religion's dicta concerning her alleged spiritual life, the critic should find a condition

asserted concerning this alleged spiritual life which was quite different from any known condition of physical life—some condition which had no known homologue in our mundane existence at all; and which, further, so far from being trite, or commonplace, was characterized by a marked and startling originality of idea; such a discovery would instantly arrest his attention, as being of the highest importance to his critical enquiry. And for this reason. The importance of the allegation of such an unexperienced condition lies in the fact that it must have originated from a state of consciousness, on the part of the author of the doctrine, quite different from the state of consciousness which produced, or, at least, might have produced, the obvious analogies above referred to. The latter *might* have originated from the simple process of drawing imaginary analogies from the experiences of natural life known to the author of the doctrine; the former, being an anomaly, could not have so arisen.

Now, suppose that the doctrine under examination had been propounded two thousand years ago, and that the supposed critical examination of it were being conducted, say, five hundred years ago. And suppose, further, that at the date of such critical examination the state of biological science was such, that the anomaly discovered by the critic was universally believed by the biologists of that day to be actually an anomaly; that it was at that time an alleged condition having no then-known homologue in physical life; and then observe the effect which the discovery of such an alleged anomaly must have upon the critic's mind. Reflecting that, if in the then state of scientific knowledge the condition referred to was to himself an anomaly, it must *a fortiori* have been an anomaly to the propounder of the doctrine, writing as he did in the still profounder scientific nescience of some fifteen hundred years earlier—a reflection, the soundness of which no scientist of the present century will seriously dispute—the critic will scarcely fail to come to the con-

clusion, that the internal evidence, deducible from his critical examination of the doctrine, affords no sufficient material upon which to base any reliable conclusion as to the reality, or unreality, of the alleged spiritual life. He will have found several alleged conditions which may, or may not, have been deduced from experiences acquired in the physical world. He will have found also one alleged condition of which he can say nothing, except that it cannot have been so derived.

But now transport the critic over the gulf of five hundred years. Unfold to him the book of Science as it stands to-day; and then let him once again test his problem by the same method as before. Once more he scans the familiar theory of spiritual life. Once more he traces the familiar homologues—spiritual assimilation, spiritual growth, spiritual death; he recognizes them all, and passes them by. And once more he lights upon the unfamiliar anomaly, and stops, with the critic's subtle intuition, that here, if anywhere, is the object of his search. He turns to his new book of Science, and there he finds that the anomaly is an anomaly no longer; for there, on the last-written page, is its companion phenomenon in the physical world.

Once more, pause for a moment to consider the effect which this discovery will have upon the critic's mind. How came the apparent anomaly—which was really not an anomaly—into Religion's scheme at all? Only two possible sources are conceivable. Either it was the product of a fortunate guess; or it was derived from an actual experience acquired, mediately or immediately, by the author of the doctrine. Of these two alternatives the former will disappear, if it can be shown that Religion's scheme contains not one such supposed anomaly, but many. If we can take any one of Religion's alleged spiritual phenomena, and can show that Religion has advanced not one, but many, propositions concerning it, each of which must, until recently, have appeared to any scientist to be not only anomalous, but so unlike any known condition of physical phenomena as to be inherently improbable; but each

of which has, nevertheless, ultimately proved to be exactly homologous with some recently discovered corresponding fact in the physical world ; it will then be impossible to attribute such unexpected coincidences to any random flights of the imagination. Even if it be conceivable that chance can have determined one such coincidence, it is obviously impossible to maintain that chance has determined a whole series of such coincidences. If, therefore, we can point to such a series of coincidences, the former of the two possible alternatives will obviously become untenable. The critic will then be compelled to attribute the knowledge, thus mysteriously displayed by Religion, either to direct experience on the part of the author, or his intellectual predecessors, or to that mediate experience which is called Revelation.

And here we need not be over-careful to choose between these two remaining alternatives, or to enquire how far Religion's knowledge is attributable to both or to either ; for either is consistent, and only consistent, with the reality of the spiritual phenomena. No one with whose opinion we need concern ourselves will contend that a supernatural Revelation, if it be a revelation at all, is likely to be untrue. Either it is no revelation at all, or it is a true revelation.

Nor is the remaining alternative—direct experience—less clearly demonstrative of the truth of Religion's spiritual doctrines, and of the reality of her alleged spiritual life. Once more, it is the apparently anomalous doctrines that help us ; for they relate to experiences which clearly were not acquired in the physical life, inasmuch as they preceded by many centuries the knowledge of the existence of any such conditions in physical life ; and they therefore preclude the possibility of any such conditions having been consciously experienced in the physical life. Clearly, therefore, such experiences, not having been acquired in the physical life, must have been acquired in the spiritual life ; for the only alternative supposition of a third kind of life, in which they can have been acquired, is, obviously, too remote for consideration.

And in this conclusion is involved, by necessary implication, the supposition of the reality of spiritual life, as being the only life in which such experiences can have been acquired.

We see, then, that we have here a possible mode of testing the reality of Religion's alleged spiritual life. If, amongst Religion's allegations concerning her alleged spiritual life, we can point to a series of statements in which conditions are asserted, which must be taken to have been to the authors of the Bible anomalous, in the sense of being homologous with no then-known conditions of physical life ; and if we can further show that, by *subsequent* scientific discoveries, the apparently anomalous character of the alleged conditions have been removed, and the conditions themselves have become recognizable as exactly homologous with recently discovered conditions in physical life, so that the spiritual conditions are attributable, and exactly conform, to the same laws as those which are now known to have produced the corresponding physical conditions ; then we shall be compelled to conclude that the knowledge betrayed by Religion's allegations must be attributed, either to Revelation, or to immediate experience ; and either of these alternative conclusions necessarily implies the truth of the allegations, and, consequently, the reality of the alleged spiritual life, concerning which the allegations are made.

The problem, therefore, which we have now to endeavour to solve, is to establish the truth of the proposition that in the Bible is to be found such a series of statements as those just indicated. For this purpose we shall especially devote our attention to the phenomenon known to Religion as *Spiritual Light* ; and we shall endeavour to show that the conditions which the Bible attributes to spiritual light are exactly homologous with conditions which *recent* scientific discoveries have shown to attach to physical light. We shall seek to demonstrate that spiritual light is represented to be homologous with physical light in respect of its source ; its constitution ; its mode of transmission ; its vitalizing

functions; its de-vitalizing functions; the part which it plays in the production of spiritual growth; and its relation to the origin of spiritual sight. And as all these are points, the physical homologues of which were until yesterday entirely unknown to Science, the correspondences, if any, which they may be found to exhibit are just such as we require.

Part III

THE SPIRITUAL

CHAPTER XXII

THE SPIRITUAL UNIVERSE

"Modern Science takes into account all the phenomena of the universe which are brought to our knowledge by observation or by experiment. It admits that there are two worlds to be considered, the one physical and the other psychical."—HUXLEY.

SCIENCE lecturers are in the habit of exhibiting a pretty experiment in illustration of the communicative properties of Magnetism. A handful of soft-iron filings is sprinkled over a sheet of paper, and a powerful bar magnet is passed underneath. The behaviour of the iron filings under the magnetic influence is remarkable. In the absence of the magnet they lie scattered over the sheet of paper without order or design, a picture of social chaos. But the introduction of the magnet is the signal for a totally new order of things. As if endowed with life, the filings immediately arrange themselves into graceful and symmetrical curves, each attaching itself to its neighbour, and all observing that mysterious order, in which they seem to be rendering homage to a superior Power.

This apparent vitality is exhibited only so long as the filings are under the immediate influence of the magnet. As it is passed along the lower surface of the paper, the filings immediately above it spring into seeming life, and group themselves in the manner described—only to sink once more into their original apathetic chaos, as the magnet moves away.

If we ask for an explanation of these phenomena, the

scientist will tell us that they are due to the fact that magnetism is, under certain conditions, a communicable force. Each of the iron filings, when exposed to the immediate influence of the magnet, becomes, for the time being, a little magnet in itself. Its natural molecular arrangement is taken away from it ; and a new molecular arrangement, similar to that of the parent magnet, is given in its place. And with this change of nature it acquires, though on a smaller scale, the properties of the parent magnet. It attracts, and repels, just as the parent magnet attracts, and repels. But this acquired nature and faculty last only so long as the filing remains subject to the parent's influence. Remove it from the parent magnet, and it at once reverts to its former, and natural, condition. The acquired molecular constitution, with its ensuing faculties, disappears ; and the converted magnet relapses once more into an inert and passive piece of iron.

Now, these things are an allegory. The immediate truth which is disclosed by the relations of the magnet to the iron filings, is a picture of a deeper truth concerning the relations of God to man. Long centuries before the phenomena of magnetism had yielded any of their secrets to the researches of Science, Religion had proclaimed that the selfsame phenomena are to be found in the spiritual world. That the constitution of man is capable of acquiring the nature of God ; that only through the immediate influence of God's Spirit can this change of nature be acquired ; that the divine nature, even after it has been acquired, can be maintained only so long as its possessor continues in close communion with God ; and that, upon the withdrawal of that communion, the spiritualized man inevitably relapses into his former, and natural, state of torpid inertia towards heavenly things ; are all doctrines, at once so familiar as to require no formal verification here, and so obviously analogous to the magnetic phenomena as to need no further comment.

If the allegory of the magnetic experiment stood alone,

its value to Religion might be small. It is because it is but a part of a larger allegory, that its value to Religion is great. For the lesson, which is thus propounded by the movements of molecules and atoms, occupies but a chapter in that sublime allegory, of which all Nature is the exponent. The belief that the material Universe is but a working model of a higher and invisible Universe, is one from which the human mind has never been wholly free. It appears, like an outcrop of golden ore, in every stratum of religious thought, from the barren totemism of the rudest savagery, up to the richest veins of the most advanced theology. Nor is it by any means the peculiar property of Religion. It is the dream of Poetry, and the hope of Philosophy. When the poet, in lines of unrivalled beauty, bewails the departed glories of Parnassus—

> "Though here no more Apollo haunts his grot,
> And thou, the Muses' seat, art now their grave,
> Some gentle spirit still pervades the spot,
> *Sighs in the gale, keeps silence in the cave,*
> *And glides with glassy foot o'er yon melodious wave*"—

he is but applying, though in a more fanciful connection, the truth by virtue of which the Philosopher

> "Finds tongues in trees, books in the running brooks,
> Sermons in stones, and good in everything"—

the truth, namely, that all material phenomena contain within them, hidden, indeed, from the vulgar gaze, but clearly visible to the eye of a discerning philosophy, an ulterior and allegorical meaning.

But though Religion cannot claim an exclusive monopoly in this belief, it is, nevertheless, essentially a doctrine of her own. Not only does she expressly assert it in the New Testament —"for the invisible things of Him from the foundation of the world are clearly seen, *being perceived through the things that are made*"[1]—but her whole scheme is based upon this

[1] Rom. i. 20.

conception. Why, we ask once again, does her scheme open with a Cosmogony? Already we have discussed, and partially answered, this question. We have seen that Religion's method of explaining her spiritual truths in terms of natural truths, necessitated that her scheme should open with a statement of the ultimate truths of Natural Science; and upon carefully analyzing the first two verses of the first chapter of Genesis, by the light of the *Synthetic Philosophy*, we have found that those ultimate truths are there correctly stated, with an exact—indeed, an extraordinarily exact—scientific accuracy.

But this discovery, though sufficient for the immediate purpose which we then had in view, obviously does not explain why Religion should have thought it necessary to build up, out of these fundamental phenomena, an elaborate cosmogony of the physical Universe. The truth that God is the Author of the Universe is a truth in which Religion is obviously closely interested. The doctrine that

> "His names
> Of Wisdom, Power, and Love
> Are written in the earth beneath,
> The glorious skies above,"

is self-evidently a doctrine which belongs to her province alone. But why should she trouble herself with elaborate details as to how, or in what order, the Formation of the material Universe was effected? These are facts which belong to Natural Science. What are they to Religion?

Already the answer to this question has been foreshadowed. If the physical Universe is really a model of the spiritual Universe—if "the invisible things of Him" are really to be "perceived through the things that are made"—then it follows that the spiritual Universe must be studied by aid of the physical Universe; not only the isolated phenomena of the spiritual Universe, such as spiritual life, or spiritual growth, but the spiritual Universe as a whole. Here is the

pathway to the knowledge of the Invisible. The Natural is the gateway to the Supernatural. The invisible things of Him will be clearly seen, when they are perceived through the things that are made.

This, then, is a debt which we owe to Science and Religion alike. We must test the reality of Religion's alleged spiritual phenomena, by placing them side by side with the corresponding phenomena of the physical Universe. We must compare the two together, and ascertain in what respects they agree. And, for the purpose of this comparison, we shall especially direct our attention to the spiritual homologues of those physical phenomena and laws, which were certainly unknown to the authors of the Bible, but the existence of which has since been satisfactorily proved by modern Science. We shall then be in a position to judge what amount of credence may—and must—be placed in statements, rendered abnormal by the scientific prescience which they display.

In order to satisfactorily achieve this end, it is obviously of the first importance, to obtain as clear a view as possible of the spiritual phenomena which we have to examine. Our first efforts, therefore, must be directed to constructing the spiritual Universe in its entirety. Out of the scattered utterances of Religion we must select the materials of which her alleged spiritual Universe is built ; and, piecing those materials together, we must examine their product analytically and synthetically.

And here observe the first great parellelism, which we may expect to find between the phenomena of the spiritual Universe and those of the physical. In classifying the component factors of the physical Universe, the principal classification drawn by Science is that which divides the inorganic from the organic. This is the most conspicuous of all bases of classification in the physical Universe. It is the first great division of Nature.

If the spiritual Universe is constituted on lines at all

similar to those of the physical Universe, we must expect to find there, too, the same great dividing line. Among the parallelisms which the two spheres will exhibit, this is likely to be a primary parallelism. On the assumption of the truth of Religion's doctrine, it almost necessarily follows that this fundamental classification will extend from the physical into the spiritual sphere. The first great division of Nature will be the first great division of Spirit. If there is a spiritual Organic, there will, almost certainly, be also a spiritual Inorganic.

There needs no argument here to prove that Religion fully recognizes such a classification. The fundamental distinction which she draws between the spiritually living and the spiritually dead has been so ably discussed, and so fully illustrated, in Professor Drummond's *Natural Law in the Spiritual World*, that we need not further discuss the point. We may, therefore, after directing our attention to the fact that Religion does lay down this dividing line, at once pass on to the consideration in detail of either of these two fundamental divisions ; and, in obedience to the analogies of Science, we will commence with the study of the Inorganic, as the necessary introduction to the Organic. For the sake of convenience, and also because of the absence of exact knowledge with reference to any of the more distant planetary systems, and, further, because in all probability other systems are similarly constituted to our Solar System, we shall, in treating of the physical Universe, confine our remarks to our Solar System, to which system alone we shall hereafter refer when we speak of the natural, or physical, Universe.

The principal factors of the inorganic portion of the natural Universe consist of the Sun and the Planets. What are the homologues in the spiritual Universe of these constituent factors of the physical Universe? For the spiritual homologue of the Sun we have not far to look. Almost every page of the Bible declares that it is to be found in one of the attributes of God. Everyone will admit that it has

always been the consistent doctrine of Religion, that the relations—or, rather, some of the relations—of God to the spiritual Universe are identical with the relations of the Sun to the physical Universe. Of the many familiar passages which will occur to everyone in support of this proposition, the following may be here mentioned. In the Old Testament we have, "The Lord is my light," [1] and "The Lord shall be unto thee an everlasting light"; [2] with which should be coupled the still more explicit statement that "the Lord God is a Sun"; [3] and, once more, "Unto you that fear My name shall the Sun of Righteousness arise." [4]

In the New Testament the allegation that "God is light, and in Him is no darkness at all," is familiar to everyone.

Still more conclusive are the passages, occurring again both in the Old and New Testaments, in which the function of the Sun, as the author of physical light, is ascribed, in respect of spiritual light, to God. Thus, in the Psalms occurs the following passage: "For with Thee is the fountain of light"; [5] and St. James calls God "the Father of lights." And so, again, in Revelation it is asserted that the Spiritual World "hath no need of the Sun, neither of the Moon, to shine upon it: for the glory of God did lighten it" (*ἐφώτισεν αὐτήν*); [6] and once more, "And there shall be night no more; and they need no light of lamp, neither light of the Sun; for the Lord God shall give them light" (*φωτίσει ἐπ' αὐτούς*).[7]

No less illustrative of the same fact are the passages in which the true relations of man to God are expressed in similar terms. Thus, the condition which, when expressed in terms of psychology, is represented by the expression "to know God," becomes, when translated into terms of

[1] Ps. xxvii. 1.
[2] Isa. lx. 19.
[3] Ps. lxxxiv. 11.
[4] Mal. iv. 2.
[5] Ps. xxxvi. 9.
[6] Rev. xxi. 23.
[7] Rev. xxii. 5.

biology, "to see the light." This allegation will be sufficiently illustrated by the following well-known quotations :—

"The people which sat in darkness *saw a great light*; and to them which sat in the region and shadow of death, *to them did light spring up*."[1]

"Who hath called you out of darkness into His marvellous light."[2]

"To open their eyes, and to turn them from darkness to light."[3]

And, finally, reconciliation with God is alleged to be synonymous with the acquisition of a relationship with light :

"The children of this world are in their generation wiser than *the children of light*."[4]

"While ye have the light, trust in the light, *that ye may become sons of the light*."[5]

Scarcely less patent is the doctrine that man constitutes the spiritual homologue of the planets. If this doctrine is stated less explicitly than the last, it is only because it is so self-evident a corollary therefrom, that it scarcely requires stating at all. If God, the Author of spiritual light, is the spiritual homologue of the Sun, clearly the planets—the recipients of Solar light—must correspond, in the spiritual Universe, to man, the recipient of spiritual light. Nor need it cause us any surprise to find man, the highest organism in the physical world, treated as absolutely inorganic in the spiritual Universe. Already we have referred to the doctrine, elaborately illustrated by Professor Drummond, that the "natural man" is to the spiritual world inorganic and dead. It is only when he becomes spiritualized, that he enters the spiritually organic kingdom. The truth is, that the "natural man" is described as furnishing the spiritually inorganic habitat of spiritual life, just as the Earth furnishes the inorganic habitat of physical life. As direct authority for this proposition we will not do more here than refer to Christ's well-known parable of the Sower.

[1] Matt. iv. 16.
[2] 1 Pet. ii. 9.
[3] Acts xxvi. 18.
[4] Luke xvi. 8.
[5] John xii. 36.

Recognizing, then, these constituent factors of the spiritual Universe, let us now examine some of their more general inter-relations, in order that we may compare them with the corresponding inter-relations of the Sun and the Planets.

When Religion asserts that mankind, having been "made and created in the image of God," originally participated in the divine nature, and subsequently, by an act of self-will, forfeited this participation; and when she further predicts that a reconciliation with God, and a re-participation in the divine nature, is the future destiny of man; she is propounding a doctrine which, though habitually treated with contempt by scientists, is nevertheless exactly paralleled in the relations which, according to Science, have existed, and will hereafter exist, between the Sun and the subordinate members of the Solar System. Accepting the now established Nebular Hypothesis, we have to observe that each planet, as originally constituted, was in actual contact with the Sun—was part of the Sun;[1] and, so long as such contact subsisted, actually participated in the Sun's constitution, in respect of consistence and temperature, as well as in respect of molar motion. That is to say, the constitution, and the motions, both molar and molecular, of each of the planets, were originally identical with those of the Sun, from whom they were at that time directly derived.

But by-and-by, in each case, a separation from the parent mass took place. And, in each case, this separation was accompanied by a subsequent differentiation, first, of the motions, and thence, of the constitution, of the separated planet, from the motions and constitution of the parent mass. No longer receiving, through that circulation which is constantly taking place in heated fluids, direct impulses from the central mass, the molecular motions of the detached planet became differentiated from those of the central mass, with a resulting differentiation of constitution; and simul-

[1] Cf. the well-known doctrine of Religion: "I said, Ye are Gods, and all of you sons of the Most High."—Ps. lxxxii. 6.

taneously, the detached planet, while partially retaining the molar motion which it had previously acquired from the central mass, also set up an independent molar motion of its own.

Thus the past history of the planets exhibits a change of constitution and motions, exactly paralleled by the change of nature and of actions which Religion attributes to their spiritual homologue, Man. Originally in immediate contact with God, and therefore sharing in the divine nature, man subsequently became separated from God. And, as a consequence of such separation, not only has his internal nature become differentiated from the divine nature, but his actions, which were originally regulated in entire conformity to the will of God, have come to be partially regulated in conformity to a self-will, which is not derived directly from God. As in the case of the planets, while retaining some of the divine motions, which were originally imparted to him whilst he was in direct contact with God, he has also set up certain independent motions of his own.

From these general considerations, when we pass to a more particular consideration of the molar motions of the planets, we find that the changes which these motions have undergone are paralleled, with a curious exactness, in the spiritual Universe.

It will be recollected that Religion explains reconciliation with God as a being brought *near* to Him. While the unreconciled man is he whose "heart is *far from Me*," [1] the reconciled man is he who has been "made *nigh* in the blood of Christ." [2] It will also be remembered that Religion alleges that one of the accompaniments of this reconciliation is a complete submission of the will, and, through the will, of the actions, to the will of God. Henceforth the actions of the reconciled man will be obedient, not to his own will, but to God's will. His movements will be, not his own, but God's. The familiar Prayer-book petition, "that we may

[1] Matt. xv. 8. [2] Eph. ii. 13.

evermore *obey Thy godly motions*," is an admirable summary of this part of the doctrine of reconciliation.

Placing these two doctrines together, it will be observed that they combine into a doctrine, which may be formulated as follows : that in proportion as a man is "nigh" to God, so will his actions be guided less by himself, and more by God. Nearness to God, and "obedience to the godly motions of righteousness and true holiness," are represented to be conditions which, in the spiritual Universe, habitually accompany one another.

Turning now to the physical Universe, we find there, too, the very same phenomenon. The molar motions of the primary planets are of two kinds : first, their orbital motions ; and, secondly, their axial motions. Of these, the orbital motions are derived directly from the Sun ; they are the Sun's own molar motion, imparted to the several planets while they were still united with the Sun. The axial motions of each planet are, on the other hand, self-acquired motions, induced in the planet itself by its own inherent forces, independently of the Sun, and after its detachment from him.

Now, the point to be here noted is, that the Sun-acquired orbital motions are most active in those planets which are nearest to the Sun, and least active in those which are more remote ; while, conversely, the self-acquired axial motions are most active in the more remote, and least active in the nearer planets. The following table gives in miles the mean orbital velocity per second of each of the primary planets :—

ORBITAL VELOCITY.

Mercury.	Venus.	Earth.	Mars.	Jupiter.	Saturn.	Uranus.	Neptune.
30	22	19	15	8	6	4	3

And the following table gives their respective rates of axial rotation :—

AXIAL ROTATION.

Mercury.	Venus.	Earth.	Mars.	Jupiter.	Saturn.	Uranus.
h. m.	h. m.	h. m.	h. m.	h. m	h. m.	h. m.
24 5½	23 21	23 56	24 37	9 55	10 29	9 30

A glance at the former of these two tables will show that, in every case, the sun-acquired orbital motions increase with increased proximity to the Sun. As regards the self-acquired axial motions, the second table shows that the converse holds true generally. There are, it is true, certain irregularities in the series of axial motions, induced by differences in the respective sizes and constitutions of the planets. But, although the serial decrease is irregular, on the whole the rule holds good, that the self-acquired axial motions decrease in point of velocity, as the Sun is approached. The axial motions of the four inner planets are immensely less active than those of the three outer planets.

Indeed, these local irregularities serve only to emphasize the exactness of the parallelism which we are here illustrating. Though increasing nearness to God will, in all cases, necessarily ensure that the influence of His will has a more powerful effect, yet it does not at all follow that increased subjection of the self-will follows with a corresponding regularity. On the contrary, differences of individual constitutions will, almost necessarily, prevent such a result. The rule that subjection of self-will increases with increased nearness to God, will hold good only as a general rule. Amongst each group of individuals there will necessarily be partial exceptions. And thus the local exceptions, exhibited by the series of axial velocities, lend an additional touch of truth to the allegorical picture which the Solar System displays. The regularity with which the orbital motions increase, coupled with the irregularity with which the axial motions decrease, as the Sun is approached, is in exact harmony with the corresponding spiritual phenomena.

Here, then, we see a remarkable homology between the conditions which we now know to exist in the physical Inorganic, and the conditions which Religion, two thousand years ago, represented as existing in the spiritual Inorganic. We have here, at least, two primary points of correspondence

between the actual physical Universe known to modern Science, and the alleged spiritual Universe propounded by Religion ; correspondence in respect of God-imposed motions ; and correspondence in respect of self-imposed motions. And in either case the correspondence is of such a nature, that few will be likely to adopt the view, that it could have been suggested to Religion by any knowledge of physical science which she possessed at the time when she formulated her spiritual doctrines. It will scarcely be suggested —indeed, it will be shown immediately that any such suggestion, if made, would be quite untenable—that the authors of the theological doctrine had any knowledge of the rates of planetary orbital motions and axial motions, from which they could have deduced their homologous doctrines of the motions by which the spiritual light-receivers are alleged to be impelled.

But when from this primary general homology we turn to examine, in detail, the conditions which Religion alleges to exist in her spiritual Universe, we are met by a set of homologies of extraordinary exactness. Of all the discoveries which Science has made concerning the movements of the heavenly bodies in the physical Universe, three stand out in bold relief above all the rest. The first is, that each of the planets has an orbital motion round the Sun. The second is, that each of the planets rotates upon its own axis. And the third is, that the Sun himself rotates upon his axis. Let us trace very briefly the history of each of these transcendent discoveries, in order to observe how great were the difficulties by which it was attended and retarded.

The first was undoubtedly retarded for many ages by the fact, that the truth which it postulates is concealed under the greatest optical illusion to which the human intellect has ever been subjected. The belief that the Earth is a stationary body, and that the Sun travels round the Earth, is a *primâ facie* conclusion which is certain to be drawn

by any uninformed observer, who bases his judgment solely on the apparent passage of the Sun through the heaven, coupled with the apparent stability of the Earth. To such an observer the phenomenon will seem to require, and, indeed, admit of, no other explanation ; and if we had no other data to guide us, it is in every respect probable that we should long ago have finally accepted this apparently obvious solution as the true explanation. It is only when we proceed to examine concurrent phenomena, the precession of the equinoxes, the recurrence of the seasons, the real and apparent displacements of other planets, the different courses which sun-spots appear to travel across the Sun's disc at different periods of the year, that we come to recognize that this apparently obvious conclusion is, in reality, wholly untenable.

It is material to our present purpose to observe how slowly and hesitatingly Science arrived at the truth upon this fundamental astronomical problem ; and we will, therefore, trace out the history of the discovery with some little particularity.

At least until the enunciation, some five hundred years before Christ, of the Pythagorean System of Astronomy, the belief that the Sun travels daily round the earth was universally accepted. Pythagoras, it is true, propounded the more correct view, that the Sun is a body placed near the centre of the Solar System, round which the planets revolve. But his theory, which appears to have been based upon abstract speculation, rather than scientific observation, and which introduced such visionary conceits as the entity of number, and the music of the spheres, was far indeed from furnishing Astronomy with anything like a true conception of the Universe. According to this system the Universe was supposed to be a sphere, in the heart of which was placed the " central fire," to which the name of Hestia—the hearth, or altar, of the Universe, and the citadel, or throne, of Zeus—was given. Around this moved the ten heavenly

bodies ; farthest off, the heaven of the fixed stars ; then the five planets known to antiquity ; then the Sun, the Moon, and the Earth ; and lastly the counter-earth (*ἀντίχθων*), an imaginary body which was supposed to revolve between the earth and the central fire.

No one who examines this fanciful system can for a moment imagine that Pythagoras succeeded in formulating anything like a true conception of the Universe. How little impression his speculations made upon scientific minds is sufficiently attested by the fact that the Ptolemaic System, some seven and a half centuries later, succeeded in again restoring the Earth to her usurped post of honour, as the centre of the Universe, once more relegating the Sun to the subordinate rank of a Satellite.

The absurd system of Ptolemy, with its fanciful and unexplained *primum mobile*, its crystalline shells, its eccentrics and epicycles, held undisputed sway over scientific minds until the sixteenth century A.D., when the Copernican system restored the Sun and the Planets to their true relations as regards relative motion. So slowly and painfully has Science wrested from reluctant Nature this primary and fundamental truth.

The discovery of the earth's axial rotation was attended by difficulties, scarcely less formidable than those which retarded the recognition of her orbital revolution. Upon this point the Pythagorean system, which made at all events some approach to the truth with reference to the Earth's orbital motion, went hopelessly astray. Assuming that all light and heat are derived from its "central fire," this system supposed that its imaginary counter-earth (*ἀντίχθων*) revolves with the Earth, and is constantly interposed between the Earth and the direct rays of this central fire, which were supposed to reach the Earth indirectly by reflection from the glassy surface of the Sun. Consequently, it was believed that, when the Earth is on the same side of the central fire as the Sun, we have day ; when on the other side, night.

And thus the distinction between light and darkness was supposed to be produced by the Earth's orbital revolution, and not by an axial rotation. Before the true view could be evolved it was necessary that the central fire, and the counter-earth, should both be eliminated from the system.

At what date, or by whom, the suggestion of the Earth's axial rotation was first made, it is impossible at this distance of time to say. Philolaus, who was born about 480 B.C., and Aristarchus of Samos, who flourished 280–264 B.C., have both been credited with the suggestion. But, on the whole, it seems probable that the doctrine was first broached by Heraclides of Pontus, and Ecphantus, a disciple of Pythagoras.

But whoever may be entitled to the credit of having first propounded this scientific doctrine, it is obvious, from the numerous points of error which the Pythagorean astronomy introduced into its view of the Solar System, that such a doctrine must have been the product of a fortunate guess, rather than of scientific observation. It was not until the promulgation, in the sixteenth century A.D., of the Copernican system, or, at all events, until the speculations of the famous Cardinal Cusa, who, in the fifteenth century, is said to have anticipated Copernicus, by maintaining the theory of the rotation of the Earth, that Science can be said to have formed any clear and definite view on the subject.

Nor can it be alleged that even the Copernican system furnished a satisfactory solution of the problem. To the favourite argument advanced against the Copernican theory of axial rotation, that it is inconsistent with the fact that bodies fall to the points of the Earth directly beneath the points from which they are dropped, Copernicus himself could give no answer. And so powerfully was he affected by the mechanical difficulties presented by his system, that not only was he reduced to the device of Epicycles, in order to account for the apparent irregularities of the planetary motions, but he openly declared that he held his theory

of the Earth's motion only as an hypothesis, and not as an established fact. It was not until the seventeenth century, that the discoveries of Newton, following the investigations of Kepler, placed the theories of the orbital and axial motions of the Earth upon a basis of scientific certainty.

From the foregoing considerations, it is clear that the discoveries of the Earth's orbital and axial motions were attended, and retarded, by enormous difficulties. But, in order to realize to the full how slow and tentative the process of discovery really was, we should consider the histories of the two discoveries, not separately, but together. For it so happens that almost every early astronomer who happened to stumble upon the truth on the one point, went wrong upon some other point. Thus, while the ancient Egyptians discovered the truth that Mercury and Venus revolve round the Sun, and thus laid the foundation for the theory of planetal revolution, they supposed that the Sun himself, with Mars, Jupiter, and Saturn, moved round the Earth. On the other hand, Apollonius of Perga, who is said to have correctly selected the Sun as the common centre of all the planetary motions, maintained that, like the moon, he revolved around the Earth. Again, the principal Pythagorean philosophers, while placing the Sun near the centre of the Solar System, fell, as we have seen, into the error of imagining a still more central fire, and a counter-earth.

Once more, Nicetas, Heraclides, and others are stated to have correctly attributed an axial rotation to the Earth; but, unfortunately, they regarded her as the central body, round which all other heavenly bodies revolved. Philolaus alone appears to have any claim to be credited with having guessed that the Earth possesses both an axial rotation and an orbital revolution round the Sun. But whether, or no, he be entitled to the credit of having really held these opinions, it is certain that the views thus attributed to him made little, or no, impression upon the scientific world, and gained no authoritative acceptance, until they were formally

promulgated by Copernicus in the sixteenth century A.D., in his famous treatise, *De Orbium Cœlestium Revolutionibus.*

Reviewing the foregoing facts, it will be very generally admitted that the history of scientific thought, with reference to the Earth's orbital and axial motions, has followed the strictly natural course. At first—and, indeed, for a very long time—Science fell into the natural error of mistaking the apparent explanation of the phenomena for their true explanation. It was only after centuries of speculation and observation, of mistakes gradually corrected, and errors slowly eliminated, that she at last, and tardily, arrived at the truth.

In marked contrast with the natural course, which has thus been followed by Science, Religion in this, as in all other matters, followed the supernatural course which led direct to the truth. While Science has been slowly, and doubtingly, groping her way through errors and mistakes, Religion at the very first grasped the truth, and without a moment's doubt, or hesitation, fearlessly committed herself to it. It is not only that the cosmogony contained in the first chapter of Genesis has avoided the error into which Science fell, of making the Sun a satellite of the Earth. It is not only that, by a judicious silence, Religion has escaped the most natural of all mistakes. But it is that she has expressly asserted the apparently improbable, but really true, view of the case. And in this instance, the supernatural knowledge which Religion displays possesses a special interest for us, from the fact that the immediate object, for which she uses it, is to illustrate a parallel arrangement which, as she declares, is exhibited in the spiritual Universe. Let us verify this assertion.

Everyone is familiar with the fact that if an object be viewed separately by the right eye, the left eye being closed, and then by the left eye, the right eye this time being shut, the head all the while remaining unmoved, the object itself appears to change places. As seen by the right

eye it appears, in comparison with more remote objects, to occupy a position to the left of that which it apparently assumes when regarded from the left eye. This apparent displacement is technically termed a *parallax*.

As known to Astronomy, a parallax is the apparent displacement of a star as seen from two different points of view, as, for instance, from opposite points in the ecliptic. And inasmuch as a change of position on the part of the observer is an essential condition to the existence of a parallax, it follows that the assertion of the existence of a parallax contains, by necessary implication, the assertion of a real change of position on the part of the observer, by which the apparent change of position, which constitutes the parallax, is obtained. Hence, any astronomical system which should assert that the Sun is, but the Earth is not, liable to a parallax-producing change of station, would be guilty of the error of asserting that the Sun is a migratory body, and the Earth a stationary body. And, contrariwise, a system which should advance the opposite theory would, in so doing, by necessary implication assert the true view of the case, namely, that the Sun is the central body, and the Earth a planet. In other words, to predicate of the Sun a parallax-producing change of station, and to deny it of the Earth, is to fall into the Ptolemaic error of regarding the Earth as the stationary centre of the Universe; while to predicate of the Earth such a change of station, and to deny it of the Sun, is to propound that true order of the Universe which was dreamed of by Pythagoras, affirmed by Copernicus, and proved by Newton.

In the light of these considerations turn now to the following doctrine of Religion:—

"Every good gift and every perfect boon is from above, coming down from the Father of lights, with whom can be no parallax-producing change of station (*παραλλαγὴ*), neither shadow that is cast by turning (*τροπῆς ἀποσκίασμα*)."[1]

[1] James i. 17.

This passage takes us at once into the very heart of astronomical science, and into the very heart of Spiritual Astronomy. Religion is here explaining something of the constitution of the spiritual Universe. She is propounding a portion of her spiritual Cosmology. And, in doing so, she here, as elsewhere, follows the only possible course, of explaining the Spiritual in terms of the Physical. Her immediate subject is a comparison of the spiritual Sun with the physical Sun, and her argument is as follows :—

"To understand some of the relations of God, 'the Father of lights,' to the spiritual Universe, consider the relations of the Sun, the author of physical light, to the physical Universe ; for the two are homologous. Just as the Sun is the source of all those benefactions to the Earth which flow from the two Solar gifts of light and heat, so is God the Giver of every good gift, and of every perfect boon, in the spiritual Sphere. Moreover, we may trust to God for a continuance of these gifts with perfect confidence, for, like the Sun in heaven, He is constant ;—constant in respect of His undeviating position ; constant also in respect of the ceaseless flow of the spiritual gifts which He confers. Man, like the wandering planet of the physical Universe, is ever changing his position hither and thither, until, to his bewildered and unstable gaze, even the fixed star of Truth seems to shift its ground (*παραλλαγή*). With man, too, as with the planet, the light is perpetually failing ; sometimes he is in the light, sometimes in the shadow. But this darkness is not due to any failure in the supply of light ; it is caused by the fact of man turning away from God, the Light-giver—it is a 'shadow cast by turning.'

"With this inconstancy on the part of the light-receiver, contrast the constancy of the Light-giver. *There* is perfect stability. *There* is perpetual light. As with the physical Sun, so with the Spiritual Sun, there can be no parallax-producing change of station—no *παραλλαγὴ*—there can be no shadow cast by turning—no *τροπῆς ἀποσκίασμα*."

If we carefully examine the text of this passage, we shall find that it contains every one of the statements comprised in this somewhat lengthy paraphrase. The passage is, in fact, a model of pregnant condensation. Indeed, it is scarcely less remarkable, in this respect, as a composition, than it is phenomenal, as a scientific statement, for the scientific prescience which it displays. In order to understand it, we must bear in mind that every word is used in a double sense; a primary direct sense, and a secondary implied sense. Thus the expression the "Father of Lights" *means* God, and *suggests* the Sun; the terms "from above" and "coming down" *mean* the source of spiritual light, and *suggest* the source of Solar light; the expression "every good gift and every perfect boon," *means* the gifts of spiritual light and heat, and *suggests* the two gifts of Solar light and heat. Throughout the whole passage there is a play—a *double entente*—upon every word. And only on thus understanding the passage, can we appreciate the full scientific significance of the two remarkable terms παραλλαγὴ and τροπῆς ἀποσκίασμα.

For, while bearing in mind that these terms have a secondary implied reference to the Sun and the Earth, we must recollect that their primary direct reference is, not to the Sun and the Earth, but to God and Man. In this two-fold application the terms παραλλαγὴ and τροπὴ are exactly appropriate; appropriate, first, because they *directly* assert "variation" and "turning," which is the author's primary meaning in reference to God; and, secondly, because by their philological relationships to the physical terms παράλλαξις ("parallax") and στροφὴ ("rotation"), coupled with the astronomical metaphor introduced by the expressions "Father of lights" and "from above," they indirectly, but irresistibly, suggest to a Greek reader these, their physical homologues. To an English reader the difficulty of understanding the passage is simply the difficulty which is inseparable from every translation, where the original

contains any sort of play upon words. In the English version the suggestion of παράλλαξις from παραλλαγὴ, and of στροφὴ from τροπὴ, is necessarily lost. But to the sensitive ear of a Greek, the secondary idea, intended to be suggested by the primary idea, must have been conveyed with a vividness which entitles the passage to rank high as a literary composition, illustrative of one of the many subtle capacities of the Greek language.

But whatever vividness the passage may unavoidably lose in translation, a careful analysis of its terms cannot fail to satisfy the most sceptical of readers that it *does* assert, expressly in the case of the spiritual Universe, and by necessary implication in the case of the physical Universe, that order of relations between the light-giver and the light-receivers which Science, centuries later, has pronounced to be the true order of relations in the physical Universe—that order, namely, which regards the light-giver as the relatively stationary (though rotating) centre of the Universe, and the light-receivers as wandering, and rotating, planets. And this true order of the physical Universe, to which Religion thus appeals as a witness to the order of the spiritual Universe, so far from having been drawn from the scientific knowledge of the day, was advanced by Religion in direct opposition to what was then believed by all, except, perhaps, a few isolated speculators, to be the actual order of the Universe.[1]

[1] The passage is scarcely more remarkable for the scientific accuracy of the express and implied *assertions* which it contains, than for its skilful *avoidance* of a scientific error as regards the Sun's axial rotation. It does not, it is true, assert the Sun's axial rotation; but it avoids the denial of that rotation in circumstances which almost amount to its assertion. Whatever view may be adopted as to the date of the discovery of the Earth's axial rotation, it cannot be denied that the discovery of the Sun's axial rotation was not made prior to the year 1611 A.D. This discovery is, in fact, entirely due to the telescopic study of Sun-spots. Inasmuch as the Sun has no fixed and permanent markings, Sun-spots constitute the only possible means of discovering the fact that the Sun rotates on his axis, and the rate at which he so rotates.

Now, although spots do occasionally appear of such magnitude as to

What, then, to sum up the foregoing remarks, are the principal homologies between the general conditions of Religion's alleged spiritual Universe, and the physical Universe known to modern science? In either case the great primary dividing line between the Organic and the Inorganic is to be found. Of these two grand divisions we see that the Inorganic, in either case, consists of a light-giver and light-receivers. In either case, too, the light-receivers were originally in close communion with the light-giver, but have subsequently become separated from the light-giver; and, in either case, this separation has been accompanied by a differentiation from the light-giver in respect of the (orbital) motion which was acquired

be visible to the naked eye, as, for instance, the spots recorded by Adelmus, a Benedictine monk, on March 17th, 807 A.D., and by Averroës in the year 1161 A.D.; yet it is obvious that these visible spots are of such extremely rare occurrence as to render it in the highest degree improbable that they could ever have led to the discovery of the Sun's rotation. The vast majority of Sun-spots are entirely invisible, except by the aid of the telescope; and, consequently, no connected or detailed study of them was possible prior to the invention of that instrument. As a matter of fact, the first telescopic observations of Sun-spots were made in the year 1611 A.D., by J. Fabricius, Galileo, and Harriot; and it was not until the same year that Fabricius, by a telescopic study of their movements, discovered the Sun's axial rotation.

Reviewing the foregoing facts, no one will contend that the Sun's axial rotation was even suspected—much less accepted as an article of scientific belief—at the date when the *General Epistle of James* was written. And this being so, observe what that document says concerning the Sun. Note once more the words "with whom can be no variation neither shadow that is cast by turning." The second half of this sentence is not what one reader out of a thousand would have expected. The contrast that is being drawn is between the constancy of the light-giver, and the inconstancy of the light-receiver. The inconstancy of the light-receiver is illustrated in two respects; the one a shifting of station (παραλλαγή); the other a rotation (τροπὴ) which causes a shadow. In contrast with these two characteristics of inconstancy on the part of the light-receiver, the author points out that the light-giver exhibits two antithetical characteristics;—the one that, unlike the light-receiver, it does not shift its position (παραλλαγή); and what is the other? Does not every reader, who sees the passage for the first time, expect that the second alleged characteristic will be the antithesis of rotation—namely, non-rotation? Does not the passage seem to almost require that its second term shall be "turning" (τροπή)? "With whom is neither variation

directly from the light-giver, and by a second differentiation in respect of a self-acquired (axial) motion.

We have seen, too, that, in either case, nearness to the light-giver is accompanied by an increased activity in respect of that motion which was acquired directly from the light-giver, and by a decreased activity in respect of the self-acquired motion.

And, finally, when we come to examine Religion's allegations concerning the conditions of the spiritual Light-giver, as contrasted with the conditions of the spiritual light-receivers, we find that, not only does she expressly assert that those respective conditions are homologous to each

nor turning," is the natural course which every reader expects the sentence to take, and the departure from which must strike every attentive student with a certain shock of surprise.

But our surprise is turned into admiration when, by the light of the discovery made by Fabricius in the year 1611 A.D., of the Sun's axial rotation, we read the passage, not, indeed, as we expected it, but as we find it. For we then perceive that, while the expected, and seemingly natural, close of the sentence would, according to the then current scientific ideas, have passed unchallenged ; it would, nevertheless, at the present day, in the light of recent scientific discoveries, have stood condemned as scientifically untrue. And we see, too, that the author, in turning aside from this expected contrast to a contrast perfectly unexpected by his readers, and utterly unsuspected by his contemporary scientists, and in thus avoiding a scientific error into which he seemed on the very point of falling, exhibits a scientific prescience which, in the circumstances, it is scarcely possible to regard as fortuitous. We recognize that the point upon which he has thus kept himself scientifically correct by this unexpected transition, and to which a special emphasis is attached by the very unexpectedness of the transition, is the then unknown fact of the Sun's axial rotation.

Realizing these things, we cannot, indeed, say that the author has expressly asserted the axial rotation of the Sun ; but we can, and must, admit that the laboured and pointed manner in which he has avoided its denial, amounts to scarcely less than its positive assertion. At all events, the case in favour of Religion cannot, even by the most exacting critic, be put less high than this :—that in respect of the two then unknown facts of the orbital revolution, and the axial rotation, of the Earth, the author has, either directly, or by necessary implication, made positive assertions contradictory to the scientific notions current in his day, but exactly accordant with the theories first discovered by Copernicus, and first proved by Newton ; while, as regards the axial rotation of the Sun, he has, by an unexpected transition of thought, avoided the unscientific denial of the Sun's axial rotation which the expected contrast, which the author seemed to be on the point of drawing, would have necessarily involved.

other, but that the conditions, both as regards orbital revolution and axial rotation, which, in making this assertion, she by implication alleges to exist in the physical Universe, are exactly those conditions which, quite unknown to the author's contemporaries, Science has, within the last few hundred years, discovered to be the true conditions of the physical Universe. And thus we observe that the numerous homologies traced out between Religion's allegations concerning her alleged spiritual Universe, and the beliefs of modern science concerning the physical Universe, are of such a nature that it is simply incredible that Religion can have based her allegations upon any scientific knowledge possessed by her at the time when her allegations were made.

CHAPTER XXIII

GRAVITATION AND ETHER

"ἡ γὰρ ἀγάπη τοῦ Χριστοῦ συνέχει ἡμᾶς."—PAUL.

FROM the consideration of the general constitution of the Universe discussed in the last chapter, turn we next to consider the forces, by virtue of which the inter-relations of its constituent members are maintained. Here, once more, we shall find the closest parallelism between scientific facts and theological doctrines; and here, too, we shall find parallelisms in relation to scientific facts which can by no possibility have been known to the writers by whom the corresponding doctrines are propounded.

The most magnificent discovery of the seventeenth century—perhaps of any century—was Newton's discovery of the law of gravitation. The grandeur of this discovery is due to the fact that it has completely transformed the two great sciences of Matter—astronomy, the science of masses, and chemistry, the science of molecules.

The first fact that strikes every observer with regard to gravity is its ubiquity. Wherever there is Matter there is gravity. And the second is its supreme importance in the scheme of the material Universe. Wherever there is coherence, concentration, order, it is gravity that is the efficient cause of it all. Gravitation may properly be regarded as the most important operative factor in Nature.

It would be strange indeed if so transcendent a phenomenon in the physical Universe had not its homologue in

the spiritual. Nor have we far to look for that homologue. We have already had occasion to refer to it in the chapter on the Antiquity of Man. It will be recollected that it was there remarked :—

"That primary and elemental manifestation of Force, which is known as 'molecular attraction' in the molecule, and as 'gravitation' in the mass, is the concentrating force of the material Universe. Eliminate this single influence, and worlds and systems instantly dissolve into chaos. Such a force in the social system is Affection, equally elemental and equally essential. Eliminate this single bond, and society melts into social chaos. Those only, who have realized the transcendent value of this unpretentious but ubiquitous influence, can appreciate in any degree how profound is the truth which Religion enunciates, when she claims this force in its perfection as the essential attribute of God, in her central doctrine that 'God is love.'"

No one will for a moment dispute that love is represented by Religion as the spiritual homologue of gravity. Not only is it alleged to derive its principal source from God—"Love is (an emanation) of God (ἡ ἀγάπη ἐκ τοῦ Θεοῦ ἐστι)"[1]—but human beings, who, as we have seen, correspond in other respects to the planets, are represented to be subordinate sources of love—"Love one another." Just as the Sun is the principal seat of gravity, and the planets are inferior seats of gravity, so God is the central and main source of love, and human beings are subordinate sources of love.

Moreover, the functions of love in the spiritual Universe are represented to be exactly homologous with the functions of gravity in the physical Universe. Not only is love expressly stated to be (like gravity) a *tractive* force—"I drew them . . . with bands of love";[2] but it is alleged to be the concentrating force of the spiritual Universe—"the love of Christ holds us together" (συνέχει ἡμᾶς).[3] And, lastly, the same importance as that which Science attributes to gravity is attributed by Religion to love. Her three great principles are "faith, hope, love, these three; *but the greatest of these is love.*"[4]

[1] 1 John iv. 7.
[2] Hosea xi. 4.
[3] 2 Cor. v. 14.
[4] 1 Cor. xiii. 13.

Pursuing no further the more or less obvious homologues between love in the spiritual sphere and gravitation in the physical, turn we now to consider an homology which, so far from being obvious, appeared, until recent scientific discovery had disclosed its real character, to be an actual heterology.

One of the most characteristic doctrines of Religion is that which alleges that the love of God is extended equally to all. No matter to what depths of sin the heart of man has sunk, be it steeped in degradation and vice, or paralyzed by carelessness and indifference, God's love is still able and ready to save. No man is beyond its reach. No soul is impervious to its ubiquitous influence. Stated in terms of physics, this familiar doctrine may be expressed by the formula that *God's love acts equally upon all.* The existing differences in the degrees to which different hearts respond to that love are due, not to differences in the force of the love itself, but to differences in the counter-attractions to which each heart is subjected. One man is attracted by the charms of wealth, or ambition; another is allured by the fascinations of pleasure, or vice. These and countless other attractions draw him away from God. But the divine love is there all the time. *Its* force never fails, or decreases. All that is necessary, in order that we may be drawn to God, is that we should somehow be freed from the counter-attractions of the world's desire. Withdraw these, and we are irresistibly drawn to God with the gravitative "bands of love."

With this doctrine compare the tractive power of gravitation. I stand on the edge of a cliff, holding a stone and a feather in my hand. I fling them from me with equal force, and watch their descent into the abyss below. No contrast can be more marked than that which their respective courses exhibit after they have left my hand. While the stone falls steadily and swiftly, with a rapidly increasing velocity, the feather flutters slowly down in a series of irregular gyrations, and with a

velocity which exhibits little, or no, perceptible acceleration. In face of these phenomena can it be maintained that gravity acts equally upon these two bodies? The stone has fallen a hundred yards before the feather has fallen as many feet. Where, then, is that impartiality of gravitation for which we looked. Has the expected homology failed?

Not so. I take a glass tube a couple of yards in length, closed at one end, and having a stop-cock at the other. I introduce into the tube a number of bodies having different weights and densities—a lump of lead, a feather, a piece of paper, a stone. By means of an air-pump I exhaust the air in the tube, and close the stop-cock. I then suddenly reverse the position of the tube; and, behold, all the different bodies fall to the opposite end with an exactly equal velocity. Again and again I repeat the experiment, always with the same result. The feather and the stone, the paper and the lead, are now absolutely inseparable.

Through the stop-cock I once more introduce a little air into the tube, and repeat the experiment; and now, on the occasion of each fall, the feather and the paper are slightly outstripped by the lead and the stone. I admit more and more air, repeating the experiment on each occasion; and I find that each increment of admitted air is marked by a corresponding retardation in the fall of the lighter articles; until, upon the air being once more freely admitted into the tube, the same differences are perceived in the falling velocities of the various bodies, as those which were exhibited in the first experiment on the cliff.

And now observe the exact homology between gravitation and love. So long, but only so long, as external influences are shut out, gravity acts upon all bodies alike. It makes no difference whether the substance is large or small, light or heavy, dense or rare. These are matters of utter indifference to gravity. It acts upon all bodies always, and it acts upon all alike. Whatever differences in results are perceived are due, not to any difference in the force with which gravitation works—that

is constant—but to differences in the degrees in which various bodies are affected by other influences. This is the only cause of the seeming variations. And in order that it may be seen that gravity exerts an equal tractive effect upon all bodies, one condition, and one only, must be fulfilled—external counteracting influences must be shut out.

We must not leave the subject of gravitation, without pausing to remark upon the exactness of the homology which Religion draws, in attributing to love the supreme importance which she attaches to that concentrating force. It is impossible to exaggerate the importance of the tractive force of gravity in the physical universe. A reference to the tenth chapter will recall the fact that, in treating of the Nebular Hypothesis, it was shown that gravitation is the cause of both the orbital revolution, and the axial rotation, of each of the planets. It will be remembered that from an extract from the *Synthetic Philosophy* it was shown that the molecular attractions of the molecules constituting the volume of gaseous matter which has subsequently evolved into the Solar System, acting through a medium which was not absolutely homogeneous, induced a motion of molecules in a curve directed towards one side of the centre of the mass; and that from this motion arose a rotatory motion of the whole mass. This rotatory motion gave rise to that centrifugal force which, in course of time, detached from the central mass each of the equatorial rings, which successively evolved into the various planets from Neptune to Mercury.

It was also shown that the same cause produced similar effects in each of the planets, and again in each of their respective satellites. Analyze every motion, orbital and axial, of every planet and of every satellite, and we find that gravitation is the cause of them all. Nay, the very centrifugal force, which, by counteracting the force of gravitation, produced the detachment of the several equatorial rings from which the planets and their respective satellites have been formed, was itself induced by the motion initiated by the force

of gravitation. And thus gravity is responsible, not only for the motions of each of the planets and satellites, but also for the fact of the detachment and formation of each planet, and of each satellite.

Further than this, gravity is the primary cause of the shape which each planet, and each satellite, has assumed. That shape is in every case the resultant of two forces—the one, gravity, and the other, centrifugal force; and of these two forces, as we have seen, the centrifugal force was itself induced by the rotatory motion initiated by gravitation; and is thus a product of gravity.

See here, then, the transcendent value of gravitation in the scheme of the physical Universe. So far as the planets and their respective satellites are concerned, this ubiquitous force is the primary cause of every motion, and of every shape. Nor is the importance of the part played by the force of gravitation less conspicuous when we descend from the contemplation of the Earth herself to the consideration of her organic inhabitants, both vegetable and animal. As regards their movements, the effects of gravity upon these are too conspicuous to require detailed mention here; and as regards their forms, Mr. Spencer, in his *Principles of Biology*, has fully illustrated the all-important functions which this force has exercised in determining the shapes of all vegetable and animal structures.

And lastly, gravitation is primarily responsible for the constant supply of light and heat which the Earth receives from the Sun, and upon the continuance of which all terrestrial life, both vegetable and animal, is absolutely dependent. There has, it is true, been much discussion, as to the particular causes which govern the continuity and regularity with which the supply of Solar heat is maintained. But, be these particular causes what they may, there can be no doubt that the force of gravitation is their principal and primary cause.

Reviewing these considerations, we are compelled to admit that an enumeration of all the forces at work in the physical

Universe serves only to emphasize the fact, that the greatest of these is gravity.

But if so, how exact is the scientific accuracy of Religion in attributing the same transcendent importance to gravitation's spiritual homologue—love! To this supreme factor Religion assigns exactly that pre-eminence in the scheme of her spiritual Universe, which Science attributes to gravitation in the physical sphere. In language of unexampled beauty she exhausts the resources of rhetoric in emphasizing the supremacy of this unrivalled force.

"Though I speak with the tongues of men and of angels, and have not love, I am become a sounding brass, or a clanging cymbal. And though I have the gift of prophecy, and know all mysteries and all knowledge; and though I have all faith, so as to remove mountains, but have not love, I am nothing. And though I bestow all my goods to feed the poor, and though I give my body to be burned, but have not love, it profiteth me nothing."[1]

Thus Religion, in reviewing the comparative values of the several forces at work in her spiritual Universe, assigns to love a precedence so supreme, that, as weighed against it, every other force is "nothing." And then, after enumerating the various merits, positive and negative, which contribute to the establishment of the supremacy of this all-important factor, and especially emphasizing, with a curiously scientific accuracy, that peculiar property of *continuity*—"love never faileth"—which it shares with its physical homologue, she completes the homology by summing up the whole position in the well-known words,

"But now abideth faith, hope, love, these three; but the greatest of these is love."[2]

Passing now from the subject of gravitation, we have next to consider a truth which was clearly enunciated by Religion two thousand years ago, but which, in the records of Science, is not yet—at all events, in its developed form—three centuries old; a truth, too, so little self-evident in its nature, that, occupying as it does the post of central importance in

[1] 1 Cor. xiii. 1-3. [2] *Ibid.* verse 13.

the whole scheme of Religion, it has been more completely misunderstood than, perhaps, any other. It is, in fact, a truth which, like so many other truths of Religion, can only be adequately understood after its corresponding physical truth has been ascertained.

It will be readily admitted that the main object of Religion is to teach mankind how to re-establish a spiritual communication with God. Representing that man originally participated in the divine nature, and that the first great fact in his religious history was a Fall, which resulted in the loss of that divine nature; and further representing that there are means, by the due exercise of which that loss may be repaired, and a communication with God may be once more established; Religion sets herself to explain how this great object is to be achieved. Somehow, man has fallen out of correspondence with God. How is this broken correspondence to be restored? This is the central problem of Religion.

The answer which Religion gives to this momentous question is so very strange that, at first sight, it appears as if there could be nothing at all like it in Nature. She alleges that intercourse with God can only be established through Christ. This is a doctrine which we have direct from the lips of Christ Himself:—"I am the Way, the Truth, and the Life: *no man cometh unto the Father but by Me.*"

What is the explanation of this mysterious proposition? If God is so close to us that we may almost see Him in His works; if the phenomena of Nature are such eloquent witnesses to His presence and to His power that even

> "the poor Indian's untutored mind
> Sees God in clouds, and hears Him in the wind,"

why is it that no man can come to God except by Christ? Can Science help us here? Has she any companion phenomenon in the physical Universe?

If such a phenomenon is to be found, it is not difficult to see

in what department of Science it is to be sought. We have already seen that God, "the Father of lights," is the Sun of the spiritual Universe. Interpreted in the light of this fact, the doctrine amounts to this—that it is a law of the spiritual Universe that no man can come into correspondence with spiritual light except by Christ. He is a necessary medium between God and man for the transmission of spiritual life. Christ, the giver of spiritual life, is also the vehicle to mankind of spiritual light. And this for the simple reason, that this life and this light are but two names for the same thing: "In Him was life, *and the life was the light of men.*"

Thus it is indisputably a doctrine of Religion that spiritual light requires for its transmission from God to man the intervention of Christ. Between the Light-giver and the light-receiver there must be this medium of communication. Without Him, spiritual light is shining, it is true; but it is inaccessible to mankind. It produces no impression on the human faculties—it is not "the light of men."

Turn now to the phenomena of physical life, and observe how exactly this mysterious doctrine of the transmission of spiritual light is paralleled by the phenomena of the transmission of Solar light.

It is well known to students of Science that during the last two hundred years two theories of light have been before the world. The one, which was accepted by Newton, and is known as the "corpuscular theory," regards light as an attenuated imponderable substance, emitted from illuminating bodies, and depending for its colour upon the velocity of its transmission. The other theory, of which Huygens may be regarded as the author, and which is called the "undulatory theory," assumes that light is simply the immensely rapid molecular vibrations of the illuminating body, which vibrations are transmitted through space by means of the corresponding vibrations of the imponderable substance known as ether. It is well known, too, that after a long rivalry, the corpuscular

theory has now entirely yielded to the undulatory theory. On examination, the former theory was found inadequate to explain certain of the phenomena of light, of which the undulatory theory yields a satisfactory interpretation ; and the latter theory may now be regarded as completely established.

The chief importance which the fact of the establishment of the undulatory theory of light has for the present argument lies in the part which it has played in the discovery of the existence and constitution of the luminiferous ether. This substance is now known to be a necessary agent for the transmission of physical light through space ; and as the late Professor Tyndall has recently discussed its more prominent features and properties in language which is as clear as it is precise, we cannot do better than cite here a short extract from his writings, in illustration of the facts to which it is necessary to call particular attention.

To the questions, Are the stars hung *in vacuo* ? Are the vast regions which surround them, and across which their light is propagated, absolutely empty ? Professor Tyndall gives the following answer :—

"A century ago the answer to this question, founded on the Newtonian theory, would have been 'No, for particles of light are incessantly shot through space.' The reply of modern science is also negative, but on different grounds. It has the best possible reasons for rejecting the idea of luminiferous particles ; but, in support of the conclusion that the celestial spaces are occupied by matter, it is able to offer proofs almost as cogent as those which can be adduced of the existence of an atmosphere round the earth. Men's minds, indeed, rose to a conception of the celestial and universal atmosphere through the study of the terrestrial and local one. From the phenomena of sound, as displayed in the air, they ascended to the phenomena of light, as displayed in the *ether ;* which is the name given to the interstellar medium. . . . The luminiferous ether has definite mechanical properties. It is almost infinitely more attenuated than any known gas, but its properties are those of a solid rather than of a gas. It resembles jelly rather than air. . . . A body thus constituted may have its boundaries ; but although the ether may not be coextensive with space, it must at all events extend as far as the most distant visible stars. In fact it is the vehicle of their light, and without it they could not be seen. This all-pervading substance takes up their molecular tremors, and conveys them with inconceivable rapidity

to our organs of vision. It is the transported shiver of bodies countless millions of miles distant, which translates itself in human consciousness into the splendour of the firmament at night.

"If the ether have a boundary, masses of ponderable matter might be conceived to exist beyond it, but they could emit no light. Beyond the ether dark suns might burn; there, under proper conditions, combustion might be carried on; fuel might consume unseen, and metals be fused in invisible fires. A body, moreover, once heated there, would continue for ever heated; a sun or planet, once molten, would continue for ever molten. For the loss of heat being simply the abstraction of molecular motion by the ether, where this medium is absent no cooling could occur. A sentient being, on approaching a heated body in this region, would be conscious of no augmentation of temperature. The gradations of warmth dependent on the laws of radiation would not exist, and actual contact would first reveal the heat of an extra-ethereal sun.

"Imagine a paddle-wheel placed in water and caused to rotate. From it, as a centre, waves would issue in all directions, and a wader as he approached the place of disturbance would be met by stronger and stronger waves. This gradual augmentation of the impression made upon the wader is exactly analogous to the augmentation of light when we approach a luminous source. In the one case, however, the coarse common nerves of the body suffice; for the other we must have the finer optic nerve. But suppose the water withdrawn; the action at a distance would then cease, and, as far as the sense of touch is concerned, the wader would be first rendered conscious of the motion of the wheel by the blow of the paddles. The transference of motion from the paddles to the water is mechanically similar to the transference of molecular motion from the heated body to the ether; and the propagation of waves through the liquid is mechanically similar to the propagation of light and radiant heat."[1]

The points to which we must pay particular attention in connection with the above quotation are, that light is conveyed from the Sun to the Earth by means of the ether, which extends from the Sun, at the one end, to the Earth, at the other; that without this ethereal medium, extending from the Sun to the Earth, the Sun's light would be perfectly imperceptible, so far as the Earth is concerned, insomuch that without the ether, if a sentient being were to wander in search of the Sun, he might grope his way close up to the Sun, and yet be perfectly unconscious of its light, or, in fact, of its existence, until he actually came into physical contact with the Sun itself.

Now this is precisely the state of things which the Bible

[1] *Fragments of Science*, vol. i. pp. 3–5 (7th ed.).

predicates, and which every-day experience demonstrates, of the relations between God and man. God, according to the Bible, is the Sun of Righteousness ; mankind is groping in darkness. "In vain," says Christ, "do you search for God. He is very near. He is close beside you. But you can never see Him—never, except by Me."

Except by Me? How is it that we can do by Christ what we cannot do without Him? What is there in Him which renders possible the otherwise impossible? Turn from the Bible to the book of Science, and there we find the explanation clear and natural. Christ is, between God and man, exactly what the ether is between the Sun and the Earth. The ether possesses two qualifications, by virtue of which it performs its function of transmitting light from the Sun to the Earth. In the first place, it extends from the Sun, at the one end, to the Earth, at the other ; it is a connecting-link between the two. And in the second place, its constitution is characterized by such a sympathetic responsiveness, its substance possesses such plastic mobility, as enables it to respond to the infinitesimal molecular tremors which constitute Solar light, and taking up those tremors, to transmit them in the form of waves into surrounding space.

And are not these exactly the two qualifications which Religion has always specially attributed to Christ, and by which she has always distinguished Him from all other men? Is He not represented as fulfilling in the spiritual Universe just these two essential characteristics of the luminiferous ether? In the first place, in a sense in which it is true of no other, He extends from God to man. With what force has He Himself asserted this great verity. He *is* God at the one end—"I and My Father are one." And man at the other ; for He over and over again identifies Himself with man by the emphatic title (never applied to Him by any one but Himself) of the "Son of Man," a Hebraistic form of expression, meaning "man in the fullest and most essential meaning of the word," "man of the very essence of man."

And in the second place, His grand characteristic was a sympathetic responsiveness so perfect as enabled Him, while conducting His own actions and will in strict conformity with the will of God, yet to be continually "moved with compassion" for the aspirations and sorrows of mankind.

What connecting-link between God and man could be more perfect than this? It precisely fulfils both the requirements of Science. In Christ, Religion offers to the spiritual Universe exactly what Science offers to the physical Universe in ether. Without the ethereal medium, says Professor Tyndall, this dark Earth could receive no communication from the Sun. Without Christ, the Spiritual medium, says the Bible, the dark heart of man can have no communion with the God of spiritual light. In either case it is a question of the transmission of light; and Science insists that, in the existing order of things in the physical Universe, no light can pass from one body to another without the intervention of a sympathetic medium, extending from the one to the other. Such a physical medium the Science of to-day has discovered in ether. Such a spiritual medium Religion, nearly two thousand years ago, announced in Christ.

Nor must it be supposed that there is any doubt, or uncertainty, in this part of Religion's doctrine concerning spiritual light. In no department of Science does Religion display a more exact and mysterious prescience than here. For in the homology which we have just been tracing is to be found the solution of a passage which, in respect of its apparent contradiction of Science, has hitherto baffled the ingenuity of critics and scholars; and the secret of which could, in the nature of things, never be unlocked by any key but that of modern science.

"In Him was life; and the life was the light of men. And the light shineth in the darkness, and the darkness apprehended it not."[1]

How is it possible for this strange phenomenon to occur?

[1] John i. 4, 5.

—for the light to shine in the darkness in such a way that the darkness should remain darkness still? The proposition sounds absurd; it is opposed to universal experience. Introduce a lighted candle into a dark room, and observe how instantly the darkness is absorbed by the light. So is it under all known conditions. Stone walls may shut out light's illumining rays. Mists, or clouds, may obstruct their path, and so prevent their shining. But never in human experience has light been known to "shine in" the darkness in vain. No chemist's laboratory, no magician's wand, no alchemist's magic, has ever yet conjured up the Plutonian shades which could refuse allegiance to light's imperious sway.

What, then, is the purport of the Apostle's words? Are they anything better than a meaningless parodox? Yes; turn to Science, and she will explain it all. Create, she says, an ethereal vacuum, and light will have lost its power. Eliminate the ethereal medium, and then—

"*Dark suns* might burn, . . . fuel might consume *unseen*, and metals be fused in *invisible fires*."

The sun might be shining not less brightly than now; the fuel might be wrapped in not less brilliant flames; but, without ether, brilliant flames and fiery suns could emit no light. Their effulgence would be lost upon benighted worlds. Their light would be shining in the darkness, the darkness apprehending it not.

And what is this but the exact counterpart of St. John's words? "In Him—the medium of spiritual light—was . . . the light of men. The light shines in the darkness, and (without Him) the darkness could not apprehend it."

Observe the force of the two tenses *φαίνει . . . οὐ κατέλαβεν*. The words "without Him," which to an English reader we appear to have interpolated, are in reality no importation at all. They are inherent in the change of tense. "In Christ the spiritual light first became perceptible to men ('the light of men'); that light shines in darkness, and (until

Christ came) the darkness could not apprehend it." Read by the light of Science, the meaning of the passage is beyond dispute. It is explaining the function which Christ performs in relation to spiritual light; and the distinction which is being drawn is between the effect of light with Christ, and without Him. In either case the light itself is there, unaltered, unconditioned. But the difference in its effect is supreme. In Christ it becomes "the light of men;" without Him it is invisible. Here, as in the physical universe, the medium is the vehicle of light, "and without it light could not be seen."

One word, before leaving the passage, as to the word "apprehend." In respect of this word there is a peculiarly scientific fitness in the language of the text. The word *καταλαμβάνω*, which is so translated, means literally "to seize upon," "to lay hold of," "*to take up*;" and it will be seen at a glance how admirably, when applied to light, this meaning expresses the function performed by the ethereal medium. Recall once more Professor Tyndall's words on the subject of ether :—

"This all-pervading substance *takes up* the molecular tremors (of the stars) and *conveys* them with inconceivable rapidity to our organs of vision."

It is with mingled wonder and delight that we turn from these utterances of nineteenth-century Science to the untutored page of the peasant of Galilee, there to read that without Christ, the Spiritual Luminiferous Medium, "the light shines in the darkness, and the darkness *could not take it up*."

It is impossible to dismiss the homology now under discussion, without first drawing attention to the fact that it furnishes another instance of those numerous cases, in which Religion has forestalled, not merely the discoveries, but the actual terminology, of modern science. Ether, as we have seen, is known to Science as a *medium*. In relation to space generally, it is "the interstellar medium," or, as Mr. Spencer

calls it, "the ethereal medium." In relation to the Solar System, it is the vehicle of Solar light, and is thus the medium between the Sun and the Earth. But between the scientific theories of physical light, and Religion's doctrines of spiritual light, there is one fundamental distinction, which debarred Religion from adopting—or, rather, from forestalling—in this case the exact terminology of Science. Solar light is a phenomenon of Physics. Spiritual light, according to Religion, is a phenomenon of Biology. For spiritual light is a species of life. "In Him was life, *and the life was the light of men.*" And accordingly the dead *medium* of Science becomes the living *Mediator* of Christianity. "For there is one God, one Mediator also between God and men, Himself Man, Christ Jesus."[1]

Out of the two last-mentioned homologies arises a compound homology, which must not be overlooked; because it illustrates more markedly, perhaps, than any other parallelism, the wonderful exactness of the homologies that exist in the physical and spiritual spheres.

Early in the preceding chapter it was shown that the separation of the planets from the Sun is paralleled by Religion's doctrine of the separation of man from God at the Fall; and further, that Religion's promise of reunion with God, and reparticipation in the divine nature, corresponds with that future reunion of the planets with the Sun, which Science confidently predicts. Observe, now, what are the forces through which, according to Science, this forthcoming reunion of the planets with the Sun will be effected.

At the present time the Earth, and each of the other planets, possesses, as a consequence of its orbital velocity, a centrifugal force, which would carry it with immense velocity away from the Sun, if only it were released from the force of gravitation; which latter force, by attracting it towards the Sun, neutralizes the centrifugal force, and retains the planet in its orbit. Just as, according to Religion, man,

[1] 1 Tim. ii. 5.

in the existing order of things in the spiritual Universe, has an inherent tendency to fall away from God, and would rapidly do so if he were not being constantly "drawn" towards God with the gravitative "bands of love;" so, in the existing state of things in the physical Universe, each planet is possessed of a tendency to fly away from the Sun, and would do so if it were not being continually drawn towards the Sun by the influence of Solar gravitation.

But there is a force at work in the physical Universe which, with the assistance of the Solar gravitation, will in time more than counteract this centrifugal force, and which will, consequently, at length bring about the reunion of the now separated masses.

"This force is the resistance of the *ethereal medium*. From ethereal resistance is inferred a retardation of all moving bodies in the Solar System—a retardation which certain astronomers contend even now shows its effects in the relative nearness to one another of the orbits of the older planets. If, then, retardation is going on, there must come a time, no matter how remote, when the slowly-diminishing orbit of the Earth will end in the Sun."[1]

Thus, we find that in the physical Universe the reunion of the planets with the Sun, which is at present being prevented, or, rather, delayed, by the centrifugal force generated by the orbital motions of the planets—a force which is at present exactly balanced, in what Mr. Spencer terms "a moving equilibrium," by the force of Solar gravitation—will, in course of time, be brought about by the co-operation of the forces of Solar gravitation and ethereal resistance. It will not be effected by gravitation alone, nor by ethereal action alone; but by the two combined. In order to overcome the decentralizing centrifugal force, a combination of these two forces, gravitation and ethereal friction, is necessary.

With this condition of things in the physical Universe compare the corresponding condition of things in the spiritual Universe. No doctrine of Religion is better known than that which avers that the reunion of man with God is to be

[1] *First Principles*, p. 528 (5th ed.).

effected, not by one force alone, but by the co-operation of two forces. Two influences, according to Religion, are continually at work upon mankind. The one is the tractive force of God's love. The other is the centrifugal force of sin.

And between these two forces man hangs in a moving equilibrium. Sometimes, as in the case of the Earth when at her perihelion and aphelion points, the two forces counteract one another in an exact equilibrium. Sometimes, like the Earth when journeying towards aphelion, man yields to the overmastering allurements of sin, and actually travels further away from the Sun of Righteousness. Sometimes, like the Earth when approaching perihelion, the tractive force of divine love prevails, and he draws nearer to the Giver of spiritual light. But beyond the limits thus prescribed for him, he can neither approach, nor recede. If he retire to his aphelion point, his path is still directed by God: "Even there *shall Thy hand lead me*, and Thy right hand *shall hold me*."[1] Nor, without Christ, is he capable of reunion with God: "No man cometh unto the Father but by Me." Man, according to Religion, is incapable of either escape from, or reunion with, God. Such is his present condition; and such, if no other force had been introduced, would have been his final fate.

But in the spiritual, as in the physical, Universe, a third force *is* at work—a force which we have already identified with its homologue in the physical Universe, namely, the force of the ethereal medium. This spiritual force is the influence of Christ; which, by continually checking the awayward motions of sin, by continually clogging the centrifugal forces which are antagonistic to the divine attractivity, introduces that friction which must, in time, bring the motions of sin to a standstill, and so leave man eventually subject only to the gravitative force of God's love.

And thus, in the spiritual, as in the physical, Universe, the

[1] Psalm cxxxix. 10.

reunion of the light-receivers with the Light-giver will be the resultant, not of one force, but of two. Not of God's love alone ; nor of Christ's mediation alone ; but of both together. And in this transcendent work the function of Christ is exactly homologous with that function performed in the physical Universe by the ethereal medium, by virtue of which the separative motion of centrifugal force will eventually be overcome.

In examining the foregoing homologies individually, we must not lose sight of the synthesis into which they compound. For that synthesis far more than doubles the force of the argument. Examined analytically, each homology by itself is sufficiently striking. But viewed synthetically, all the separate homologies compound into an aggregate of homologies, the combined effect of which, for argumentative purposes, it is simply impossible to over-estimate. In order to fully appreciate the increase of force which is thus gained by aggregation, consider the case of the ethereal medium. To this factor in the physical Universe Science attributes two functions which are as unlike each other as any two functions could be. The one is its function as a vehicle of light—a function which consists of the *propagation of molecular motion.* The other is its frictional function, as the future cause of the reunion of the light-receivers with the light-giver—a function which consists of the *retardation of molar motion.* Both of these almost contradictory functions Science attributes to a single factor—the ethereal medium.

If, then, on turning to Religion's account of the spiritual Universe, we note it as a remarkable coincidence that, centuries before Science had any idea of the existence of this ethereal medium, or any notion that physical light requires a medium at all for its propagation, Religion had propounded the doctrine that spiritual light requires for its propagation from the Light-giver to the light-receiver, the interposition of a spiritual Mediator; is it not a coincidence immeasurably more astonishing to find that Religion attributes also to this

Mediator the second of the two almost contradictory functions which modern Science assigns to the ethereal medium? If either homology, standing alone, is noteworthy, how much more noteworthy is the joint homology!

See, then, from this illustration, how much force we gain from a synthetic comparison of the spiritual Inorganic with the physical Inorganic. We perceive one grand homology running throughout the two. In either case we find a primordial union between the light-giver and the light-receivers; a subsequent separation; a future reunion. And, leaving on one side the various points of homology discussed in the last chapter, which are presented by the individual members constituting either Universe, we find, when we come to examine the principal agencies at work in either Universe, that the same grand homology is maintained.

For we see that in the spiritual Universe there is a concentrating force, which corresponds to gravitation in the physical. This concentrating force is love; and we identify this force as the spiritual homologue of gravitation, by the facts that it derives its principal source from the Light-giver, and subordinate sources from the light-receivers; that it is expressly stated to be not only a *tractive* force, but *the concentrating force* of the spiritual Universe (*ἡ γὰρ ἀγάπη τοῦ Χριστοῦ συνέχει ἡμᾶς*); and that it is represented to be the most important operative factor in the spiritual Universe; all of which characteristics, which, in their aggregate, exclusively characterize love, and distinguish it from all other factors of the spiritual Universe, similarly exclusively characterize and distinguish gravity in the physical Universe.

Having thus fixed the correspondence between love and gravity, we pursued the homology into a region of phenomena in which, so far from being obvious, or self-evident, it appears, at first sight, to be actually negatived by the facts. We compared the religious doctrine that the love of God acts equally upon all, with the action of gravity, which *appears* to act very unequally upon different bodies;

and we found once again that the researches of modern science have converted this seeming heterology into an actual—and striking—homology. For we found that not only is it now a demonstrated scientific fact that gravity—like God's love—does act equally upon all bodies ; but also that the seeming variations in the force with which gravity acts upon various bodies, are due, not to any variations in the tractive power of gravity, but to variations in the counter-attractive forces to which different bodies are subjected. Which cause of seeming variations is exactly paralleled in the spiritual Universe.

Passing, then, to the subject of the transmission of light, we discovered that the seemingly unique and inexplicable doctrine, that spiritual light is only perceptible to man through the *mediation* of Jesus Christ, is an exact companion phenomenon to the recently-established scientific fact, that physical light is only transmissible from a light-giver to a light-receiver through the agency of the ethereal *medium*. And the exactness of this homology received its completing touch in the discovery, that the two characteristics of the ethereal medium—namely, extension from the light-giver to the light-receiver, and an extreme sympathetic sensitiveness —are exactly the two distinguishing characteristics which Religion attributes to the Spiritual Mediator. We observed also, in Religion's express doctrine of the imperceptibility of spiritual light in the absence of the luminiferous Mediator, an exactly scientific explanation of the doctrine referred to, and consequently a strong confirmation of the homology. And, further, we noted an additional homology in the strictly scientific language in which the doctrine is expressed. Not only are the homologous functions expressed by the common term "Mediator" and "medium"; but the word *καταλαμβάνω* is a verbal translation of the term "take up," by which Professor Tyndall explains the luminiferous function of ether.

And, lastly, we observed that the doctrine that the reunion of the light-receivers with the Light-giver will be effected by

the co-operation of two forces, namely, the gravitative force of God's love coupled with the paralyzing effect of Christ's influence upon the centrifugal force of sin, is paralleled by the fact that the reunion of the planets with the Sun will be brought about by an exactly homologous combination of forces ; namely, by the force of Solar gravitation, aided by the retarding influence of the ethereal medium upon the centrifugal motions of the planets. Having found one homology in the respective functions of Christ and of the ethereal medium in respect of the transmission of light, we found a further homology in their respective functions in relation to those forces which alone keep the light receivers away from the light-giver. In either case, the reunion will be effected by paralyzing the awayward forces, and so leaving the gravitative force supreme ; and in either case, this paralyzing force is—unexpectedly enough—derived from the luminiferous medium.

And thus we find that, so far as the Inorganic is concerned, the spiritual Universe, depicted two thousand years ago by Religion, exhibits numerous likenesses to the physical Universe known to Science to-day. Many of the most conspicuous of these undesigned homologies are based upon phenomena and laws which, so far as the physical homologues are concerned, were utterly unknown to Science, until long centuries after the propounding of the scheme of Religion in which the spiritual homologues are found. The physical homologues, moreover, so far from being obvious, or self-evident, are of the most abstruse and recondite nature ; so little open to the possibility of being discovered by chance conjecture, that they have only recently been disclosed by a jealous Nature, after centuries of diligent and unremitting research.

The facts, therefore, to be here noted, before passing on from this branch of our subject, are two. First, that these refractory secrets of Nature are common to both the physical and the spiritual spheres. And second, that, by some means or other, they were first discovered, not in the physical Universe, but in the spiritual.

CHAPTER XXIV

THE CONSTITUTION OF LIGHT

"ὡς ὄψις ἐν ὀφθαλμῷ, νοῦς ἐν ψυχῇ."—ARISTOTLE.

IF a scientist be asked for a general classification of the principal parts of which a human being is composed, he will probably answer that there are three. A man possesses, he will say, a material form ; he possesses also a mysterious something called life ; and, finally, he possesses the still more wonderful attribute of intellect. These three constituents, which are recognized also by Religion, are well known to Science ; and, to tell the truth, she knows a great deal about them. Each of them has been allocated to a separate branch, or separate branches, of Science. The phenomena of man's material form are the objects studied by the morphologist, the physiologist, and the chemist. The biologist examines the phenomena of life. And, lastly, the phenomena of the intellect, from the simplest sensations and emotions, at the one end, up to the highest complexities of thought, at the other, are the subjects contemplated by the branches of Science termed Psychology, Sociology, and Ethics.

Thus for the study of each of the three great branches of phenomena which man presents to her gaze Science is ready with an appropriate machinery. None of these phenomena is too humble for her contemplation ; none too abstruse for her penetration. From structure and form up to motion and will, she knows and provides for them all. But at

intellect the domain of scientific knowledge comes to an end. This is the concluding chapter in the programme of Science. Having reached this last and highest point in the study of man, Philosophy stops. She knows of nothing more.

If, now, from the man of science we turn to the Divine, and ask him of how many parts *he* consists, he will answer, Of four. To the three parts recognized by the scientist he will add a fourth, which he calls πνεῦμα, or "spirit"; and he will tell us that this fourth part is not only his highest part, but is also to him incomparably the most real of the four. We may tell him that Science laughs at his boasted "spirit," and asserts that it exists only in his fond imagination; but we shall make little impression upon him. He will assure us that it exercises all the functions of life; and that he is as certain of its existence and vitality, as he is of the existence of any part of himself. And he will add that this spiritual life is so separate and distinct from the natural life known to Science, that not only will it continue to exist after the latter has perished, but that there have been thousands of cases in which men and women have actually sacrificed their physical lives for the sole purpose of preserving it.

If we question him as to this spiritual life which he claims to possess, he will tell us of its various phenomena, its functions and properties, its growth and activities, in as orderly and precise a manner as a biologist could employ in explaining the phenomena of physical life. All that he says (whether true or untrue) will at least be rational and clear; and we shall find, in fact, that he possesses, or at all events appears to possess, a branch of knowledge which, utterly unknown to the scientist, sounds yet so strangely scientific that (borrowing the terminology of Science) we may, perhaps, for want of a better name, call it a "Spiritual Biology."

Thus, if we should ask him whether the scientist is right in repudiating for himself the alleged spiritual life, the

Divine will answer, without the least hesitation, that he is quite right in doing so, for that, as a matter of fact, he does not possess it. And if we should further enquire how it is that, while he himself has acquired (as he alleges) this mysterious possession, the man of science has to go without it, he will reply, with equal confidence, that it is because the scientist rejects Revelation. He will tell us, moreover, that the spiritual life never is acquired except under the influence of Revealed Religion ; and further, that it is so dependent for its existence upon the light of Revelation, that, even after it has been acquired, if that light be withdrawn or shut out, it will speedily droop and die.

Now, without pronouncing for the moment any opinion as to whether the views thus expressed by the Divine are sound or unsound, we may safely assert, without fear of contradiction, that it is an indisputable fact that they have been, and still are, held by a very considerable number of persons. History and contemporary experience prove beyond all doubt that, rightly or wrongly, millions of men and women have professed to have acquired this spiritual life, and have persistently, and even in the teeth of persecution and derision, maintained that they did actually possess it. These are facts which are beyond dispute. But before attempting to deduce any conclusion from them, let us direct our attention for a moment to a further fact.

This claim to spiritual life (which *claim* is, as we have seen, an undoubted fact) is absolutely dependent, not only for its origin, but also for its maintenance, upon what Religion calls "Revelation." Universal experience shows that even after a man has once been convinced, or (if Science insists upon putting it so) has once succeeded in convincing himself, that he does possess this spiritual faculty, he must, as the first condition to keeping its active manifestations alive within himself, constantly and diligently employ himself in the study of the Bible. Call this alleged possession by what name we please—spiritual life, communion with God,

spiritual-mindedness—it is a fundamental condition to its maintenance that its possessor shall habitually study the Word of God. In that law he must "exercise himself day and night" if he wishes to continue spiritually-minded. For the moment that he ceases to comply with this essential condition, from that moment the active manifestations of his spiritual faculty will begin to fail.

Let not our meaning be misunderstood. We are not speaking now of any theory or doctrine on the subject. We are speaking of actual fact. Experience shows that, in proportion as men drop the study of the Bible, they cease to be spiritual-minded and grow worldly-minded. This is a phenomenon well known to all who have studied the subject. As a divine of great experience once expressed it—"I never despair of a man so long as he reads his Bible." And even those who have never given the subject a thought, will, on reflection, admit the fact, both from their knowledge of themselves, and from their experience of their friends. There is a mysterious, but essential and intimate, connection between this alleged spiritual faculty and Revealed Religion. If the spiritual faculty is to continue to exhibit active manifestations —in other words, if it is to live and grow—it must be kept constantly bathed in the light of Revelation. Cut off from that light it speedily droops and dies.

Here, then, are two phenomena which press for an explanation—the one, the existence, both in the past and at the present time, of an immense number of persons laying claim, with the utmost persistence and with unflinching confidence, to the possession of a spiritual faculty which, as they allege, exhibits a vitality entirely distinct from physical or intellectual vitality; the other, the fact that this professed spiritual faculty exhibits vital activity so long only as it is kept bathed in the sunlight of Revelation. Of both these phenomena the existence is indisputable. No one can seriously call them in question. Of both Religion gives us her explanation. And of both, Science, whose province, according to Mr. Herbert

Spencer, is "co-extensive with the phenomenal," is bound to give us her's. What is her explanation?

The interpretation which Science has hitherto given of the former of these two phenomena—for the latter she practically ignores—is certainly eminently unsatisfactory from the religious point of view. She tells us that this boasted spiritual life is a mere visionary conceit. She asserts that its alleged existence is to be regarded as an empty chimera; that its claimants are to be derided as deluded devotees. So confident is Science upon this point that she scarcely admits any serious discussion of the subject. The term "spiritual," in Religion's sense of the word, is to Science practically an unknown term. It has no place in her vocabulary at all.

Now, although at first sight it is undoubtedly somewhat disconcerting to the theologian to find that the verdict of Science, with the immense weight which that verdict carries, is absolutely opposed to the reality of his boasted spiritual life, yet he may take heart again when from that verdict he turns to contemplate the grounds upon which it is based. For he is then almost startled to find that those grounds are as untrue to Science as the verdict is unsatisfactory to Religion. Analytically examined, those grounds resolve themselves simply into this, that Science rejects the reality of the alleged spiritual life *because she herself has never experienced it.* Strange as it must appear to those who give the subject more than a passing thought, this extraordinary ground for rejection is almost universally accepted as adequate. It is habitually taken for granted that the very fact that Science, who knows so much about most things, is so profoundly ignorant of this one thing, goes a long way towards actually disproving its existence. Why, we are asked, until we are tired of answering the question, is this boasted spiritual life cognizable only to Religion? Why is it totally unknown to Science? Surely, it is urged, if spiritual life were anything better than an empty dream,

Science must, sooner or later, have succeeded in learning something about it.

At first sight, no doubt, this argument appears to have some show of reason. In reality no argument could be more unsound. And it is interesting to observe that Science herself is, however involuntarily, the first to provide the necessary materials for its disproof. Granting that her admitted—and, indeed, boasted—ignorance with regard to this phenomenon is *primâ facie* evidence against the interpretation which Religion places upon it, we must equally admit that, if it can be shown that Science can furnish us with a scientific reason why the attitude which she has taken up with regard to this phenomenon necessitates that, however real it may in fact be, she must, so long as she maintains that attitude, remain completely ignorant of it, her ignorance of the phenomenon is by no means incompatible with its reality. And if so, it must then be further admitted that the *primâ facie* value of the negative evidence furnished by the ignorance of Science goes for nothing. We are then thrown back upon the positive counter-evidence of Religion, supported by the weight of an enormous mass of experience, as the only available data from which to decipher this undoubted phenomenon. Can such a scientific reason be found?

Pursuing the method of argument which we have hitherto been employing, the first step in this enquiry is to establish a correct homology between the two spiritual phenomena which we are considering and their corresponding physical phenomena. Given the so-called Revelation, and the alleged spiritual faculty, as the factors of our spiritual phenomena, what are their physical homologues? The names "Revelation" and "Spirituality" being terms unknown to Science, the first step towards finding the required physical phenomena, with which to compare our spiritual phenomena, is to translate these two terms from their theological, into their corresponding scientific, nomenclature.

In effecting this translation we are clearly both entitled and compelled to trust solely to the authority of Religion —entitled, because Religion has the right to interpret her own terms; compelled, because Science professedly knows nothing about it, and cannot, therefore, in the nature of things, help us here. What, then, is Religion's scientific name for that which, in theological diction, she calls "Revelation"? We have not far to seek for an answer to this question. Revelation, Religion tells us, is light. Of the many passages which might be cited in support of this assertion, the following may here suffice:—

"*Thy word* is a lamp unto my feet, and *light* unto my path."[1]
"*The commandment* is a *lamp* and the *law* is *light*."[2]
"The *light of the glorious gospel of Christ*."[3]

And Christ Himself, who, as the Revealer of God's will to man, is emphatically called "the Word," is also stated to be "the Light of the World."

And what is Religion's scientific explanation of spirituality? Spirituality, she tells us, is Life—"to be spiritually-minded is *life*."[4] And this spiritual life, by the acquisition of which a man is said to "see the kingdom of God,"[5] is represented as something implanted in man—"the kingdom of God is within you."[6] And, finally, this spiritual life, thus implanted in man, is a species of plant; it lives and grows as a plant lives and grows—"It is like unto a grain of mustard seed, which a man took, and cast into his own garden; and it grew, and became a tree."[7] "So is the kingdom of God, as if a man should cast seed into the ground . . . and the seed should spring up and grow."[8]

[1] Psalm cxix. 105.
[2] Prov. vi. 23.
[3] 2 Cor. iv. 4.
[4] Rom. viii. 6.
[5] John iii. 3.
[6] Luke xvii. 21.
[7] Luke xiii. 19.
[8] Mark iv. 26, 27. It need cause us no surprise to find that the spiritual organism is, in spite of the animal attributes which are ascribed to it, described as a plant. Indeed, there is a scientific propriety in this apparent confusion of thought. The spiritual organism, as possessed by man, is represented by Religion to be in a rudimentary

See here, then, the homologues in the physical world of the spiritual terms "Revelation" and "Spirituality." Revelation is light; Spirituality is a living plant. The inter-relations between Revelation and Spirituality ought, therefore, to be homologous with the inter-relations between light and plant life. From a survey of these latter inter-relations we must seek for an explanation of the corresponding inter-relations between Revelation and spiritual life. With this object let us, in the first place, briefly consider the constitution and properties of light.

It has long been common knowledge that Solar light does not consist of homogeneous white rays, but is composed of the seven different coloured rays called respectively red, orange, yellow, green, blue, indigo, and violet, into which constituent rays a white ray of light can be decomposed by being passed through a prism.

It is further very generally known that these seven rays, after being separated, can be recombined by being passed through a double convex lens, and that upon being so reunited the seven colours once more recombine into white light. The same process can be effected with any two or more of the separated rays; but, except by a combination of the seven rays, white light is never produced. Thus, if the red rays are subtracted, the remaining six rays combine into a greenish blue; the violet, indigo, and blue rays, when combined, form a bluish violet; while a combination of the remaining four rays of red, orange, yellow, and green, gives yellow. The point to be here noted is that white light can be, and can only be, obtained by a combination of all the seven.

condition. It has not yet passed the initial stages of life. And, as was shown in the chapter on "The Organic," at the initial stages of life the distinction between vegetable and animal is imperceptible. Rudimentary organisms belong as much to the one kingdom as to the other. It is only at a later stage, that the characteristic features, which distinguish the animal from the plant, make their appearance Hence, the perfect scientific propriety with which Religion attributes to the rudimentary spiritual organism a present plant-like vitality, coupled with the promise of a future animal vitality.

Further than this, it is very generally known that Solar light is not composed solely of these seven rays, but is very largely composed of non-luminous, or invisible, rays. At the one end of the spectrum there are ultra-red rays, and at the other end ultra-violet rays; and these ultra-red and ultra-violet rays, which to the human eye are entirely invisible, compose by far the larger part of the Solar spectrum. A considerable portion of the invisible rays is, it is true, lost to us by refraction on the passage of the rays through the comparatively denser medium of the atmosphere which surrounds our earth; but, even as thus diminished, the Sun's light, as it reaches us, may be divided into two distinct parts—(1) invisible rays and (2) visible rays—and although the invisible rays produce no sensible impression on our organs of vision, yet the reality of their existence can be demonstrated with no less certainty than the reality of the existence of the visible rays.

Let us, then, before passing on, fix these fundamental phenomena of Solar light firmly in our minds; and let us note two corollaries which naturally flow from them.

In the first place, it is obvious that any being whose eyes are so constructed as to be capable of appreciating some only of the seven constituent rays which together make up white light, will view all objects in an entirely different light from that in which a being capable of appreciating all the seven constituent rays will view them. The effect which all surrounding objects will produce on the eye, and thence on the mind, of such a spectator will, as regards colour, be entirely different from the effect produced on the eye and mind of other spectators.

And, in the second place, it is in the highest degree probable that if a being, whose eyes are capable of appreciating all the seven constituent rays of white light, were miraculously so opened as to become capable of appreciating, in addition to those seven visible rays, one or more of the invisible rays of light, the effect produced upon the optic nerve by such

aggregated rays would be different from the effect produced by the seven visible rays alone. Visible light being composed of seven different rays, the addition or subtraction of any of which produces a different colour, it is inconceivable that, to an eye so sensitized as to perceive the difference, the addition of further ultra-violet rays would fail to produce a corresponding difference in the colour of such aggregated rays.

We are next to note that Science, as interpreted by Mr. Herbert Spencer, divides Truth, as comprehending the totality of existences, into two grand divisions—(1) the Unknowable and (2) the Knowable.[1] Of these the latter alone is cognizable by our intellectual organs, and constitutes the proper sphere of Philosophy, and, indeed, of all human knowledge. The former is "rigorously inconceivable,"[2] and produces no sensible impression upon our minds. Yet, for all this, the reality of its existence is not for a moment to be doubted. As in the case of the invisible rays of light, so here, its actuality can be proved with no less—perhaps, with even greater—certainty than the actuality of the Knowable. Having shown that all knowledge, properly so called, is relative; and that in that very assertion is involved the allegation that there exists a Non-relative, for that from the very necessity of thinking in relations it follows that the Relative is itself inconceivable except as related to a real Non-relative—that, in fact, unless a real Non-relative or Absolute be postulated, the Relative itself becomes absolute, and so brings the argument to a contradiction—Mr. Spencer concludes that it is

"impossible . . . to get rid of the consciousness of an actuality lying behind appearances, and . . . from this impossibility results our indestructible belief in that actuality."[3]

With this division of Truth drawn by Science, let us now

[1] *First Principles*, p. 551, etc. (5th ed.).
[2] *Ibid.*, p. 35.
[3] *Ibid.*, p. 97.

compare the corresponding classification of Truth drawn by Religion. The Bible, too, divides all things into two grand classes. By various names, and under various metaphors, the distinction is drawn. Now it is the contrast between Light and Darkness; now it is the rival services of God and Mammon; now it is the conflicting claims of "the prince of this world" and of a kingdom which is "not from hence." But under whatever disguise, a systematic classification is distinctly formulated, which may be roughly generalized as a distinction between the Human and the Divine.

Now, if we compare this classification with that of Science, we shall find that the two tally nearly, but not quite. That "the human" is known, or at least knowable, is, of course, everywhere tacitly assumed. That "the divine" is, at least as regards itself, unknown and actually unknowable is expressly asserted. "Who hath known the mind of the Lord?" is Religion's incredulous enquiry.[1] And the same authority asserts that "His judgments are unsearchable" (*ἀνεξερεύνητα*)[2] and "His ways past finding out" (*ἀνεξιχνίαστοι*).[3]

Now, in these two passages a curious, and highly characteristic, distinction is drawn by Religion between what she terms "the Unknowable" and what she designates "the Unsearchable." There are, Religion declares, some things (such, for instance, as the mind of the Deity) which are strictly unknowable—"Who hath known?" And there are other things (such as God's judgments and ways) which, though not absolutely unknowable, are yet unsearchable—"past finding out." It will be at once observed that the distinction

[1] Rom. xi. 34.

[2] Compare also Is. xl. 28, "There is *no searching* (חֵקֶר, *cheqer*) of His understanding;" Job v. 9, "God, which doeth great things and *unsearchable* (אֵין חֵקֶר, *en cheqer*)"; Psalm cxlv. 3, "Great is the Lord . . . his greatness is *unsearchable* (אֵין חֵקֶר)"; Eph. iii. 8, "The *unsearchable* riches of Christ (*τὸ ἀνεξιχνίαστον πλοῦτος τοῦ Χριστοῦ*)." From these passages it is evident that the distinction between "unknowable" and "unsearchable" is to Religion a very real, and, for her purposes, a very important, distinction.

[3] Rom. xi. 33.

thus drawn by Religion—whether sound or unsound—is, at least, a real distinction. The terms "unknowable" and "unsearchable" are by no means interchangeable. On the contrary, they are radically distinct. On the one hand, the term "unknowable" includes everything that the human intellect cannot comprehend by any process of thought. To man's finite capacity "the Unknowable" is simply a sealed book, which must remain for ever unopened. No amount of explanation could possibly make it clear. It is "literally unthinkable."[1] The term "unsearchable," on the other hand, is confined to those things which the human intellect cannot grasp *by any process of original research.* There is no reason, in the constitution of things, why the unsearchable should be unknowable, or even unknown. On the contrary, a thing may be perfectly "unsearchable," and yet it may be quite "knowable." There are, for instance, many subjects of common knowledge which a child of average intelligence, if left to himself, could never find out for himself, but which, nevertheless, he is perfectly capable of understanding, if a person already possessed of the knowledge should explain them to him. Such things are to the child "unsearchable," but by no means "unknowable." And, on the other hand, there are many things (such, for instance, as an abstruse mathematical problem) which no amount of explanation can make clear to his childish intellect. Such things are to him "unknowable."

It appears, then, that, while Science divides truth into two grand classes, the Unknowable and the Knowable, Religion makes a three-fold classification—the Unknowable, the Unsearchable, and the Searchable; and this three-fold distinction is, for the purposes of Religion, just as important as, for scientific purposes, is the two-fold classification made by Science.

In order to obtain a clear conception of the likenesses and unlikenesses of these two rival classifications, it will be worth

[1] *First Principles*, p. 35 (5th ed.).

while to compare them together in a tabulated form, as follows :—

THE CONSTITUENTS OF TRUTH AS CLASSIFIED BY SCIENCE.	THE CONSTITUENTS OF TRUTH AS CLASSIFIED BY RELIGION.	
THE UNKNOWABLE	THE UNKNOWABLE	
	THE UNSEARCHABLE (But not Unknowable)	THE KNOWABLE
THE KNOWABLE	THE SEARCHABLE (*I.e.*, Knowable by the unassisted efforts of the human intellect)	THE KNOWABLE

A glance at the foregoing table will show that the "Knowable" of Science is coincident in extent with the "Searchable" of Religion, understanding by the latter term every branch of knowledge which is discoverable by the ordinary and natural processes of unaided human thought and investigation. Here, according to Science, knowledge stops. The limit of human intellectual effort is the boundary of human knowledge. Everything else is "rigorously inconceivable."

To this delimitation Religion takes exception, and upon this point she joins issue with Science. Admitting (with Science), and, indeed, expressly asserting, that truth in its highest forms is absolutely unknowable, she yet extends the range of the Knowable into the region which Science terms the Unknowable. There is, Religion asserts, a form of knowledge which, utterly "unsearchable" and "past finding out," has nevertheless been placed within the range of man's capacity—bequeathed as a divine inheritance direct from on high. This is the only point of difference between the two classifications. Here is the only debatable ground. All

else being agreed, this question alone remains, What is the true nationality of this disputed region? Science calls it Superstition ; Religion calls it Revelation.

Now, while Science and Religion thus differ as regards the analysis of truth, upon one important point both are absolutely agreed—namely, that, whatever may be its proper divisions and sub-divisions, truth itself is light. That this is a doctrine of Religion scarcely needs proof. We have already identified Revelation with light ; and that Revelation is a part of truth is not only one of Religion's central tenets, but is expressly asserted in the well-known dictum, "Thy Word is Truth." Moreover, Religion declares that for practical purposes truth and light are necessarily correlated ; that to be intimate with the one is to approach the other—"He that doeth the Truth cometh to the Light." And, finally, Christ, who is emphatically "the Truth," is Himself "the Light of the World."

And in this doctrine Science heartily concurs. As a scientific dogma, it is at least as old as Aristotle—"ὡς ὄψις ἐν ὀφθαλμῷ, νοῦς ἐν ψυχῇ."[1] And that this formula is to Science the expression of something more than a mere metaphor will become clear on a moment's reflection. We have but to examine the psychical sphere to perceive that truth is the psychical homologue of light. Knowledge, using that term in the wide sense which includes all perceptions, both intellectual and emotional, is in the psychical sphere exactly what sight is in the physiological. And the perceptive organs—brain and heart—are the organs of psychical sight. Truth—mind—knowledge ; Light—eye—sight. We have but to examine the inter-relations of these two sets of factors to realize that they are identical. In turning from the one set to the other, we step from the physiological to the psychical sphere, or back again from the psychical to the physiological, only to find in either case

[1] *Topic*, i. 14.

identical correlations. From the point of view of Science, no less than of Religion, we may—we must—say that truth is light.

Now, the division of light into visible and invisible rays presents an obvious homology with the scientific division of truth into the knowable and the unknowable. If, then, we express the foregoing rival classifications of truth in terms of light, instead of in terms of truth, that is to say, in physiological, instead of in psychological, terms, we shall find that the point of dispute between Science and Religion will be simply this : Where do the visible rays end, and the ultra-visible rays commence ? Science fixes the boundary at one point ; Religion at another. Expressed in physiological terms, the difference between Mr. Spencer's views and those of Religion as to the proper analysis of truth lies in the fact that Religion possesses, or claims to possess, more visible rays of light than Mr. Spencer possesses. And as the colour of an aggregated ray of light depends, as we have seen, upon the number of its constituent rays, it follows that if Religion is in the right here, the colour of the light in which Science is working is different from that in which Religion is working. In examining phenomena, Science views them in one light, and Religion in another ; and this, not because the light in which Science pursues her investigations is a different light from that in which Religion pursues her's, but because it is only a portion of that light.

Now, it is the persistent doctrine of Religion that the light of Revelation is, under natural conditions, invisible to human sight. It constitutes the " unsearchable " rays of the spectrum of truth. To man, in his natural condition, it is invisible. It makes no impression on his natural senses. And before it can become visible to any man, it is necessary that his spiritual eyes should undergo that intensifying process which Religion terms " being opened." This doctrine, which is frequently propounded under different forms, finds direct expression in the familiar prayer, " Open Thou mine eyes

that I may behold wondrous things out of Thy law."[1] So long, therefore, as Science, who is professedly blind to the light of Revelation, refuses to submit to the conditions which can alone render her eye sensitive to these naturally invisible rays, it need cause no surprise to find that she fails to perceive certain colours in the spectrum of truth which, to "the man whose eyes are opened," are distinctly visible.

The truth is that the assertion that spiritual light and spiritual phenomena have no real existence, though often made in the name of Science, is a thoroughly unscientific assertion; for it is a wider proposition than the premises will logically support. What Science is entitled to say is, that they have no real existence *for her*. And this is a proposition in which Religion heartily concurs. Indeed, it is but a re-statement by Science of a doctrine which, to Religion, is as old as Christianity. "The natural man receiveth not the things of the Spirit of God: for they are foolishness unto him; and he cannot know them, because they are spiritually discerned."[2] However real to the eye of Religion may be

> "The flaming bounds of place and time:
> The living throne, the sapphire blaze,
> Where angels tremble while they gaze,"

to the eye of Science they simply are not. To these things, on her own showing, as well as on that of Religion, Science *must* be colour-blind.

Let us now, in view of the foregoing considerations, enquire what effect this colour-blindness on the part of Science to the "unsearchable" rays of Revelation must, from the scientific point of view, necessarily have upon the phenomena exhibited by Religion's alleged Spiritual Life.

[1] Psalm cxix. 18.
[2] 1 Cor. ii. 14.

CHAPTER XXV

THE VITALIZING FUNCTIONS OF LIGHT

"On plants the solar rays that produce in us the impression of yellow, are the immediate agents of those molecular changes through which are hourly accumulated the materials for further growth."—HERBERT SPENCER.

"Thy word hath quickened me."—THE AUTHOR OF THE 119TH PSALM.

WHEN John Dalton, the celebrated chemist, was a boy, he happened to be present one day at a military review; and, hearing those around him expatiating on the gorgeous effects of the military costumes, he asked in what respect the colour of the soldier's coat differed from that of the grass on which he trod. The derisive shouts with which this question was received by his companions warned the future chemist that there must be a fundamental difference between colours as seen by them and colours as perceived by himself; and from this discovery he first became aware of that defectiveness of his own eyesight, which has derived from him the name of "Daltonism," or colour-blindness.

In order to understand the nature and effects of colour-blindness, it is necessary to know something of the theory of colour-perception.

The theory generally accepted was first proposed by Thomas Young, and afterwards revived by Helmholtz. It is based on the assumption that three kinds of nerve fibres exist in the retina, the excitation of which give respectively sensations of red, green, and violet. These may be regarded

as fundamental sensations. Homogeneous light excites all three, but with different intensities according to the length of the wave. Thus long waves will excite most strongly fibres sensitive to red, medium waves those sensitive to green, and short waves those sensitive to violet.

Hence Red light, exciting strongly the fibres sensitive to red, and feebly the other two, gives rise to the sensation, *Red.*

Green light, exciting strongly the fibres sensitive to green, and feebly the other two, gives rise to the sensation, *Green.*

Violet light, exciting strongly the fibres sensitive to violet, and feebly the other two, gives rise to the sensation, *Violet.*

And when the excitation is nearly equal for the three kinds of fibres, then the sensation is *White.*

This theory explains some of the phenomena of what is called *colour-blindness* or *Daltonism.* All individuals appear to have some kind of colour-sensation: in some, however, there may be no sensation for particular colours. The most common defect is insensibility to *red* (Daltonism, properly so called). The spectrum to such an eye is deficient in red, and the sensation corresponding to all compound colours containing red is that of the complementary colour only. Thus, white is bluish green, and intense red appears green, so that red poppies in a green cornfield do not appear of a different hue from the green by which they are surrounded. If we suppose in such cases an absence or paralysis of the red fibres, the phenomena are accounted for.

This theory, applied to the scientific explanation of the colour-blindness which Science exhibits towards Religion's "unsearchable rays," as contrasted with Religion's colour-perception in respect of those rays, amounts to this—that "the man whose eyes are opened" possesses certain nerve fibres capable of responding to the "unsearchable rays," but which in "the natural man" are "absent or paralyzed." And consequently, the incidence of these rays of light produces, in the one case, a sensible impression upon the sensorium, but produces, in the other case, no impression at all.

What follows? How will this difference of impression affect the vitality and growth of that spiritual faculty which, as we have seen, Religion represents as a plant-like organism implanted in man? The answer to this question is that it will make just the difference between life or death to this spiritual organism. The impressionability to the "unsearchable" rays of Revelation constitutes the all-essential condition upon which the vitality of the spiritual organism depends, and in the absence of which that vitality is simply a scientific impossibility. Let us explain.

As Christ most truly pointed out, "the lamp of the body is the eye."[1] Consequently, upon the condition of the eye depends both the quantity and the quality of the light which the body receives internally. If that organ "be perfect (ἁπλοῦς) the whole body is full of light; but if it be defective (πονηρὸς) the whole body is full of darkness."[2] The physical eye, in which the red nerve fibres are in a condition of potential responsiveness to the shocks imparted by the ethereal undulations, transmits to the sensorium those molecular vibrations which produce in consciousness the sensation which we call red light. The spiritual eye, in which the nerve fibres are in a condition of potential responsiveness to the pulsations of spiritual light, transmits to the spiritual sensorium those divine impulses which, when translated into consciousness, we call "the Love of Christ." But, as in the physical eye, so in the spiritual eye, there is a liability to colour-blindness, as well as a faculty of colour-perception. If the particular nerve fibres which are—or which are capable of becoming—responsive to the pulsations of spiritual light, are, in the language of Religion, "defective" (πονηρὸς)—or are, in the language of Science, "absent or paralyzed"—then no message of light is transmitted to the sensorium; the whole body will be full of darkness. Such a visual organ, from the spiritual point of view, is an eye, but it sees not.

[1] Matt. vi. 22. [2] *Ibid.*

Thus the quality of the light which the body receives internally, depends upon the condition of the eye ; and as spiritual life is, as we have seen, represented by Religion to be a plant-like organism implanted in man, it follows that the quality of the light which will reach that organism, also depends upon the condition of the spiritual eye. If the eye possesses nerve fibres responsive to the pulsations of the spiritual light of Revelation, that light will be transmitted to the spiritual organism within. But if the nerve fibres, which should be responsive to spiritual light, are absent or paralyzed—if, in fact the eye is πονηρὸς, colour-blind to the light of Revelation—then the spiritual organism within will receive no spiritual light at all. "The whole body will be full of darkness."

Now, what will be the difference in effect upon the plant-like organism of "spiritual life" that must necessarily arise out of this difference of condition—on the one hand, a condition of spiritual light, and on the other, a condition of spiritual darkness? Let us turn to Science for an answer to this question ; and let us note that the answer which Science gives furnishes one of the most beautiful, as well as one of the most complete, of the homologies which can be traced between the Physical and the Spiritual. For when we turn to consider what are the relations which exist between Solar light and plant-life, we find that the latter is dependent upon the former for its maintenance and vital activities in exactly the same way as that in which Religion represents, and experience proves, spiritual plant-life to be dependent upon the unsearchable rays of the light of Revelation. Observe, first, what is the part which Solar light plays in relation to the vital functions of organic beings.

Mr. Spencer tells us that the importance in this respect of the function performed by light can scarcely be over-estimated. Though in animals its effect is, perhaps, less immediately conspicuous, in the case of plants some of the

effects which light produces "are among the most important that organic matter undergoes."

"On plants the solar rays that produce in us the impression of yellow, are the immediate agents of those molecular changes through which are hourly accumulated the materials for further growth. Experiments have shown that when the sun shines on living leaves, they begin to exhale oxygen and to accumulate carbon and hydrogen—results which are traced to the decomposition by the solar rays, of the carbonic acid and water absorbed. It is now an accepted conclusion that, by the help of certain classes of the ethereal undulations penetrating their leaves, plants are enabled to separate from the associated oxygen, those two elements of which their tissues are chiefly built up."[1]

With the physiological fact here indicated compare now the spiritual phenomenon which we are seeking to interpret. Recall what it is that we are endeavouring to explain. We are enquiring how it is that spiritual life, which seems to Religion—and to Religion only—so very living, appears to Science so hopelessly dead and inanimate. Upon no point are Religion and Science in more direct conflict than upon the question of spiritual life—a life which Religion postulates as her central tenet—a life which Science derides as a visionary conceit. "In Him was life"; "living water"; "living bread"; "the living Father." How natural do these expressions sound on the lips of Religion! How strange and meaningless do they fall on the ear of Science! The truths which in the sunlight of Religion constitute the basis of a spiritual biology, in the sunless laboratory of Science lie torpid and inactive.

And why? Has not Science already supplied us with the answer? What if the spiritual organism, which is "like a grain of mustard seed," or "like the seed which a man should cast into the ground, and which should spring up and grow, he knoweth not how," can exercise its vital functions only when exposed to the light of Revelation? What if here, too, as in the physical world, the light is an all-important "agent of those molecular changes" which constitute growth? Cut

[1] *Principles of Biology*, vol. i. p. 28 (1884 ed.).

off the Solar rays from the material plant, and its functions cease ; it droops and dies. Exclude from the spiritual plant the life-inducing rays of the Sun of Righteousness, and must it not follow that, for the self-same reason, it, like the material plant, will cease to live? Can Science devitalize this delicate plant by excluding a necessary portion of the life-giving rays, and then be heard to say that the plant is inorganic, because in this attenuated and artificialized atmosphere it fails to display the functions of life? Yet this, if Religion is right in her analysis of truth, is what Science is doing. Is Religion right?

In seeking an answer to this question, the following further question at once arises : Have we any scientific reason for supposing that Revelation happens to be that part of the spectrum of truth which is necessary to the vitality of the spiritual organism? Even if we obliterate that portion of knowledge which Religion calls "unsearchable," much of truth still remains. On our own contention the philosopher and the theologian have much in common—nay, we are even now engaged in an attempt to persuade the scientist that the common ground is immensely wider than he supposes. Should we not, then, if spiritual life be a reality, expect to find it flourishing, however feeble and sickly, yet still flourishing to some extent, under the rays of the common truth? Why select Revelation as *the only* vitalizing rays?

To this objection, again, Science supplies a complete and singularly beautiful answer. In order to realise its full force, let us enquire what is the mechanical process by means of which plant growth is effected.

Suppose that we have, suspended from a fulcrum, a gigantic pendulum, of such weight that, by exerting my utmost strength, I can push it one inch and no more, out of the perpendicular. Suppose that I apply the required force, and, pressing against it in a northerly direction, deflect it in that direction to the extent of one inch, and then suddenly release it from the pressure I have applied. It will

swing back in a southerly direction, and, passing the perpendicular position, will continue its sweep, until it has reached a position slightly less than one inch on the southerly side of the perpendicular. Here it will stop, and will swing back in a northerly direction, and so will continue to oscillate, with an ever-decreasing momentum, until, if no further force be applied to it, it will finally come to rest once more in its original perpendicular position.

But now suppose that at the exact moment when the pendulum, on its first return swing, has reached the extremity of its southerly sweep, and is on the point of returning on its northerly oscillation, I apply to it the same force as before. It will then be found that this added force, being so timed as to exactly synchronize with the commencement of the northerly swing of the pendulum, will carry it beyond the one inch to which my original effort deflected it, to approximately a second inch; with the result that in its return swing it will travel to a point approximately two inches on the southerly side of its perpendicular point.

Suppose, now, that at the end of the second return swing of the pendulum, and again at the end of the third, fourth, and each successive return swing, I adopt the same course, each time taking care to so time my effort as to exactly synchronize with the commencement of its northerly swing, the force added by each of my efforts will add an increment to the length of the sweep through which the pendulum will swing, until at length the maximum sweep, which the force at my disposal is capable of imparting to the pendulum, will have been reached, and thereafter no further increment of sweep will be imparted.

In this imaginary experiment two points require attention. In the first place, although I have at no time applied any force greater than that which I applied on the occasion of my first effort, the effect upon the pendulum of each later effort is immensely greater than the effect of my first effort.

Whereas my first effort deflected the pendulum only one inch, the twentieth effort (aided by the momentum induced by the preceding nineteen efforts) had the effect of deflecting the pendulum some twenty inches from the perpendicular. In other words, my twentieth effort, though no greater in itself than my first, had twenty times as much effect on the pendulum. And, in the second place, this immense accession of effective power (without any increase of active power) was gained entirely by synchronizing each effort so as to exactly coincide in point of time with the acquired momentum of the pendulum. Obviously, if I had paid no attention to synchronism, but had applied my efforts at irregular intervals, sometimes at one period of the pendulum's sweep, and sometimes at another—sometimes in aid of, and sometimes in antagonism to, its acquired momentum—the aggregate effect upon the pendulum of my mistimed efforts would have been infinitesimal, as compared with the combined effect of the same efforts when synchronized to the movements of the pendulum. Whereas the twentieth synchronized effort deflected the pendulum some twenty inches, the twentieth a-synchronous effort would scarcely, if at all, avail to deflect it more than the one inch effected by the first effort.

Now, although these are truths of the very simplest order, it is necessary to recall them here, in order to ensure that we form a clear mental picture of the exact process by means of which synchronism produces the marvellous effects which Science attributes to this unostentatious factor in the physical sphere, and the no less marvellous effects which Religion claims for the same factor in the spiritual sphere. For synchronism is one of the most important of all the factors at work in the Universe. On the physical side, it is to synchronism that we owe all our highest faculties—hearing, sight, growth, even life itself. And in the spiritual sphere, long centuries before Science had framed a notion of this extraordinary truth, Religion was busily at work proclaiming, with a persistence, redeemed from monotony only by the

transcendent importance of the subject, an exactly homologous doctrine.

The importance of synchronism in the physical world, and the sort of way in which it works, will be best illustrated by an experiment, similar to an experiment described by the late Professor Tyndall.

Mounting a C tuning-fork upon a resonant case, I take a B tuning-fork, and, after throwing it into strong vibration, I hold it near to the C tuning-fork, taking care not to bring the two into actual contact. After allowing the B fork to vibrate for some four or five seconds, I arrest its vibrations. It will be found that the C fork remains perfectly silent, being quite unmoved by the vibrations of the B fork.

But now, leaving the C fork still mounted on its case, I take a second C tuning-fork, tuned to exactly the same pitch as the mounted fork. Once more I throw the second C fork into strong vibration, and hold it near the mounted fork, taking care, as before, not to bring the two forks into actual contact. After allowing the second fork to vibrate for some four or five seconds, I once more arrest its vibrations ; and it will then be found that the silent mounted fork is silent no longer, but is sounding loudly. The vibrations of the second fork have been communicated by the air to the mounted fork, and have thrown it into strong vibration.

Now, why has the second C fork been able to effect upon the mounted C fork this impression, which the B fork was powerless to produce? The aerial waves caused by the vibrations of the B fork were just as powerful as the aerial waves caused by the vibrations of the second C fork. Either set of waves smote upon the prongs of the mounted C fork with just about the same force. Yet the mounted fork regarded the former with complete indifference, but was so violently agitated by the latter as to burst into involuntary sound. What is the cause of this difference of effect.

The answer is comprised in the single word, Synchronism. The first aerial wave produced by the second C fork dashed

against the tongue of the mounted C fork with a shock which

"caused the prong of the silent fork to vibrate through an infinitesimal space. But just as it has completed this small vibration, another pulse is ready to strike it. Thus, the impulses add themselves together. In the five seconds during which the forks were held near each other, the vibrating fork sent 1,280 waves against its neighbour, and those 1,280 shocks, all delivered at the proper moment, all perfectly timed, have given such strength to the vibrations of the mounted fork as to render them audible to all."[1]

But while this was the case as between the two C forks, between the B fork and the C fork the element of synchronism was wanting. The second, third, and following aerial waves produced by the B fork, not being synchronous with the vibrations of the mounted C fork, hindered and thwarted, instead of increasing, those vibrations, and were therefore powerless to produce any perceptible impression upon the C fork.

Merely noting here, in passing, that the perceptions of sound and of light are similarly due to Synchronism; that the drum of the ear is an organ composed of molecules whose potential vibrations exactly synchronize with the sound-producing aerial waves which strike upon them, and which, in consequence solely of the accumulated effects to which this synchronism gives rise, become so violently agitated as to transmit to the brain, along the auditory nerve, a nervous discharge which, when translated into consciousness, we call "hearing"; and that, similarly, the retina of the eye is an organ composed of molecules whose potential vibrations exactly synchronize with the undulations of the light-conveying ethereal waves; and which, in consequence solely of the accumulated effects to which this synchronism gives rise, become so violently agitated as to transmit to the brain, along the optic nerve, a nervous discharge which, when translated into consciousness, we call "sight"—let us turn at once to the consideration of the part which Synchronism plays in the processes of vegetable growth.

[1] Tyndall, *Fragments of Science*, vol. i. pp. 81–2 (7th ed.).

Observe, first, "that different chemical compounds are decomposed or modified in different parts of the (solar) spectrum."[1] What does this fact mean? It means synchronism. It means that any particular chemical compound is decomposed or modified in that part, but only in that part, of the spectrum, of which the rate of vibration synchronizes with the potential molecular vibrations of the compound. And this for the same reason as before. It is the synchronism of the ethereal waves with the molecular oscillations that, in spite of the infinitesimal force of each individual wave, gives to an aggregated series of waves such an accumulated potentiality, as agitates the synchronizing molecules with sufficient energy to decompose or modify the chemical compound of which those molecules are constituents.

Note, next, that vegetable growth is effected not by all parts of the Solar spectrum, but only—or, at all events, principally—by those "solar rays that produce in us the impression of yellow." What, again, does this mean? Once more the answer is, Synchronism. For it means, as before, that each individual ethereal wave is powerless to produce any appreciable effect upon vegetable matter; but yet that the accumulated effect of innumerable ethereal waves, exactly synchronizing with the oscillations of the molecules upon which they strike, is capable of agitating the synchronizing molecules of the plant with sufficient energy to wrest asunder the oxygen, nitrogen, carbonic acid, and water contained in the air which they absorb, and thence to decompose the dissociated carbonic acid and water, so as to accumulate the carbon and hydrogen of which the plant's tissues are chiefly built up.

Thus vegetable growth is entirely dependent upon synchronism. It is to the fact that the plant's tissues are so constituted as to be capable of responding synchronically to the pulsations of the waves of ether that beat upon

[1] *Principles of Biology*, vol. i. p. 31 (1884 ed.)

them—are, in other words, so constituted as to be capable of obeying the ethereal impulses by which they are perpetually being assaulted—that vegetable life and growth are due. In the absence of this molecular responsiveness —this capacity for obedience—the ethereal undulations would beat upon the plant's tissues in vain. They would evoke no growth-producing response.

And now observe how exactly this physiological law was foreshadowed by Religion, as being a law which holds good in the spiritual sphere. One of the most persistent of Religion's doctrines, and one which has often subjected her to the severest criticism, is that which inculcates the necessity of implicit obedience to the divine commands. On the one hand, she holds up unquestioning obedience as the most imperative of duties—"Behold, *to obey is better than sacrfiice*, and *to hearken* than the fat of rams."[1] "This is My beloved Son, *hear Him*."[2] And, on the other hand, she represents disobedience as the most heinous of sins. It was a simple act of disobedience that, according to Religion, sufficed to produce an alienation between God and man, so irreparable as to require for its rectification the mysterious remedy of the Incarnation and the Redemption. And this doctrine of the heinousness of disobedience is consistently emphasized throughout the whole of her system. "They were disobedient";[3] "Because they obeyed not";[4] are offered as sufficient reasons to account for a total absence of intercommunion between the human and the divine.

And what is obedience but synchronism? Consider the Centurion's well-known definition of obedience—"I say to this man, Go, and he goeth; and to another, Come, and he cometh; and to my servant, Do this, and he doeth it."[5] Have we not here an exact description of synchronism? Is not obedience simply an adjustment of the motions of the

[1] 1 Sam. xv. 22. Mark ix. 7.
[3] Neh. ix. 26. [4] 2 Kings xviii. 12.
[5] Matt. viii. 9.

obeying entity to the impulses received from the commanding entity—a synchronization of those motions with those impulses? And is not disobedience simply a failure of synchronism between action and command? "I say to this man, Go." If he obeys, his action synchronizes with the impulse engendered by my command. If he disobeys, there is a failure of synchronism. "I say to another, Come." Here again, there is synchronism or a-synchronism, according as he obeys, or disobeys. Even if we look no deeper than at the molar motions which constitute "going" or "coming," we cannot fail to see that obedience is synchronism.

But it is not until we pass from these outwardly manifest molar motions, to the contemplation of those invisible molecular motions, by which the molar motions are produced, that we fully see how active is the part which synchronism plays in the constitution of obedience. Analytically examined, obedience resolves itself into two distinct parts—the one, the perception of the command; the other, the translation of that perception into an act of obedience.

Of these two parts, the "perception" may reach the brain either through the ear, or through the eye—either by hearing, or by sight. And, as we have already seen, both the senses of hearing and of sight are entirely due to synchronism—in the one case a synchronism of the molecular vibrations of the ear with the impacts of the sound-producing aerial waves; in the other, a synchronism of the molecular vibrations of the eye with the light-transmitting ethereal waves. Hence it is clear that, in so far as obedience consists of perception of the command, it is entirely due to synchronism.

Nor, when we pass to the second half of obedience—the part which consists of the translation of the perception of the command into an act of obedience to it—do we find molecular synchronism playing a less conspicuous part. When the perception of a command is transmitted from the ear, or the eye, to the brain, the message takes the form of "waves of molecular motion propagated through the auditory, or the

optic, nerve,"[1] such waves synchronizing with the vibrations, or with certain accumulations of the vibrations,[2] of the aerial, or ethereal, waves, which, beating against the tympanum of the ear, or the retina of the eye, gave rise to the molecular disturbance. These waves of molecular motion, reaching the brain, agitate the molecules there into corresponding synchronous vibrations. What happens then? If the command is followed by obedience, these brain molecules impart their vibrations to the molecules of the efferent nerves, along which waves of molecular motion, exactly synchronizing with the vibrations of the brain molecules, are propagated to the particular muscles which move the limbs into those actions which constitute the act of obedience.

Thus, in whatever aspect we regard it—whether in respect of the visible molar motions by which it is manifested, or of the invisible molecular motions by which it is produced—obedience is synchronism. And this fact throws a flood of new light upon the scientific connection between Religion's doctrine of the necessity for obedience, and her doctrine of spiritual life and growth. Recalling once more the facts that Religion represents the spiritual faculty to be a plant-like organism implanted in man; that the Word of God is stated to be light; and that obedience to the Word of God is alleged to be a necessary condition to the maintenance of spiritual life and growth; we see that these three assertions of Religion, taken together, and translated from the terminology of Theology into the corresponding terminology of Science, simply amount to this—that in the spiritual sphere plant growth is effected by synchronism between the spiritual organism and spiritual light. And this proposition is exactly homologous with the laws of vegetable growth which hold good in the physical sphere.

Further than this, Science has shown that vegetable life and growth are produced not by the whole spectrum of light,

[1] *Principles of Psychology*, vol. i. p. 158 (4th ed.).
[2] See *Principles of Psychology*, vol. i. p. 153, footnote.

but only by the yellow rays ; and that the reason of this is, that the molecular vibrations of the plant's tissues synchronize with these particular rays. And this newly discovered law is, again, exactly homologous with Religion's two-thousand-year-old doctrine, that spiritual life and growth are effected, not by the whole spectrum of truth, but only by the "unsearchable" rays of Revelation. Synchronism with the impulses of these rays is a necessary condition, in order to effect that obedience to God's will, which is the first step in the grand process of the evolution of the human into the divine.

From the foregoing considerations three things become clear. In the first place, Religion is right, not only in her analysis of truth, but also in her doctrine that the "unsearchable" rays of Revelation are necessary to the manifestation and maintenance of spiritual vitality. Upon these points Religion *must* be right ; for this is the only conceivable hypothesis, by which it is possible to explain the proved phenomenon of the observed dependence of the claim to spiritual vitality upon the light of Revelation. And here it is curious to observe how completely the hypothesis explains the phenomenon. For not only is the claim to the alleged spiritual vitality confined to the theologian, who has also an exclusive monopoly of the light of Revelation ; but in the different departments of Religion the claim is strongly pronounced and clear, or indefinite and faint, in exact proportion as the light of Revelation is in active requisition, or the reverse. In England we are familiar with three broadly distinguished divisions of Religion, which are respectively termed High, Broad, and Low Church ; with which last division must be ranked, in respect of the point now under consideration, the great body of the Dissenters. Now, it is a general, though by no means universal, truth that the doctrine of spiritual vitality, though theoretically shared by all branches of Religion, is mainly confined to the Low Churchman and the Dissenter. The doctrine of "Instant Salvation,"

of the immediate conversion from spiritual death to spiritual life, by an act of trust in Christ, which is to the Evangelical the very pith and marrow of Religion, is often questioned by the Ritualist, and more than doubted by the Broad Churchman. When the Evangelical points to the well-known text, "He that hath the Son hath life," and argues from the present tense, "hath," that the text is not merely a promise that at some future time he "shall have" spiritual life, but the assurance that he has it now; the High Churchman and the Broad Churchman frequently join issue with him, declaring that the utterances of the Bible are not to be treated after this literal and realistic fashion. Spiritual life, they maintain, is a thing of the future, not of the present; to be experienced in another world, not here. The doctrines of present forgiveness and assurance savour, they tell us, too much of self-confidence, and too little of that self-effacing humility which is so constantly enjoined. In a word, they relegate the spiritual vitality, which the Evangelical prizes as a present and priceless possession, to a future state and another world.

With this divergence of views as to the status and functions of spiritual life, there is a corresponding divergence of views as to the status and functions of Revelation in the scheme of Religion. It has been often said that to the question, Why must I believe this or that doctrine? the Ritualist will reply, Because the Church bids me believe it; the Broad Churchman will reply, Because common-sense bids me believe it; while the Evangelical alone will reply, Because the Bible bids me believe it. This criticism, though certainly not universally applicable, illustrates very forcibly the intimacy of the connection between Revelation and the claim to spiritual vitality. The theologian who regards the Bible as the highest and, indeed, the only, binding authority on religious matters, is the only theologian who lays claim to the present possession of spiritual vitality. Wherever the light of Revelation is wholly, or partially, ignored, the claim to spiritual life does not arise at all, or arises but feebly.

And, in the second place, we need not hesitate to recognize to the full the reality of this proved phenomenon, and to give to it the full weight to which it is entitled; for it is based upon a scientific necessity. It is just as real as the observed phenomenon that a chlorophyll-possessing plant grows—and grows only—when exposed to the yellow rays. The two phenomena, in fact, stand in all material respects side by side. In neither case can we see the actual process by means of which the grand result is obtained; but in both we can understand that process up to a point. We cannot, indeed, follow with the eye the pulsations by means of which the plant molecules, when agitated by the yellow rays, wrest asunder the constituents of the air to feed the plant's growth. We cannot trace the movements of the machinery that is plying its silent activity in Nature's workshop. But, observing the phenomenon, we can call upon Science to explain. And Science answers, It is synchronism. Neither can we trace out, step by step, the mysterious process by which the spiritual plant, when stimulated by the "unsearchable" rays of Revelation, feeds upon the "Bread of Life." We cannot stand and watch the invisible grades by which spiritual growth and development are effected. But, observing the phenomenon, we can call upon Religion for her explanation. And she gives us an explanation almost startling in its scientific simplicity. For, like Science, she answers, It is synchronism—the synchronism of obedience. "To obey is better than sacrifice." "Look unto Me and be ye saved." "In Him was Life, and the Life was the Light of men."

And, lastly, Science is scientifically correct in disclaiming for herself both the spiritual light and the spiritual life. For she cannot have the one without the other. The two are inextricably bound together by the simplest principles of Mechanics. Spiritual growth, apart from the unsearchable rays, is a mechanical, no less than a physiological, impossibility. The physical plant can grow only in the yellow rays, for the simple mechanical reason that those are the only

rays with which the oscillations of the plant's molecules can synchronize. And for exactly the same mechanical reason the spiritual plant can grow only when stimulated into activity by the "unsearchable" rays. For, of all the rays which together constitute the spectrum of truth, these are obviously the only rays which are capable of generating in the spiritual organism those synchronous motions, which constitute obedience to the will of God. No other portion of the spectrum of Truth is of any avail for this purpose. For all other truth-rays are a-synchronous to the required motions. And this fact exactly explains to Science why it is that her boasted knowledge—"co-extensive with the phenomenal"—is useless to her here; why it is that her vaunted conversation with every branch of "the Knowable" (as defined by her) is powerless to kindle in her the least spark of spiritual life. And it demonstrates, too, how perfectly scientific was Religion's anticipation of this transcendent truth—the absolute inutility for spiritual purposes of any mode of force which does not synchronize with the requirements and potentialities of the spiritual organism. However comprehensive may be my knowledge of language and poetry—"though I speak with the tongues of men and of angels"; however profoundly I may have acquired a scientific insight into the most secret of Nature's truths, even to the extent, that, in the words of the poet, my

> "Old experience do attain
> To something like prophetic strain"—

"though I have the gift of prophecy"; however extensive may be the range of my researches into the realm of the Knowable—"though I know all mysteries and all knowledge"; yet, if, with all this light of natural truth, I have not the unsearchable "light of the glorious gospel of Christ's love," for the purposes of spiritual life I am "nothing."

One further fact must be here noted before leaving the subject. We have already seen that two of the functions

which modern Science attributes to the ethereal medium are exactly homologous with two of the functions which Religion, two thousand years ago, attributed to the Spiritual Mediator. These were, first, the function of acting as the vehicle of light; and, second, the function of effecting the reunion of the light-receiver with the light-giver. And here we have a third homology—the functions of life and growth. Recall once more Mr. Spencer's words already cited:

"It is now an accepted conclusion that, *by the help of certain classes of the ethereal undulations penetrating their leaves*, plants are enabled to separate from the associated oxygen, *those two elements of which their tissues are chiefly built up.*"[1]

From this statement note, first, that in the plant world *light-waves produce life;* and with this fact compare the following:—"*In Him was life, and the life was the light of men.*"

Note, next, that these life-giving ethereal undulations "penetrate the plant's leaves"—they are *inside the plant*; and with this fact compare the following:—"I have been crucified with Christ; yet I live; and yet no longer I, but *Christ liveth in me*"—*Χριστῷ συνεσταύρωμαι· ζῶ δέ, οὐκέτι ἐγώ, ζῇ δὲ ἐν ἐμοὶ Χριστός.*

And, lastly, these ethereal undulations enable the plant to assimilate "those two elements of which their tissues are chiefly built up"—they are the *food-supplier*. With this fact compare the following:—"Jesus answered and said . . . Work . . . for the meat which abideth unto eternal life, *which the Son of man shall give unto you. . . . For the bread of God is that which cometh down out of heaven, and giveth life unto the world. . . . I am the bread of life: he that cometh to Me shall never hunger, and he that trusteth in Me shall never thirst.*"[2]

[1] *Principles of Biology*, vol. i. p. 28 (1884 ed.)
[2] John vi. 26–35.

CHAPTER XXVI

THE DEVITALIZING FUNCTIONS OF LIGHT

"If certain liquids capable of undergoing putrefaction, are exposed to the direct rays of the sun, they remain perfectly sweet, whilst exactly similar liquids kept in the dark become tainted and exhibit innumerable bacteria under the microscope."—PROFESSOR FRANKLAND.

"Let us therefore cast off the works of darkness, and let us put on the armour of light."—PAUL.

IN the last chapter we dealt only with the effect of light in its direct relations with vitality and growth. We saw that vegetable life and growth are directly dependent upon the action of Solar light. We saw, too, that Religion's so-called spiritual life, which she declares to be a plant-like organism implanted in man, is directly dependent (as is both alleged by Religion, and proved by experience) upon the light of Revelation. Having, then, observed that both Religion and Science agree that Truth, of which Revelation claims to be a part, occupies in the psychical sphere a position exactly homologous with that occupied by Solar light in the physical sphere, we found a general homology between the observed dependence of vegetable vitality on the light of the Sun, on the one hand, and the observed dependence of spiritual vitality on the light of Revelation, on the other.

On tracing out, with more particularity, this general homology, we found that it extended with singular fidelity into minute details. We noticed that plant vitality depends, not upon the whole spectrum, but solely, or, at least, principally, upon the yellow rays. We noticed also that spiritual vitality depends, not upon the whole spectrum of

truth, but only upon the "unsearchable" rays of Revelation. And, finally, we found that not only was this observed dependence in either case traceable to synchronism, but that, in the one case, it was the work of the ethereal medium, and, in the other, the work of the Spiritual Mediator.

Having thus considered the homologous effects produced by light in either sphere upon the positive side of life, we have now to consider those effects upon the negative side. Side by side with the inexplicable phenomenon of life stands the no less mysterious phenomenon of death. Modern science warns us that, in order that an organism may thrive, it is not sufficient to place it in conditions favourable to the performance of the functions of life. It is also necessary that it should be protected from the encroachments of disease. We have seen the part which light plays in stimulating the vital activities. Turn now to consider the part which it plays in arresting the activities of disease.

Probably no branch of Science has during the last fifty years made greater progress than that which concerns itself with the detection and arrest of disease. Certainly no branch of Science has experienced a more complete revolution in respect of its fundamental principles. Within the last half-century the views of Medical Science as to the nature and causes of disease have undergone an entire transformation. Formerly disease was looked upon as a sort of inanimate principle, corresponding to health in much the same way as sorrow corresponds to happiness, or pain to pleasure. But with the discoveries of Pasteur, Koch, and others, Pathology has entered upon an entirely new phase of its career. One by one, the various diseases are yielding up to patient research the secrets of their origin and their nature; and in almost every case that mysterious cause is found to be traceable to the presence of living organic beings. These minute organisms enter the human body, and taking up their abode there, breed with immense rapidity. They convert to their own use the secretions and tissues of their unwilling host; and

unless the progress of their career be arrested, they speedily reduce him to a condition of prostration and death.

Now this strange discovery has led to a counter-discovery, if possible stranger still. Disease being simply the effect of the action of living organisms, the question naturally arises, How has Nature met these hostile intruders? How are the encroachments of these active and prolific organisms kept in check?

The answer of modern science to these questions is that health, like disease, is also the product of the actions of living organisms. The tissues of every healthy animal are infested by innumerable, infinitesimally small, organic beings, known as "phagocytes," or health-germs, whose function it is to ward off the attacks of the various disease-germs; and as often as any disease-germs attack the animal whose body they inhabit, they are drawn by some inexplicable attraction, almost resembling instinct, to the spot where the attack is being made, and then and there do battle in defence of their living home. Their mode of attack is noteworthy. It resembles the warfare of most wild beasts, and of primitive man. They are not content with merely slaying the attacking enemies; they also devour them.

Thus the body of every animal is the seat of an active, and almost incessant, warfare. On the one hand, it is being constantly attacked by disease-germs, against which it is being perpetually defended by health-germs. As long as health is maintained this is due to the fact that the health-germs are victorious in this life-and-death encounter. And this victory is being constantly celebrated by this strangely cannibal feast. As often as victory inclines to the defending party, the germs of death are "swallowed up" by the germs of health.

Almost two thousand years ago Religion distinctly formulated the doctrine that the conditions of spiritual health and spiritual disease were identical with these newly discovered physiological conditions. That sin, the spiritual

homologue of disease, is the product of an active living agent is a religious doctrine at least as old as the second chapter of Genesis. And St John's Gospel contains, in language of unmistakable clearness, the announcement that the indwelling of a living Christ is a necessary condition to spiritual life and health. That these two antagonistic Powers, inhabiting man's spiritual body, are perpetually carrying on an active warfare within his members is a doctrine sufficiently emphasized by St. Paul: "But I see a different law in my members, *warring against* the law of my mind."[1] And even the exact method of the warfare thus carried on is identified with the mode of warfare waged within the natural body. On the one hand, the evil spirit "as a roaring lion, walketh about, *seeking whom he may devour*";[2] and, on the other hand, spiritual health is the result of the "spirit of health" actually devouring the spirit of sin: "Then shall come to pass the saying that is written, Death *is swallowed up* in victory."[3]

Returning now to the question of physical health, it is to be observed that, after pointing out the enormous reproductive capacity exhibited by *bacteria*, or disease-germs, each one of which is capable, under favourable conditions, of giving birth to a progeny which, if suffered to live and propagate uninterruptedly for the brief space of forty-eight hours, would number 280,000,000,000,000 individuals, Professor Percy Frankland asks, What are the agencies at work which prevent this stupendous and, to the human race, ruinous result from being realized? Note the answer to this question. First and foremost among these agencies is "the power of sunshine to destroy these micro-organisms."[4] About the year 1878 two English investigators—Messrs. Downes and Blunt—

"established the remarkable fact that if certain liquids capable of undergoing putrefaction, or in common parlance of 'going bad,' were exposed to the direct rays of the sun, they remained perfectly sweet, whilst exactly similar liquids kept in the dark became tainted and exhibited innumerable bacteria under the microscope."[5]

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[1] Rom. vii. 23. [2] 1 Peter v. 8. [3] 1 Cor. xv. 54.
[4] *Nineteenth Century*, May 1894, pp. 839 *et seq.* [5] *Ibid.*, p. 839.

Professor Frankland's ensuing remarks are so instructive for our present purpose, and so incapable of further condensation, that we shall take the liberty of here transcribing a few of them *in extenso* :—

"Numerous most important and interesting experiments were made by these investigators with the object of finding out how these wonderful results were brought about, and upon what factors they were dependent. In the first place it was ascertained that the oxygen of the air had a marked effect in assisting the sun's work, and that the bacteria suffered more from the sun's rays if the proportion of oxygen was increased, and less if it was diminished, thus clearly pointing to processes of oxidation as being the cause of the phenomenon. Recently M. Momont, in the Institut Pasteur, has obtained more exact information confirming these experiments by exposing the bacilli of anthrax to sunshine in the presence and absence of air, with the result that whilst the anthrax bacilli exposed to the sun in the presence of air were killed in two and a half hours, similar bacilli placed in a vacuum were still alive after fifty hours' exposure to sunshine.

"The next problem to be attacked was to ascertain whether all the solar rays were equally responsible for this important result or whether the different coloured rays composing the sun's beams produced different effects, as is known to be the case in those important vital processes which go on in green plants.

"Many investigators besides Downes and Blunt have bestowed attention upon this interesting question, but it was perhaps first most successfully attacked by Dr. Geisler, of St. Petersburg, now some two years ago. This investigator decomposed the white sunbeams by means of the prism, and then exposed typhoid bacilli to the light of the various parts of the spectrum. The rays at the red end he found had little or no effect at all on the growth of the bacilli, whilst the most powerfully deleterious action was obtained in the ultra-violet, the effect becoming less and less marked in passing from this to the red. On this point, in fact, all investigators are agreed—that the rays which exert this destructive or inhibiting effect on bacterial life are precisely those which also exert the most powerful action on the ordinary photographic plate.

"Of much interest also is the comparison made by Dr. Geisler of the potency of the sun and the electric light respectively in destroying bacterial life. Thus, whilst from two to three hours' sunshine was sufficient to produce a most markedly unhappy result in the condition of the typhoid bacillus, it required an exposure of no less than six hours to the beams of an electric arc lamp of 1000 candle-power, and at a distance of only thirty-nine inches, to produce a similar effect, thus clearly proving the great inferiority in this respect of this most dazzling of artificial lights in comparison with sunshine.

"Even if the exposure to the solar rays is not sufficient to actually destroy the bacteria, it may yet profoundly modify their character and bring about the most important changes in their subsequent behaviour. Thus, whilst many bacteria can produce the most wonderful

colours—yellow, orange, scarlet, crimson, indigo, blue, violet, etc.—it has been found, at any rate in the case of one of these pigment-producing microbes, that exposure to sunshine for a short time is able to rob it of this beautiful property, and the organism which, under ordinary circumstances, was wont to elaborate a splendid red pigment is, by being submitted to the sun's rays, so degraded as to produce afterwards only a dirty or colourless material.

"Much hygienic importance and interest attaches to some investigations in a somewhat similar direction made by Dr. Palermo, of Naples, and which have only been published within the last few weeks. The microbe selected for experiment was Koch's cholera bacillus. Now, these bacilli, which are almost universally accredited with the honour of producing Asiatic cholera in man, are also fatal to guinea-pigs in about eighteen hours. Dr. Palermo placed some of these cholera bacilli in the sunshine for various periods of time, and he found that whilst, when he protected them from the sun, they killed guinea-pigs in eighteen hours as usual, after they had been 'sunned' for from three and a half to four and a half hours they were perfectly harmless, and the animals experienced no evil results whatever from being treated with them.

"The cholera bacilli which refused to kill the guinea-pigs had not been destroyed, nor had their total number suffered any diminution, by the action of the sunshine during this short time, but their inability to work mischief was directly due to the removal *during this exposure of their virulence or disease-producing powers.* More than this, the further important discovery was made that those guinea-pigs which had survived the above inoculation with these sunshine-exposed or insolated cholera bacilli, had acquired immunity towards this disease, or, in other words, were protected from contracting it afterwards, much in the same way as vaccination with cowpox protects the individual from an attack of smallpox. Thus when eight days later these particular guinea-pigs were inoculated with *virulent* cholera bacilli they were quite unaffected by doses which to ordinary guinea-pigs proved rapidly fatal. *Thus by exposure to sunshine these disease microbes were not only deprived of their sting, so to speak, but were converted into useful servants in protecting their former victims from the attacks of their still viciously disposed brethren.*"[1]

In this somewhat lengthy quotation almost every statement is paralleled by some well-known spiritual homology. These homologies themselves are so important as to deserve a brief notice, yet so obvious as to require scarcely more than a bare enumeration.

The discovery that disease germs are destroyed, or at least rendered innocuous, by being exposed to the direct rays of the Sun, and that they can only exercise their harmful

[1] *Nineteenth Century*, May, 1894, pp. 839–41. All the italics in this quotation are Professor Frankland's.

functions in the dark, bears an obvious and exact analogy to the Bible doctrine which connects spiritual health with spiritual light, and attributes sin to the operations of "the powers of darkness:"—"And this is the condemnation, that the light is come into the world, and men *loved the darkness rather than the light, because their deeds were evil.* For every one that doeth evil hateth the light, neither cometh to the light."[1] Where would it be possible to look for a more exact parallel than that which we have here? In the physical sphere the noxious disease-germs can work only in the dark—their works are literally "works of darkness." And in the spiritual sphere the noxious sin-germ can work only in the dark; *his* works also are "works of darkness"—"he cometh not to the light." In either case, too, there is an intolerance of light. In the one case, sunlight is fatal to the disease-germ; in the other, "every one that doeth evil *hateth the light.*"

Further than this, to beings whose spiritual health is being hourly exposed to the attacks of the "powers of darkness," the beautiful discovery of the inoculating action of sunlight on microbes throws a scientific significance, never before realized, into the exhortation that, if we aspire to maintain our spiritual vitality and health, we must "cast off the works of darkness *and put on the armour of light*" (*τὰ ὅπλα τοῦ φωτός*). For this language is taken out of the category of metaphor, and transformed into stern and literal fact, by the discovery that to Science, no less than to Religion, light is a protective armour against those "works of darkness," which are but another name for disease and death.

Scarcely less significant is the fact that the destructive action upon microbes of the sun's light is increased by the presence of air. The antiseptic treatment of wounds and sores has fully demonstrated that the air is the purveyor of pestilent bacteria, and that in order to heal an open

[1] John iii. 19, 20.

wound it is necessary to exclude the air, in order to exclude also the microbes which the air contains. But though this course may be necessary in the case of open wounds, the discovery now under consideration shows that to a being in ordinary health the case is reversed. For the air, which wafts the poisonous microbes, contains also within itself the materials which assist the sunlight in effecting their destruction.

And does not the history of Religion point to an eloquent homology here? Does not Science here furnish an exact explanation of the complete failure which has uniformly accompanied every form of Monasticism? Rightly recognizing that the tainted atmosphere of a worldly life is the perpetual purveyor of temptation and spiritual disease, men have wrongly sought to preserve their souls from its pestiferous influence, by shutting it out from their lives altogether. At first sight such an arrangement appears the best possible expedient for fostering the desired spiritual vitality. A life in which the soul is uninterruptedly and exclusively exposed to the direct rays of the sunlight of Religion, and from which every breath of worldly atmosphere is carefully shut out—have we not here the best imaginable conditions for furthering the wished-for end?

But if experience has shattered this expectation to atoms, Science has at last explained the reason why. The whole system is vitiated by the fatal defect that it is an attempt to apply to health a method of treatment suited only to disease. Granted that there are cases of advanced disease, in which the soul has become so honeycombed with sin—when, in the language of the Bible, it is so covered with "wounds and bruises and festering sores"[1]—that the only hope of recovery lies in the temporary estrangement from all temptation; it may be that in such cases it is necessary for a time to exclude the world and its desires altogether. But such an exclusion is an artificial state of things, and therefore one which to

[1] Isaiah i. 6.

healthy organisms Nature will by no means allow. No experiments are so dangerous, or, generally speaking, so futile, as those which attempt to upset any equilibrium established by Nature. And here is a deliberate attempt to violate one of Nature's laws. For what is the monastic life but an endeavour to apply the antiseptic treatment to the soul? And if the history of every monastic institution is a standing witness to the futility of attempting to secure spiritual health, by sealing up the spiritual faculties in the moral vacuum of the cloister and the cowl; if universal experience proves that, in this attenuated and artificialized atmosphere, spiritual life grows faint and sickly, while sin flourishes and thrives; if these forcing-houses of Religion have, one after another, degenerated into hot-beds of profligacy and vice; is it not because, in the spiritual, as in the physical, sphere, the germ-destroying properties of light can exercise their full devitalizing force only in that atmosphere which Nature has provided for their use?

And here is well exemplified at once the exquisite unity of Nature as a whole, and the no less exquisite interdependence of her parts. Keep the atmosphere and the sunlight apart, and either loses its virtue: the atmosphere then becomes the purveyor of disease and death; the sunlight suffers a paralysis of its germicidal power. But unite them, and they combine into a potent agent of life and health.

It is impossible to leave this subject without drawing attention to the fact that the foregoing considerations receive from Christ Himself that strongest of all sanctions—a negative sanction. They rest for their support, not merely upon the positive utterances of certain of his followers, but also upon the general tenor of what Christ taught—or, rather, of what He did not teach. In support of this proposition it is impossible to do better than cite a short passage from an author, now habitually ignored, but who, for all that, is one of the most powerful, as well as one of the most interesting, of all the writers who have ever adorned the

ranks of controversial literature. Upon the subject of "the *negative* character" of Christianity Dr. William Paley makes the following weighty observations :—

"Our Lord enjoined no austerities. He not only enjoined none as absolute duties, but He recommended none as carrying men to a higher degree of Divine favour. Place Christianity, in this respect, by the side of all institutions which have been founded in the fanaticism, either of their author, or of his first followers: or rather compare, in this respect, Christianity as it came from Christ, with the same religion after it fell into other hands; with the extravagant merit very soon ascribed to celibacy, solitude, voluntary poverty; with the rigours of an ascetic, and the vows of a monastic life; the hair shirt, the watchings, the midnight prayers, the obmutescence, the gloom and mortification of religious orders, and of those who aspire to religious perfection."[1]

No one can duly consider this negative aspect of Christianity in the light of the foregoing considerations, without perceiving how truly scientific was Christ's avoidance of monasticism. Here, once more, His teaching is found to exactly conform to the most rigid requirements of modern science. If there is one truth more than another, which twentieth-century science is illustrating with a daily increasing emphasis, it is the fact that the science of Christ is never at fault.

The activity of the ultra-violet rays of the Solar spectrum in the destruction of microbes is a fact which, read in conjunction with the argument contained in the last two chapters, possesses a peculiar, and even extraordinary, significance. In those chapters it was pointed out that the "unsearchable" rays of Revelation must, on the scientific principle of synchronism, constitute that portion of the spectrum of truth which is most vitally necessary to the stimulation of the functions of spiritual life; and it was shown that this proposition is not only expressly propounded by Religion, but is also supported and confirmed by the evidence of universal experience. And here we find in Science the exact complement of that proposition. For how can Science, who tells us that the *invisible* ultra-violet rays constitute the portion of the Solar spectrum which performs the function of destroying

[1] *Evidences of Christianity*, Part II., chap. ii., pp. 230–31 (1823 ed.).

microbes, be heard to contradict the homologous doctrine of Religion, when she tells us that the portion of the spectrum of truth, which alone protects the human soul from the ravages of spiritual disease, is to be sought among the *unsearchable* rays of Revelation?

In connection with this point a special interest attaches to Professor Frankland's remarks upon the comparative impotence of the electric light—"the most dazzling of artificial lights"—to devitalize bacteria. When men are seeking to live without Religion altogether, and when the leading philosophers of the day are exercising their ingenuity in the construction of artificial systems of Ethics, designed to take the place which has hitherto been monopolized by revealed religion, the probable effects upon practical morality of such a substitution becomes one of the most burning questions of the day. Before pronouncing an opinion on this all-important question, we shall do well to enquire what is the answer suggested by the homologies of Science. If "the most dazzling of artificial lights" is comparatively powerless to destroy the invading bacteria, why should we expect a better result from the corresponding factor in the spiritual sphere? Are we not forced by scientific considerations, to regard continued subjection to the influence of the Sun of Righteousness as the first condition necessary to immunity from spiritual disease?

Once again. The effect of sunlight in depriving bacteria of their power of producing beautiful colours is exactly paralleled by a spiritual phenomenon, the reality of which is attested by the according voice of millions. To the worldly-minded man no doctrine of Religion is so inexplicable, as that which enjoins contempt for the delights and pleasures of the world. "Beloved, love not the world," is to him simply an impossible precept. In his eyes, life, with its countless attractions, its pleasures and profits, its promises, however vain and delusive, its prizes, however hollow and unreal, is clothed in a thousand rainbow rays. Even its

very sins—"the lust of the flesh, the lust of the eyes, and the pride of life"[1]—bitter and unsatisfying in result, present, nevertheless, in prospect, the most attractive colours. No pigment-producing bacterium ever succeeded in clothing itself in brighter or more alluring hues, than those elaborated by "the powers of spiritual wickedness in high places."

And in view of this, no fact in Religion is more pronounced, than the change of hue which the world assumes, when once it has been shone upon by the "Sun of Righteousness." The spiritually-minded man asserts that to him the world has suddenly and mysteriously lost its attractive power. No sooner were his eyes opened to the reception of spiritual light, than a change passed over the aspect of life. Pleasure ceased to charm; sin ceased to allure. The delights, which formerly were wont to elaborate the most gorgeous colours, produce now only an unattractive, colourless ray.

There are men whose lives are a standing witness to this devitalizing power of spiritual light; men to whom the things of this world offer little or no attraction; whose conversation is in heaven. Upon the question of the true classification of these other-world beings, mankind is not agreed. Some call them converted Christians; others, deluded enthusiasts. But, whatever be their correct denomination, their existence is a phenomenon which cannot be questioned, and which presses for an explanation. To the world at large they offer an insoluble problem. To Science they present the simplest of phenomena. For to her they merely illustrate, in the spiritual sphere, one of the devitalizing properties of Solar light.

[1] 1 John ii. 16.

CHAPTER XXVII

SIGHT

"'You know this book?'
"'The Bible! Of course! Everybody knows it!'
"'Pardon! It would be more correct to say nobody knows it! To read is not always to understand. There are meanings and mysteries in it which have never yet been penetrated, and which only the highest and most spiritually gifted intellects can ever hope to unravel.'"—MARIE CORELLI.

NO one but an expert in the subject can have any idea of the extraordinary subtlety, with which many of Religion's most fundamental doctrines are expressed in the pages of the Bible. It is one of the most remarkable characteristics of that truly wonderful book that we seem never to come to an end of it. The more it is studied, the more it yields. Passages which we had come to regard as thoroughly understood are found, upon a closer examination, to contain truths utterly unsuspected, not merely by the casual reader, but even by the attentive student. As an illustration of this characteristic, let us take an instance which, in spite of its theological importance, appears to have hitherto escaped the observation of Biblical critics.

It is undeniably a doctrine of the Bible that, in order to acquire eternal life, it is necessary to be "born again." Indeed, this doctrine is the very foundation of the whole fabric of Religion. It is, therefore, from the theological point of view, of the last importance to ascertain exactly what are the necessary conditions for the attainment of this second birth.

Now, although it will, perhaps, be very generally admitted that this mysterious process is represented to be intimately connected with "trust in Christ," it would probably be difficult to lay one's hand upon any specific passage in the Bible in which such connection is expressly asserted, or its nature definitely explained. There is, however, one passage in which, by a touch all the more forcible for being almost imperceptible, both these desiderata are supplied.

In the second chapter of St. Mark's Gospel is narrated the well-known story of Christ healing the man sick of the palsy at Capernaum. It is impossible to improve upon the original version of the story, which is given in the following words :—

"And again He entered into Capernaum, after some days ; and it was noised that He was in the house. And straightway many were gathered together, insomuch that there was no room to receive them, no, not so much as about the door : and He preached the word unto them. And they come unto Him, bringing one sick of the palsy, which was borne of four. And when they could not come nigh unto Him for the press, they uncovered the roof where He was : and when they had broken it up, they let down the bed wherein the sick of the palsy lay. When Jesus saw their faith, He said unto the sick of the palsy, Son, thy sins have been forgiven."

The whole scene is here so graphically and naturally described, that we follow it by easy stages, until we are suddenly brought to a standstill by the unexpected announcement, "Thy sins have been forgiven." This is not the object, or, at all events, not the immediate object, for which the paralytic man came ; nor is it what the reader expects. The patient comes to the Physician to be cured of his palsy, and "Thy palsy is healed" is the message we expect to hear when Christ first opens His lips. To the student who seeks to read between the lines, so sudden and unexpected a transition from the immediate matter in hand cannot be without significance. He will suspect that it indicates the presence of some hidden truth ; nor will his suspicion be misplaced.

At the first glance, indeed, there does not appear much room for hidden mystery in the simple announcement, "Son, thy sins have been forgiven," unexpected though it be,

And yet in one of those six words there lies concealed the explanation—and, possibly, the only direct explanation that the Bible contains—of Religion's central doctrine ; and the magic word is, perhaps, not the most promising of the six ; —it is the word "Son."

At first sight this word scarcely arrests attention. It does not seem unnatural from the lips of the great Physician to His patient. But turn to the Revised Version, and there we find a confession by the translators that they have been guilty of a mistranslation ; for they have appended the marginal note : "Greek, 'child.'" Turn, then, to the Greek text, and there we find that the note is right and the translation wrong ; for the words are clear, without any textual uncertainty—"*τέκνον, ἀφέωνταί σου αἱ ἁμαρτίαι*"—"Child, thy sins have been forgiven."

Now, however strange may have been the unexpected greeting, "Thy sins have been forgiven," stranger still must have sounded that yet more unexpected word, "Child." It is scarcely possible that the patient was very young—palsy is a disease which far more often attacks age than youth ; and the man is represented to have been at least fully grown up, for it is mentioned that he was so heavy that it required four men to carry him—"he was borne of four." To this old, or at least middle-aged, man, then, Christ, the youthful Prophet of thirty, speaks in the strange language of the text—"*Child*, thy sins have been forgiven."

What is the meaning of this mysterious language ?

The word *τέκνον*, as the most rudimentary Greek scholar is aware, is derived from *τεκ-*, the root of the Greek verb *τίκτω*, seen, as usual, in the second aorist, *ἔτεκον·* and as *τίκτω* means "to bear," so *τέκνον* means "that which has been born" : "a child," *with special reference to its birth* ; a child, that is to say, which has only recently been born ; "a *young* child." The word is, in fact, precisely homologous with the Scotch word "bairn," which is derived from "bear," and means (originally, at all events) "a young child."

Now, here we have lighted upon the factor which we seek. The word τέκνον, as used in this passage, is the connecting link between the "trusting in Christ" and the "being born again." It shows that the two are connected together in the relation of cause and effect. For observe the position in which the word stands : "When Jesus saw their faith (in Himself) (ἰδὼν τὴν πίστιν αὐτῶν) He said to the sick of the palsy, τέκνον." It is as if He had said, "By the exercise of that act of faith in Me which I have just witnessed, you have been born again—you have become τέκνον, a little child." And that τέκνον is here used, not in the physical sense—which sense, indeed, the circumstances already alluded to preclude—but in a spiritual sense, is further proved by the words which immediately follow—not the expected physical gift, "Thy disease is cured," but the unexpected spiritual blessing, "Thy sins have been forgiven."

This doctrine of the necessity of faith in Christ in order to the attainment, through a second birth, of spiritual life, is not only the central and most essential of all Religion's doctrines, but is also so entirely original, and so very extraordinary, that it is by no means surprising to find that, in all the doctrines of Religion, none has been so persistently, or so entirely, misunderstood. It will, therefore, be worth while to enquire what further light can be thrown upon it, by a comparison of it with its homologue in the physical sphere. As a preliminary to this enquiry, let us first examine, in some little detail, the doctrine itself, in order to correctly appreciate exactly what it is.

The great doctrine of Salvation (that is, the attainment of spiritual life) by Faith is, as will be readily admitted, the keynote of the Bible. To the practical question, What must I do to be saved? the answer of Religion most undoubtedly is this : Believe on the Lord Jesus Christ, and thou shalt be saved. We are not at the present moment concerned to prove, or even to defend, the truth of this doctrine. We are merely asserting its existence. And that

is beyond dispute. Whatever we may think of the doctrine—whether we like it or not ; whether we accept it with tears of gratitude, or reject it with the scorn of incredulity—the fact remains the same, that it *is* the central doctrine of the Bible—the Alpha and Omega of the Christian religion. It is no stray doctrine propounded casually here and there ; no mere appendage to Religion. On the contrary, it is the very essence of the Bible. Alike in the Old Testament and the New, every book teems with it ; almost every chapter proclaims it. Nor is it confined to the purely doctrinal portions of the Bible. Throughout the whole of the Old Testament it permeates the text as an undercurrent, tingeing with its own peculiar hue both the still waters of devotion and the turgid stream of narrative. Represented under a hundred types, pictured by a hundred figures, from the "In the beginning" of Genesis to the final "curse" of Malachi, the great doctrine of *Trust in God* is heralded to mankind with an unrelenting and unwearying reiteration. It is the burden of the Prophet's dirge, and the keynote of the Psalmist's song. It is the one lesson, deduced alike from the flagging sword of the Israelitish warrior, and the unstable crown of the Hebrew king.

The gap of four hundred years, which separated the Old Testament from the New, was utterly powerless to stifle this, the rallying-cry of the Bible religion. Over that dreary gulf of time it came floating like an echo of the voice of God ; till the lips of the Evangelists caught up the sound, and converted the *Trust in God* of the Old Testament into the *Trust in Christ* of the New.

Let us pause here for a moment to notice two grand misconceptions, which have led to an entire misunderstanding of this all-important doctrine.

In the one direction men have rushed into extravagant and irrational notions as to the value to be placed upon the intellectual acceptance of dogma—a tendency which is forcibly illustrated by the importance which is often attached to a

complete acquiescence in the various Creeds that figure in the Church of England Prayer-book. "Belief" in these is supposed to possess some mysterious life-giving charm; "disbelief" is branded as the most fatal form of infidelity. To a reflective mind this error can scarcely fail to stand self-condemned. For it is opposed to the plainest dictates of reason, and, therefore, of Religion. Its weakness will be most readily appreciated by observing the climax which it reaches, in the denunciation with which the so-called Athanasian Creed concludes—a denunciation, be it observed, which is directed against every unfortunate victim who, without necessarily actively denying, may merely have passively failed to grasp, one or more of those incomprehensible dogmas, which the creed, while propounding them with glib complacency, makes no attempt whatever to explain. What reason is there in this—to insist upon a positive intellectual belief in incomprehensible dogmas? Nor can the converse position be regarded as any more satisfactory. Whether, or no, it be damnable to fail to accept all the dogmas of the Athanasian Creed, what merit does the Bible predicate, or can reason suggest, in their intellectual acceptance, which could conceivably entitle a human being to Salvation? The same merit, our opponent will possibly reply, as that which you claim for your Trust in Christ. Not so. There is a scientific reason, as will be explained immediately, which renders trust in Christ efficacious for Salvation. For it is not difficult to show that, from the standpoint of Science, he who trusts in Christ, not may, but must, acquire eternal life; and further, that, in the existing order of things, there is not, and cannot be, Salvation in any other way.

But while one section of mankind has thus run mad upon Creeds, another has gone equally wrong in the opposite direction. All knowledge, they say, is based upon evidence, and without proof we accept nothing. The religion of the Bible claims to be an exception to this universal law, and

therefore is rightly rejected. And they point, with a sneer, to the doctrine of Faith, as the actual confession of that weakness, which they claim to have detected. It is easy, they insinuate, for those who cannot prove, to insist upon the necessity for blind faith—a doctrine which has ever been the refuge of the credulous proselyte, and the weapon of the artful divine. And thus, instead of insisting upon acceptance, they, with equal intolerance, insist upon rejection, perverting the "faith" of the Bible into blind and unreasoning "credulity."

Now, both these errors, though diametrically opposite in their conclusions, proceed from one and the same cause—an entire misunderstanding of the term which is translated "faith." The term πίστις, which is so rendered, is wider in meaning than any single English word that can be suggested as a translation. Probably "trust" is its nearest English equivalent. It contains, it is true, the idea "belief"; but this is only a part—the intellectual part—of πίστις, and leaves its far more important part—the emotional part—utterly unprovided for. To attempt to identify πίστις with "belief" is, therefore, to violate the first and greatest axiom of geometry—to deny that the whole is greater than its part.

First and foremost, then, in our investigation of Religion's great doctrine of "faith," we demand as a postulate, or, rather, as a fundamental axiom, that the term πίστις shall receive its fullest and widest meaning, namely, that absolute reliance, trust, and confidence, which (to use a hackneyed, but unrivalled, illustration) a young child reposes in its parent; that subtle responsiveness to an extraneous influence, which is the very essence of all true intellectual and emotional intercourse; and which, at once so natural to the plasticity of infancy, so alien to the inflexibility of age, is the basis of Christ's well-known aphorism, that, unless a man receive the kingdom of God *as a little child*, he shall in no wise enter therein.

Recognizing this as the true meaning of πίστις and rendering this term by its best available English equivalent

of "trust," observe now what, in its general bearing, is the doctrine of salvation by trust in Christ.

The Bible represents that there is a certain mysterious process—a change of nature—which it is possible for every man to undergo. To this process it gives various names, and we may choose which of them we will. But whether we call it repentance, conversion, being born again, or acceptance of Christ, the Bible ever places this process before us, as a sort of turnstile, through which every man is bound to pass, if he would enter into the kingdom of heaven; and it divides mankind, with an affectionate, but stern, discrimination, into two distinct and irreconcilable classes, which, like refractory elements, refuse to combine in any proportions, or on any terms, and which consist, the one, of those who have undergone this process, and the other, of those who have not.

What, then, is the nature of this mysterious process? What the border-line between these two classes? It is, briefly, the absolute surrender of the individual will to the will of Christ; or, rather, the voluntarily permitting the spirit of Christ to enter the heart, and, expelling the spirit of self, to reign there supreme. It is "the crucifying of the old man, and the putting on of the new." It is the merger of self-will in God-will. This process, Religion insists, must be complete and absolute. No half-measures are permissible; no compromise is possible. Christ will have the whole heart, or none. The "old man" must be, not merely subdued, not even fettered, but crucified. The change of mind (*μετάνοια*) wrought by the process will be one which will affect, not some, not even most, of the events of the life of him who has undergone it, but all. Thenceforward the Christian's one object will be that every circumstance of his life, no matter how apparently trivial, shall be regulated, not according to his own will, but according to the will of Christ. This, according to Religion, is the first and last distinction between the Christian and the non-Christian—that the latter does, or tries to do, everything for himself; while the former

leaves it to Christ to do everything for him. The non-Christian looks to himself, the Christian looks to Christ, for everything.

Now, realizing that this is the meaning of Religion's doctrine of so-called "faith," we shall find, if we place this doctrine side by side with the corresponding laws which Science reveals in the physical sphere, that, so far from being unintelligible, so far from being unreasonable, so far from being even an anomaly, the doctrine of the attainment of spiritual life by trust in Christ is founded on precisely the same laws as those by virtue of which natural life has, in fact, been acquired in the physical world. Let us justify this assertion.

It will be universally admitted that the reward which Religion holds up to mankind, as the highest prize which she has to offer, is the attainment of spiritual life. And, as we have already seen, she identifies this life with sight; "In Him was life; and *the life was the light of men*"—light, that is to say, as affecting mankind; light, as the object of the human senses; light, as arousing in man the sensation of sight. That this is the meaning of the term "the light of men" is rendered clear by the still more explicit identification of spiritual life with sight: "Except a man be born again, he cannot *see* the kingdom of God." [1]

What, now, is the object and meaning of this identification of spiritual life with spiritual sight? Why does Religion go out of her way to tell us that, when she offers us life, she is offering us sight? That there must be some special meaning attached to a metaphor at once so strong, and so persistently reiterated, will scarcely be questioned. The identification of life and sight is not by any means a self-evident proposition. On the contrary, there is something in the originality of the idea which challenges the attention of even the most languid student.

The true answer to these questions can scarcely be disputed.

[1] John iii. 3.

The metaphor—if, indeed, it can truly be called a metaphor at all—is obviously introduced for the purpose of explanation. To the offer of something so mysterious as a new life, the first and paramount question which was sure to be raised is the practical question of the lawyer—"What shall I do to inherit eternal life?"[1] And Religion forestalls the question, by answering it almost before it is asked. In her very definition of eternal life she refers us to Nature. Turn, she says, to the physical world, and consider that. The life which I offer you is sight. Learn about light, and you will know something of the eternal life which I have to give. One set of laws governs the two. To perceive the one, is to receive the other. Learn to see, and you will have learned to live.

Is this scientifically true? Are sight and life, as Science knows them, really one? Fifty years ago the answer to this question would have been a derisive, No. But that verdict has been reversed by the Science of to-day. Mr. Herbert Spencer tells us that the Bible is right; that sight *is* life.

This assertion scarcely requires a justification at the present day. The publication of the late Professor Drummond's *Natural Law in the Spiritual World* has rendered readers of all classes familiar with Mr. Herbert Spencer's theory of life. Life, according to this view, may be said to consist of correspondence with environment; and varies in breadth according as the environment corresponded with is extended, or confined. An animal has, by virtue of its correspondence with a wider environment, more life than a plant; and a highly organized animal has, for the same reason, more life than an animal that is less highly endowed. Every functional organ entails a correspondence with a corresponding portion of environment, and to that extent enlarges the purview of life. The ear confers upon its possessor all the varied sensations produced by sound; a being possessed of ears has, in this direction, more life than a being (such, for instance, as the earth-worm) in which the faculty of hearing is absent.

[1] Luke x. 25.

The eye admits its possessor into a region to which all sightless organisms are dead. The field of sight is a fresh field of life.

Whatever judgment men of Science may pass upon the truth, or the justice, of this view of life, Religion, at all events, can regard it with nothing but favour. For it is her own creature. Two thousand years before Mr. Herbert Spencer had elaborated his grand definitions and generalizations, Religion, with all the artlessness of truth, had evolved from her own inner consciousness a doctrine of life, of which Mr. Spencer's theory is but an echo. "In Him was life; and *the life was the light of men.*" "*Except a man be born again he cannot see* the kingdom of God." No one can read these passages without realizing that the theory that sight is life is one which Religion is entitled to claim as essentially her own. And no one can for a moment compare this theory of Religion with the corresponding theory of Science, without admitting that the two theories are one.

This being so, we have at once a safe and certain guide, by which we may test the truth of Religion's doctrines as to the acquisition of spiritual life. Of the origin of life generally, Science knows little, or nothing; and upon that general question, therefore, she can help us but little, if at all. But of the origin of this special branch of life—sight—she knows much. Here, therefore, her help towards proving, or disproving, the assertions of Religion may be invaluable. Accordingly, our method of enquiry must be the same as before; we must compare the doctrine of Religion with the corresponding theory of Science. How is the life of spiritual sight to be acquired? Religion's answer to this question we have already seen. Trust in Christ is alleged to be the means by which all spiritual life is acquired—"And Jesus, *when He saw their trust* (*in Himself*) said to the sick of the palsy, τέκνον." "*Trust in the Lord Jesus Christ and thou shalt be saved.*" And this alleged method, by which spiritual life in general is said to be

acquired, is also expressly stated to be the one and only method of acquiring that special branch of spiritual life, which is spiritual sight—"While ye have (Christ) the Light, *trust in the Light, that ye may become sons of Light.*"[1] From this curious and highly original doctrine of Religion, turn now to consider the purely scientific question, What are the means by which physical sight has, as a matter of fact, been acquired in the physical world?

[1] John xii. 36.

CHAPTER XXVIII

SIGHT (*continuea*)

"Every hair that is not too long or flexible to convey to its rooted end a strain put upon its free end, is a rudimentary tactual organ; as may be readily proved by touching one of those growing on the back of the hand. . . . We may infer that nascent vision amounts at first to little more than anticipatory touch."—HERBERT SPENCER.

"Ζητεῖν τὸν Θεόν, εἰ ἄρα γε ψηλαφήσειαν αὐτὸν καὶ εὕροιεν."—LUKE.

RECALLING once more our remarks with reference to life—that it consists of correspondence with environment, and varies in degree according as the environment corresponded with is confined, or extended—and accepting Evolution as our guide, we are clearly committed to the conclusion which Science postulates, even if Palæontology does not demonstrate it, that the simplest and lowest forms of life preceded, in point of date, the higher and more complex. Confining our remarks to the animal kingdom, it is obvious that, on the evolutionist's theory, the lowest forms of animal organisms must have come into existence before the higher; the latter have evolved from the former. Nay, we may go still further and say that, allowing for disturbances due to local, or other, causes, the comparative complexity of any animal organism furnishes a rough measure of its comparative antiquity. From the *Protozoa* to the *Vertebrata*, from the Amœba up to Man, antiquity and complexity are related in an inverse ratio. Speaking generally, it is a truth of universal application, that the lower forms of life preceded the higher.

A proposition so fundamental to the whole theory of

Evolution scarcely requires any positive support ; and, indeed, the records of Geology are, as Mr. Spencer has conclusively shown,[1] so misleading as to be but little better than blind leaders of the blind. Still, it is not without interest, at least from the evolutionist's standpoint, to note that, so far as the evidence of Geology goes, it confirms to a very remarkable degree the postulates of the theory.

Among the most ancient undoubted animal organisms that have as yet been discovered must be classed the *Foraminifer*, detected in 1863 in the serpentine limestone of Grenville, and said to be of true Laurentian age. This creature belongs to an order of Rhizopods, which are a class of *Protozoa*, the lowest and least complex sub-kingdom of the Animal Kingdom. Another discovery of animal remains, attributable to the Laurentian age, is a disputed organic form resembling a coral, and said to have been discovered in 1852 in the limestone of Ottawa. This organism, if a true specimen, which has been much doubted, belongs to the class of *Anthozoa*, of the sub-kingdom *Cœlenterata*, which is scarcely higher in point of structure and functional development than the *Protozoa*. Thus, two of the oldest known animal inhabitants of our globe, obviously belong to the lowest divisions of the Animal Kingdom.

Next in point of remoteness are the Palæopyge of Salter, the sea-worms, detected by their burrows and tracks, and the two species of radiated *Zoophytes* called *Oldhamia*, discovered in the Cambrian rocks, and all belonging to the lowest animal sub-kingdoms.

In the Silurian strata representatives of the four invertebrate sub-kingdoms early make their appearance ; while the remaining and highest sub-kingdom, the *Vertebrata*, is represented before the close of the period by the appearance of fish, which, however, are a low order of this sub-kingdom.

Subsequent periods have disclosed, in an approximately regular order, the various classes of vertebrata—Pisces,

[1] See his essay on " Illogical Geology," *Essays*, vol. i. (Library ed.)

Amphibia, Reptilia, Aves, and Mammalia—culminating, in the Tertiary and Quaternary periods, with Man.

It must, of course, be understood that these well-known geological facts are here offered for consideration, only for what they are worth. In point of fact, the value of palæontological evidence, as regarded in its details, is very small. It is, indeed, indisputable that the lessons of Palæontology, taken in their broad outlines, strongly confirm the theory of Evolution as applied to organic beings; there is a general correspondence between the order in which Evolution supposes organisms to have appeared, and the order in which Geology displays them. But we shall fall into serious error, if we attempt to draw particular deductions from the teachings of Geology. The truth is that the geological record is manifestly incomplete. Its most detailed lessons are but fragmentary. It would, for instance, be a great mistake to suppose that the *Foraminifer* discovered in 1863 was necessarily the prevailing type of animal of the Laurentian Era. Indeed, the appearance of such comparatively high organisms as fish in the Silurian deposits warns us against any such conclusion. Yet, as far as it goes, the geological record certainly confirms the theories of Evolution; and we are at least justified in asserting that it is certain, on theoretical, and, as far as the available evidence extends, also on historical, grounds, that the earliest forms of animal life were, in point of complexity, also the lowest.

Now, this is precisely the point in the theory of Evolution which, essential as it is to that theory, yet brings the evolutionist face to face with the gravest of the difficulties which he has to encounter. Those who have not studied the subject of Evolution in its details can have no idea of the stupendous difficulties to which the theory, if accepted in the extreme form in which Mr. Spencer accepts it, commits its votaries. The admission of the theory involves the assumption that the various parts and organs, such as vertebræ,

muscles, liver, lungs, eye, heart, and all the complex organs which distinguish the highest organisms from the lowest, can, in the course of time, have been evolved simply by means of the forces inherent in the organisms themselves. And from this assumption follows the necessity for explanation. If the theory is to be supported, scientists must be prepared to give a reason for the belief that is in them. Starting with the structureless *Protozoa*, and ending with man, Science has, in support of this theory, to explain how the various distinguishing organs have—or, at least, may have—arisen ; and Mr. Spencer, duly recognizing this necessity, has applied himself, with his characteristic and inimitable skill, to the solution of this stupendous problem. With an ingenuity always marvellous in its fecundity, even if not always convincing in its proofs, he has succeeded in assigning a possible cause for the evolution of all the principal organs, with the single exception of the heart. For a spinal column, for vertebræ, for muscles, for liver, for lungs, even for eyes, Mr. Spencer has at least a plausible mode of origin to suggest —a mode of origin based on the assumption that each of these organs is simply the product of internal resistance to external forces, modified and developed by the continuous influence of the struggle for existence. Of these organs we have now to deal with the eye. We have to consider briefly Mr. Spencer's theory of the origin and development of this organ ; and we have then to examine, in the light of that theory, Religion's doctrine relative to the acquisition of spiritual sight.

The question of the origin and development of the eye is to Science at once a very real, and a very pressing, difficulty. Darwin confessed that it was a subject upon which he could never think without a shudder. But it is a problem which imperatively demands a solution. For if the theory of Evolution is to stand, and if the teachings of Palæontology are to go for aught, it is certain that the earliest animal organisms were absolutely eyeless. No symptom of an eye

is to be found in the Laurentian *Foraminifer*. No germ of a visual organ can be detected in the *Oldhamia Antiqua* of the Cambrian rocks. No prophecy of the glorious life of sight can be gathered from these humble and plant-like structures. There is something supremely affecting, yet supremely instructive, in contemplating, from the high standpoint of sight to which mankind has now attained, our beautiful world peopled solely by sightless, eyeless inhabitants, into whose dark lives no visual ray could ever penetrate. And strange, indeed, to turn from this picture, to consider the stupendous change that has been wrought—to contrast the visionless Laurentian with the keen-sighted vertebrate of to-day.

It is worth while to examine these two pictures closely, and to study the cause and nature of the change; for upon the exactness with which we realize both the reality, and the immensity, of that change will depend, to a great extent, the clearness with which we shall grasp the truth of the Bible doctrines of spiritual sight.

Picture, then, our world as it was, when it was inhabited solely by beings who "walked in darkness and had no light"; who, being in a world of light, yet groped out their lives in perpetual night; creatures upon whom the light shined in vain; whose highest achievements and noblest aims were literally "works of darkness." Picture this; and then imagine that some Great Teacher had viewed with sorrow the blind apathy, which thus ignored the glorious sights around. Imagine that such a Teacher had seen and pitied; and, moved by divine compassion, had condescended to stoop to their lowly estate with a message from on high. He preaches to them that their blind lives are poor and worthless; that in following them they are entirely missing the highest objects of their existence; that close beside them, though they know it not, lies a world into which they have never penetrated, and of the beauties of which they have never dreamed. And he teaches them new, strange words

—unsearchable, and past finding out; of light and darkness, of blindness and sight—names which they knew not; and he bids them lay aside the works of darkness, and strive to attain to this new and higher life—the life of sight. And thus he tempers his high doctrines to their lowly capacities, teaching, with easy words and simple allegories, of the mighty gulf which divides the children of darkness from the children of light.

Imagine—or, rather, realize—all this. For it is sober truth—a truth which we have from the lips of Science. Long ages ago, such a Messenger *was* sent; such a message *was* given and received. For Evolution tells us that the eye was not suddenly made, but was slowly evolved. To those lowly, sightless organisms there did in truth descend from on high such a heaven-born Teacher. In the guise of instinct, and with the voice of God, he taught of the steep and narrow way which leads from darkness up to light. And this was the lesson which he taught:—that every individual had within him, though he knew it not, a faculty which, if rightly exercised, would in time open up this new and glorious power; but which, if neglected, would leave him condemned to perpetual night; that then (as now) the life of darkness was easy, the pathway up to light hard and difficult; that the dead life of darkness would be the fate of the many, the attainment of sight the prize of the few. Alas! that lesson is for all time:—

"Facilis descensus Averno;
Noctes atque dies patet atri janua Ditis;
Sed revocare gradum, superasque evadere ad auras,
Hoc opus, hic labor, est. Pauci, quos æquus amavit
Jupiter, aut ardens evexit ad æthera virtus,
Dis geniti potuere."[1]

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[1] Virgil, *Æneid*, Book VI., ll. 126–131.

"The journey down to the abyss
Is prosperous and light:
The palace-gates of gloomy Dis
Stand open day and night:

"Dis geniti!"—"Ye must be born from above."[1] How near of kin is the Poet to the Divine! Indeed, the whole passage is little less than a prophetic echo of the saddest of all Christ's warnings. Compare the "facilis descensus Averno," the "patet atri janua Ditis," of Virgil, with Christ's "Wide is the gate, and broad is the way, that leadeth to destruction; and many there be which go in thereat." And Virgil himself lends a touch of curious completeness to the identity of the two passages, when he closes with his melancholy "pauci potuere":—"Because strait is the gate, and narrow is the way which leadeth unto life, and *few there be that find it.*"[2]

And now, what was the hidden faculty, the exercise of which was to convert the sightless Laurentian into the keen-sighted vertebrate of to-day? Turn to Mr. Herbert Spencer for an explanation as to how the great work of conversion was wrought out.

Amongst the many startling discoveries of Modern Science, one of the most striking is that which has disclosed the marvellous effects which Evolution has wrought upon what Scientists call "dermal structures." It will come as a surprise to many to be told that hairs, feathers, quills, and scales are all homologous organs; that all these appendages, now so different, have emanated from one and the same source—a simple excretion of horny matter from the skin; and that it has depended entirely upon the environment in which each species of organism has lived, whether that excretion has turned into the hairy coat of the dog, the feathers of

> But upward to retrace the way
> And pass into the light of day,
> There comes the stress of labour; this
> May task a hero's might.
> A few, whom Heaven has marked for love,
> Or glowing worth has throned above,
> Themselves of seed divine conceived,
> The desperate venture have achieved."
>
> Conington's Translation.

[1] John iii. 7.

[2] Matt. vii. 13, 14.

the pheasant, the quills of the porcupine, or the scales of the fish.

Nor does this community of origin stop here. It is extended by Professor Huxley to the teeth of all vertebrates. "It appears to me indubitable," writes Professor Huxley, quoted by Mr. Herbert Spencer,[1] "that the teeth and the hairs are homologous organs!"

But even this strange discovery pales into insignificance beside the far more wonderful discovery of the origin of the eye. That the eye, like the teeth, is nothing more nor less than a highly developed hair seems at first sight incredible. Yet this "seemingly incredible proposition" Science now gravely asserts.

In order to justify this proposition Science has to explain how the eye originated; and she replies that a simple hair has, by constant use and practice, under suitable conditions of environment, developed into the perfect eye. We have clear indications of how this development has arisen. The steps are shortly these. The smooth amœboid develops spines or hairs. These, sooner or later, come to be used as tactual organs, for discovering the presence of objects while at a slight distance from the organism. Up to this point these tactual organs are simply *feelers*, conveying to the brain of the organism, by means of actual contact with any foreign body, impressions relative thereto. By constant use and exercise, these tactual organs become gradually more and more impressionable and sensitive; until at length, after long ages of modification and development, they become impressionable to the ethereal vibrations which constitute light, and develop into the perfect eye.

To the question, What are the reasons upon which this wonderful theory is based, Science replies that, not only are there traces in intermediate organs of the process which has led to the development of a hair into an eye, but that the eye is, in respect of the rudiments of its structure and

[1] *Principles of Biology*, vol. ii. p. 300 (1884 ed.).

development, identical with the structure and development of the root of a hair.

"The ultimate justification for classing these unlike parts as divergent modifications of the same thing, is the unity in their modes of development. Besides a linking together of them by intermediate structures, there is a linking together by their common origin."[1]

In order to appreciate the force of this statement, it is necessary to understand something of the origin and nature of the structure of a hair. The following is Mr. Herbert Spencer's theory on this subject :—

"Suppose a small pit to be formed on the previously flat skin ; and suppose that the growth and casting off of horny cells, which goes on over the skin in general, continues to go on at the usual rate over the depressed surface of this pit. Clearly, the quantity of horny matter produced within this hollow, will be greater than that produced on a level portion of the skin subtending an equal area of the animal's outside. Suppose such a pit to be deepened until it becomes a small sac. If the exfoliation goes on as before, the result will be that the horny matter, expelled, as it must be, through the mouth of the sac, which now bears a small proportion to the internal surface of the sac, will be large in quantity compared with that exfoliated from a portion of the skin equal in area to the mouth of the sac : there will be a conspicuous thrusting forth of horny matter. Suppose once more that the sac, instead of remaining simple, has its bottom pushed up into its interior, like the bottom of a beer-bottle—the introversion being carried so far that the introverted part reaches nearly to the external opening, and leaves scarcely any space between the introverted part and the walls of the sac. It is easy to see that the exfoliation continuing from the surface of the introverted part as well as from the inside of the sac generally, the horny matter cast off will form a double layer ; and will come out of the sac in the shape of a tube, having within its lower end the introverted part, as the core on which it is moulded, and from the apex of which is cast off the substance filling, less densely, its interior. The structure resulting will be what we know as a hair."

From the mode of origin of a hair, Mr. Herbert Spencer passes to the development of a hair as a tactual organ as follows :—

"Every hair that is not too long or flexible to convey to its rooted end a strain put upon its free end, is a rudimentary tactual organ ; as may be readily proved by touching one of those growing on the back of the hand. If, then, a creature has certain hairs so placed that they are habitually touched by the objects with which it deals, or amid

[1] *Principles of Biology*, vol. ii. pp. 300 (1884 ed.).

which it moves, an advantage is likely to accrue if these hairs are modified in a way that enables them the better to transmit the impressions derived. Such modified hairs we have in the *vibrissæ*, or, as they are commonly called, the "whiskers" possessed by Cats and feline animals generally, as well as by Seals and many Rodents. These hairs are long enough to reach objects at considerable distances; they are so stiff that forces applied to their free ends, cause movements of their imbedded ends; and the sacs containing their imbedded ends being well covered with nerve-fibres, these developed hairs serve as instruments of exploration. By constant use of them the animal learns to judge of the relative positions of objects past which, or towards which, it is moving. When stealthily approaching prey or stealthily escaping enemies, such aids to perception are obviously important: indeed, their importance has been proved by the diminished power of self-guidance in the dark, that results from cutting them off. These, then, are dermal appendages originally serving the purpose of clothing, but afterwards differentiated into sense-organs."

Turning then to the subject of the eye, he thus writes :—

"That eyes are essentially dermal structures seems scarcely conceivable. Yet an examination of their rudimentary types, and of their genesis in creatures that have them well developed, shows us that they really arise by successive modifications of the double layer composing the integument. They make their first appearance among the simpler animals as specks of pigment, covered by portions of epidermis slightly convex and a little more transparent than that around it. Here their fundamental community of structure with the skin is easy to trace; and the formation of them by differentiation of it presents no difficulty. Not so far in advance of these as much to obscure the relationship, are the eyes which the Crustaceans possess. In every fishmonger's shop we may see that the eyes of a Lobster are carried on pedicles; and when the Lobster casts its shell, the outer coat of each eye, being continuous with the epidermis of its pedicle, is thrown off along with the rest of the exo-skeleton. This pedicle, which gives the name of "stalk-eyed" Crustacea to a large group, is, strange as it may seem, a transformed limb. Otherwise shown by the homologies of the parts, the truth is made manifest by those transitional cases in which the original form of the limb is retained, and the transparent portion which serves as a visual organ is merely a prominent patch on its under surface, somewhat like a blister, spreading a little up the sides of the limb—an arrangement almost thrusting upon us the suspicion that an eye is a modified portion of the skin."

Mr. Spencer then proceeds to show that "that which the outer appearance suggests is proved by the structure within," and finally comes to the conclusion that—

"marvellous as the fact appears, *all that part of the eye which lies between its outer surface and the back of the crystalline lens, is formed in the same way as an ordinary hair-sac, and is composed of homologous parts.* . . . The eye considered as an optical apparatus is wholly

produced by metamorphoses of the skin : the only parts of it not thus produced, being the membranes lying between the sclerotic and the vitreous humour, including those retinal structures formed in them. All is tegumentary save that which has to appreciate the impressions which the modified integument concentrates upon it."[1]

Having thus briefly traced the nature of the structure and mode of development of the eye, observe what are the irresistible conclusions which Evolution thrusts upon us, as to the history of that development. These have already been glanced at. Starting with a creature possessing none of the organs of sense—nothing but a skin, having the function (which all skin possesses, more or less) of excreting a horny substance, the first stage in the history consisted of the formation of that horny substance into a hair, which in process of time developed into a tactual organ of sensation. Now, it is obvious that, in the struggle for existence everywhere in progress, those organisms in which this vibrissa-like appendage became more highly developed—whether by increase of length, so as to transmit impressions from objects at a greater distance, or by increased sensitiveness, so as to convey truer and more reliable impressions—would gain an advantage over organisms less highly endowed in this respect, in regard to both the two great divisions of labour into which the struggle for existence divides itself, namely, the acquisition of food, and the escape from enemies. Hence the law of Natural Selection compels us to conclude that, in process of time, this rudimentary tactual organ must inevitably have developed into a state of greatly improved functional efficiency.

Not less obvious is it that, when the tactual organ had developed into a high state of efficiency, the impressions which it must have conveyed to the brain of its possessor must have been similar in kind—however inferior in degree—to the impressions now conveyed by the developed organ of sight. The highly sensitive vibrissa of an eyeless organism,

[1] *Principles of Biology*, vol. ii. pp. 301–5 (1884 ed.).

upon coming into contact with some foreign body—say, for instance, a stone—must have transmitted to the brain of the organism definite ideas as to the distance, the position, the shape, and (so far as it lay within reach) the size of the foreign body; and as the sensitiveness of the organ increased, some idea of the substance, and the texture of the object must, in course of time, have been transmitted.

Now, the difference between such an organ and the incipient eye is a difference only of degree. The eye, no less than the vibrissa, is in fact a tactual, or, at least, an impactual, organ. The transmission of light is, as we have seen, nothing but a succession of ethereal waves set in motion by molecular movements; and sight is nothing but the impression conveyed to the brain, by the beating of these ethereal waves upon the organ of vision. In either case the sensation transmitted to the brain is produced by impact—in the one case, the impact of the foreign body itself, upon coming into contact with the vibrissa; in the other, the impact of the ethereal waves, beating against the eye. How closely allied the two organs are, and how naturally their respective functions run into one another, is clearly propounded by Mr. Herbert Spencer:—

"The contrast between light and darkness, or rather between widely different degrees of light, being all that the most rudimentary vision recognizes; and distinct obscuration being producible by an adjacent small object only when it is very close; we may infer that nascent vision extends to those objects alone which are just about to touch the organism, either in consequence of their motion or of its motion. *We may infer that it amounts at first to little more than anticipatory touch.*"[1]

Clearly, the two organs are closely allied, as is shown, not only by the fact that they are structurally related, but also by the further fact, that their respective functional activities are aroused by impacts, which are similar in kind, and differ only in degree.

But while the two organs are thus intimately connected

[1] *Principles of Psychology*, vol. i. p. 315 (4th ed.).

by virtue of a common ancestry, the difference of the environment to which either has been subjected has produced a divergence of structure, sufficient to obliterate beyond recognition, except to the keen eye of Science, all traces of their original relationship. Let us briefly trace the causes which have produced this enormous divergence.

If we examine the face of a cat, we shall observe that the respective positions occupied by its vibrissæ, and its eyes, differ in two important respects. In the first place, while its vibrissæ are attached to the anterior portion of its face, the eyes occupy a relatively posterior position. And, secondly, while the vibrissæ grow from that part of the face which is habitually directed towards the ground, the eyes are situated in the upper part of the head, where they are habitually turned more towards the sky. It is easy to show that to these two differences of location the enormous difference between a vibrissa and an eye is directly traceable.

We have seen that both these organs, now so immeasurably unlike, are the direct descendants of a common ancestor—that either was originally a simple horny excretion of the skin, taking the form of a hair. We have seen, too, that by virtue of the plexus of nerve centres, surrounding the imbedded end of this rudimentary hair, it constituted a rudimentary sense organ. Suppose, now, an animal, possessing two of these rudimentary sense organs, situated, the one at the anterior part of its head, and directed towards the ground, and the other on a posterior part of its head, and directed upwards. Observe the differences in the conditions and constitutions of these two organs, to which these two differences of location must, in time, inevitably give rise.

In the first place, there will necessarily be a difference of activity. The anterior organ, from the prominence of its position, will unavoidably be brought actively into contact with the foreign bodies among which the organism moves. It will inevitably be constantly employed as a feeler, for the

purpose of exploring surrounding objects; and will thus be kept in a condition of continual activity. On the other hand, the posterior organ will, from the necessities of its position, be incapable of being so employed. However useful it may ultimately become as an eye, for the purposes of a feeler it will be of comparatively little value. It will be but little exercised in that capacity. And thus the first difference of condition, to which the difference of situation will necessarily give rise, will be a marked difference in the respective activities of the two organs. The history of the vibrissa will be that of continual *activity*. The condition of the eye, *in the early stages of its development*, will be a condition of *passivity*.

Note, next, that the prominent and downward position occupied by the vibrissa, coupled with the active uses to which it was put, rendered it impossible that it should be kept clean. As long as it was habitually employed in groping about for food in the mud and slime at the bottom of a river, or the grit and sand at the bottom of the sea—one or other of which may be safely accepted as the probable habitat of the earliest eye-developing beings—the organ must have been constantly contaminated with the terrestrial matter, with which it was continually being brought into contact. Under such conditions it must have been a physical impossibility to ensure that purity of the organ which is essential to sight, and the all-importance of which, for the purpose of vision, is conclusively demonstrated by the elaborate contrivance for ensuring its maintenance, which is found appended to all highly evolved eyes of land-animals. On the other hand, the relatively posterior and superior position occupied by the rudimentary eye, ensured its comparative immunity from contamination with terrestrial bodies. Its location must have maintained it in a condition of comparative *purity*.

In the third place, this difference of position, with its resulting differences of condition, must, in course of time, have effected a radical difference of constitution in the two organs.

In the case of the vibrissa every impact with surrounding foreign bodies, coupled with the resulting condition of impurity to which such impacts necessarily gave rise, must have had a tendency to produce a corresponding *callosity* in the organ itself. Callosity is defined by the lexicographers as "a hardening and thickening of the skin as a result of continued pressure or friction"; and it is obviously a state of molecular constitution, which would preclude altogether that refined delicacy of susceptibility, which is a necessary ingredient in the molecular constitution of an organ of vision.

On the other hand, while the vibrissa was, in consequence of its environing conditions, continually undergoing this hardening process, so fatal to molecular mobility, the environing conditions of the rudimentary eye were such as to induce in it the very opposite result. For not only did it, by virtue both of its passivity and of its immunity from frictional contact with surrounding impurities, retain its original molecular mobility, but, in consequence of the more elevated position which it occupied, it was continually subjected to the direct action of the light. The ethereal waves, of which the Solar rays are constituted, beating down upon its mobile and susceptible surface, kept its molecules in a constant state of molecular agitation; and, under this benign influence, its molecular constitution grew gradually more and more impressionable to these ethereal vibrations, to which the constantly increasing callosity of the vibrissa rendered that organ more and more obdurate. By this means was gradually developed in the rudimentary eye that constitutional mobility which, in time, rendered its molecules capable of moving in synchronism with the ethereal pulsations by which they were continually being agitated; and these molecular motions, being communicated by its molecules to the nerve plexus in which the rudimentary eye was imbedded, travelled thence, along the afferent nerve, to the sensorium; and, being there translated into consciousness, aroused in the organism the rudimentary sensation of sight.

Such, in briefest outline, is the history of physical sight, as deciphered by modern science. The key to that history lies in the close relationship which exists between sight and touch—lies in the fact that the eye is a real, though distant, cousin of the feeler. That these two organs, now so immeasurably different, are nevertheless homologous, and were originally identical, organs, is an article of belief to which Science to-day stands fully committed. That, in spite of the immense gulf which now separates them, there was a time when their respective ancestors were absolutely indistinguishable, must be accepted as one of the most certain of facts. And that all those differences, which are now so marked, between the two organs, as they exist at the present time, are due solely to a difference of environment, is a fact upon which modern science positively insists. With an interchange of conditions, an interchange of organs would have resulted. Had the rudimentary vibrissa been subjected to the conditions which have developed the eye, the vibrissa itself would have developed into a true eye. And, conversely, if the eye had originally and continuously been exposed to the environing forces which have evolved the vibrissa, its development as an organ of sight would have been arrested, and it, in its turn, would have become and remained a vibrissa.

And, finally, the scientist assures us that such an interchange of development is not merely problematical, but certain. It is a necessary result of biological law. Any given change in the environing forces operating on an organ *must inevitably* produce a corresponding change in the organ itself. For the organ is simply the product of the organism's internal resistances to the external forces by which it is environed.

When from these nineteenth-century pronouncements of Science we turn to Religion's two-thousand-year-old doctrines, as to the method in which spiritual sight is to be acquired, it is of immense interest to find that Religion declares that that method is precisely identical with the method of sight-

development which we have just been tracing in the physical sphere. For not only does Religion allege that spiritual man possesses an organ which is capable, when subjected to the suitable conditions, of acquiring the faculty of spiritual sight; but she also declares that the self-same organ, if subjected to a different set of conditions, will, like its physical homologue, develop into an organ of touch. And, further, that it depends entirely upon the nature of the conditions to which it is subjected, along which of these two lines it will develop. In the one case it will inevitably evolve into an *eye*; in the other, into a *feeler*.

Further than this, the conditions which Religion lays down as determining these two diverging lines of development, and the resulting differences of constitution of the organ itself, which she asserts will inevitably result therefrom, are so exactly—indeed, so curiously—identical with their physical homologues, as to defy explanation, except on the assumption of the reality of the phenomena which she describes. Let us verify these statements.

The first step to be taken for this purpose is to identify the organ which, according to Religion, is capable of developing into the spiritual eye—the organ by means of which man is capable of rising into that new and highest field of life, which lies in the exercise of the faculty of spiritual sight.

Where in man shall we look for such a faculty as this? In what high part of his anatomy can this mysterious tenant dwell? It must be his most living part; for its function is to correspond with the "Living God." It must be a spiritual part; for "God is a Spirit." It must be the touchstone of sympathy and affection; for "God is love." Where, then, shall we seek this transcendent organ, whose correspondences are with Spirit, Life, and Love?

We turn to Christ for an answer, and He tells us in His own exquisite words:—

"Blessed are the pure in *heart*, for they *shall see* God."

There is a profundity of truth in this dictum, well deserving a moment's examination. Consider the conditions which Religion attributes to the heart of every man, who has acquired that correspondence with the spiritual world, by virtue of which he is said to be "at peace with God." Its cradle, the throne of life; its nursery, the "chamber whose name is Peace"[1]; mercy and loving-kindness, its thoughts; goodness and truth, its boon-companions; its school, the palæstra of wisdom and judgment; its playground, the garden of love. This—if any—is the faculty we seek; in the heart—if anywhere—is its seat. Intellect fails us here. Thought bows before a superior power. In the wakening sunbeams of "Celestial Love" knowledge, like the glow-worm's lamp, "pales her uneffectual fires."

We need not trouble ourselves here with nice discriminations between the parts which are played by the brain and the heart respectively in the evolution of the affections. True though it may be that, from the physiological point of view, Professor Huxley was perfectly correct in pointing out that "the seat of the passions is not (as many suppose) the heart, but the brain,"[2] the fact remains that the heart is intimately connected with, and plays a prominent—indeed, from the practical point of view, the principal—part in connection with the passions. In the words of Descartes, cited by the Professor—

"The opinion of those who think that the soul receives its passions in the heart, is of no weight, for it is based upon the fact that the passions cause a change to be felt in that organ; and it is easy to see that this change is felt, as if it were in the heart, only by the intermediation of a little nerve which descends from the brain to it; just as pain is felt, as if it were in the foot, by the intermediation of the nerves of the foot; and the stars are perceived, as if they were in the heavens, by the intermediation of their light and of the optic nerves. So that it is no more necessary for the soul to exert its functions immediately in the heart, to feel its passions there, than it is necessary that it should be in the heavens to see the stars there."[3]

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[1] "The pilgrim they laid in a large upper chamber, whose window opened towards the sun-rising: the name of the chamber was Peace." —Bunyan's *Pilgrim's Progress*.

[2] *Science and Culture*, p. 204 (1881 ed.).

[3] *Ibid.*

Just so. But for all that, the effect will, for all practical purposes, be exactly the same as if the eye (by which the stars are seen) were actually the seat of sight; or the foot (by which the pain is felt) were actually the seat of the pain. He who desires to see the stars will do so best, not by exercising his brains upon the theory of optics, but by applying a telescope to his eye. He who would win the race, will best attain his object, not by expending his intellectual energies in the study of the laws of motion, but by training his limbs in the palæstra and on the running-path. And in precisely the same way, and for precisely the same reason, if we would see the God of love, our only chance of success lies, not in the performance of intellectual feats, or mental achievements, but in cultivating the faculties of that organ, by which alone love is *felt*—by allowing full play, not to the brain, generally, but to that "little nerve which descends from the brain to the heart."

Here, then, are the factors of spiritual sight, placed side by side with their physical homologues :—

God	the Fountain of light;
The word of God .	the light itself;
Christ . . .	the ethereal medium between the light-giver and the light-receiver;
The heart . . .	the rudimentary organ of sight;
Trust in Christ . .	the method of sight-evolution.

Our problem is to demonstrate, from these factors, the identity of the Bible doctrine of the development of spiritual sight, with the scientific theory of the evolution of physical sight.

The first correspondence to be noted, lies in the fact that, like its physical homologue, the organ of spiritual sight is represented as being in an entirely rudimentary condition.

This proposition is contained in the words of Christ already cited—

"Blessed are the pure in heart, for they *shall see* God."

Not "can see." Spiritual sight is not for to-day. However closely we may comply with the conditions which Religion prescribes, and which Science so fully endorses, as being necessary for the attainment of sight, that transcendent faculty must still remain a thing of the future. A glance at the history of the acquisition of physical sight ought to satisfy us, that the acquirement of so superlative a faculty as spiritual sight must be the work, not of years, but of ages. At the very best, we cannot hope, in the brief span of mundane existence, to acquire more than that "nascent vision which amounts to little more than anticipatory touch"—we must be content for the present to "see through a glass darkly." Indeed, the change of tense which Christ's words introduce possesses a profound scientific propriety. "Blessed *are* the pure in heart, for they *shall see*." Though vision is a thing of the future, the blessing is none the less real now ; for purity of heart contains the *promise* of sight. By the inexorable law of Evolution, the faculty of sight, not may, but will, follow upon obedience to the prescribed conditions. Twenty million years ago, it might have been truly said of the blind Silurian that "the pure in eye *shall see* the Sun." And for exactly the same reason, and to at least the same extent, it is, and must be, true to-day that "the pure in heart shall see God."

Note, next, that, as is actually the case in the physical sphere, so in the spiritual sphere it is represented that the rudimentary sense-organ which is capable, when subjected to the requisite conditions, of developing into an eye, will, if those conditions are not complied with, evolve, not into an eye, but into a *feeler*. In support of this proposition turn to Acts xvii. 27—"that they should seek God by the vain attempt to *feel after* Him and find Him, though He

is not far from each one of us." Paul is preaching to the men of Athens. He is pointing out to them how they are to find that "Unknown God" whom they had hitherto "worshipped in ignorance." He tells them that the reason of that ignorance—the reason why they had hitherto failed to find God—was that they had fallen into the most natural of errors; an error, indeed, so natural, that, in the absence of revelation, all nations on earth had fallen into it. Recognizing, and rightly recognizing, that God is close beside each one of us, they had, from this true premise, deduced the false conclusion that they could "find Him *by feeling after Him*"; they had set themselves the vain task of attempting to find God by means of a *feeler* (*ζητεῖν τὸν Θεόν, εἰ ἄρα γε*[1] *ψηλαφήσειαν αὐτὸν καὶ εὕροιεν*). Why "vain attempt"? Why, if God be so near to us, should not a "feeler" be the proper sense-organ by which to find Him? What was the element of error which, after all their well-intentioned, though misdirected, efforts, left even the "religious" Athenians committed to that melancholy confession of failure, which found its utterance in the altar "To The Unknown God"? The answer to these questions is to be found in the word *ψηλαφάω*. It would be difficult to exaggerate the scientific propriety of this term. Its literal meaning is "to grope in the dark"; "to guide one's steps *by feeling, and not by sight*"; "to search *with a feeler*, instead of with the eye." Obviously, this word exactly expresses the condition and the attitude of the blind Silurian in the physical world. It is the old story of the vibrissa, transferred, however, this time, from the physical into the spiritual sphere. Observe how exactly the illustration fits. Paul's argument is this: Hitherto (prior to the coming of Christ, the great luminiferous Medium between God and man) mankind (like the blind Silurian) has been groping in the

[1] It is probably scarcely necessary to mention that these highly idiomatic words (*εἰ ἄρα γε ψηλαφήσειαν*) imply that the search would not be successful.

dark, in the vain attempt to find the God of Light by means of a feeler. But the attempt has been vain, because a feeler is an organ which, by its conditions and constitution, is unimpressionable to the impact of the luminous rays. This obtuseness to spiritual light God has hitherto overlooked (*ὑπεριδὼν*), because, in the absence of a medium between the Light-giver and the light-receiver, it has been unavoidable. But now that Christ, the luminiferous Medium, has come, there is no longer excuse for thus groping in the dark; for now the light is accessible to all. Henceforth we must lay aside the futile attempt to find the God of Light by means of a feeler; we must seek Him with the only appropriate organ—the organ of sight.

What, now, are the necessary conditions which Religion prescribes for the development of this new organ? How is it to be differentiated from that organ which is useless for the purpose of finding God—the organ of touch? The identity of these conditions with those which we have traced in the physical sphere is curiously exact. First and foremost there must be a change of position in the organ itself. It must no longer be directed downwards, to the contaminating influences of the world, but upwards to the ennobling influences of heaven. We must "*set our affections on things above, not on the things that are upon the earth*" (*τὰ ἄνω φρονεῖτε, μὴ τὰ ἐπὶ τῆς γῆς*).[1] And this elevation of our affections will be accompanied by a corresponding elevation of our hearts; for "where our treasure is, there will our hearts be also."[2]

Now, it is self-evident that this change of position, which Religion demands for the development of the rudimentary organ of spiritual sight, exactly corresponds with that difference of position to which, as we have seen, Science wholly attributes the differentiation of the physical eye from the vibrissa. In either case it is looking up, as opposed to looking down. And this looking up, to which Science attaches such supreme importance, that to it, as we have seen,

[1] Col. iii 2. [2] Matt. vi. 21.

she directly traces all those differentiations of condition and constitution which have produced the faculty of vision, as opposed to the more obtuse faculty of touch, is regarded also by Religion as self-sufficient for the development of the corresponding faculty in the spiritual sphere. Grant but this one condition, and Salvation, which, in the vocabulary of Religion, is a synonym for spiritual sight, will inevitably follow—"*Look unto Me and be ye saved.*" [1]

But the completeness of the homology by no means ends here. For not only do Religion and Science exactly agree as to this one and only condition, as being of itself both necessary and sufficient in order to the acquisition of sight ; but the several steps, by which this all-sufficing cause is connected with its resulting product, are in either case identical. In the first place, we saw that, in the physical sphere, this difference of position necessarily produced a corresponding difference as regards *purity*. While the down-turned organ was inevitably contaminated by, or, at least, brought into continual contact with, surrounding objects, the up-turned organ remained comparatively pure. And is not this precisely the next condition postulated by Religion ? " Blessed are the *pure in heart*, for they shall see God." In order to realize to the full extent the exact identity of the two positions, turn to a Greek lexicon, and note the primary and natural meanings of καθαρός, which is here rendered " pure." Those meanings are two ; and they are these : first (as opposed to ῥυπαρός, " foul "), it means " clear of dirt " ; and secondly (as opposed to πλήρης, " full ") it signifies " clear of objects." This second meaning, which, by the way, is also the natural and original meaning of the word " pure," [2] especially emphasizes its scientific propriety as used by Christ ; and directly introduces the next point of correspondence to be here noted.

We have seen that, in the physical sphere, the contact with surrounding objects, to which the tactual organ was continually

[1] Isa. xlv. 22.
[2] " Separate from all extraneous matter."

subjected, produced in that organ a "callosity," or hardening, which was fatal to the development of sight, and from which the rudimentary eye was free. Now, it is obvious that this hardening was produced, not necessarily by any impure or contaminating properties which the objects touched possessed. The callosity was simply the effect of "continued pressure or friction." No matter how innocent in themselves the surrounding earthly objects might be, the friction produced by constant contact with them would inevitably lead to the same result. A hardening, fatal to sight, was the unavoidable fate of any organ which had its conversation with "the things that are upon the earth," instead of "the things above." And is not this, again, exactly the state of things against which Religion so persistently warns her disciples? The condition of all others to be avoided, is a "hardening of the heart"—a hardening of that organ, which, if kept "clear of objects" (*καθαρός*), will develop into an eye. "This I say, therefore, and testify in the Lord, that ye no longer walk as the Gentiles also walk (who, as we saw, are 'groping in the dark,' *ψηλαφῶσι*), . . . *being darkened in their understanding, alienated from the life of God*, because of *the want of perception* (*ἄγνοιαν*) that is in them, *because of the hardening of their heart*."[1] Here the word *πώρωσις*, which is translated "hardening," exactly expresses that condition of being hard and unimpressionable, which we have just discussed. It is simply the theological equivalent of what Science terms "callosity." And *ἄγνοια* ("want of perception") exactly expresses that molecular immobility which necessarily results from "callosity." The text, in fact, explicitly alleges that, in the spiritual sphere, this "*hardening* of the heart" is fatal to spiritual vision, because it produces a "want of perception," which causes a "*darkening* of the perceptive faculty," which, again, results in an "alienation" from that "life of God" which, as we have seen, is "the light of men."

Thus, according to Religion, as well as to Science, if we

[1] Eph. iv. 18.

would acquire the faculty of spiritual sight, heart-contact with worldly objects must be avoided ; not necessarily because those objects are wrong or injurious in themselves, but because constant contact with them produces a hardening of the heart, which must necessarily arrest its development as an organ of vision. "Set your affection on the things that are above, not on the things that are upon the earth." "Love not the world, neither the things that are in the world. If any man love the world, the love of the Father is not in him."[1]

And, lastly, Religion's central doctrine of Trust in Christ is exactly paralleled by the scientific theory which we are discussing. Already we have seen that Religion represents that Christ performs in the spiritual sphere all the functions which, in the physical sphere, are exercised by the ethereal medium ; and chief among those functions is that of acting as the vehicle of light from the light-giver to the light-receiver. We have seen, too, that the elevated position of the rudimentary eye, gives it the advantage that, besides avoiding continual contact with earthly objects, it is placed in the very best attitude for receiving the direct impacts of the ethereal vibrations. Not only does it, by virtue of its upward tendency, escape the numbing effects of callosity ; but, from being continually subjected to the mobilizing influence of the waves of ether that beat upon it, it gradually acquires that molecular mobility, which in time enables it to move in synchronism with the heavenly impulses by which it is agitated. And here, in the spiritual sphere, is the exact counterpart of this subtle phenomenon. The heart that is set upon the things that are above, not only avoids the hardening effect produced by continual contact with the things that are upon the earth ; but, by being continually subjected to the influence of Christ, it gradually, but surely, acquires the constitutional capacity for responding to the motions of those heaven-born impacts, which, emanating from God, the Fountain of spiritual light, are conveyed to man by the "one Mediator between

[1] 1 John ii. 15.

God and men, Himself man, Christ Jesus."[1] This, to-day, is the secret of spiritual vision, just as, twenty million years ago, it was the secret of physical vision. All that is required is synchronism—the synchronism of obedience. There it was synchronism with the impulses of the ethereal medium; here it is synchronism with the impulses of the heavenly Mediator. This is the process so persistently, and so scientifically, enjoined by Religion. Spiritual sight is to be acquired to-day by a method exactly homologous with that by which physical sight was acquired then—by the simple, yet infallible, process of "looking unto Jesus."[2]

And this brings us in sight of the last homology to be here noted—that, as in the physical sphere, so in the spiritual, the first stages in the development of sight require an attitude of simple passivity. This, indeed, is a point around which one of the fiercest of Religion's many internecine conflicts has been persistently waged. Throughout the two thousand years of Christianity, the theological world has, upon this point, been rent into two hostile, and absolutely irreconcilable, divisions. The one, relying upon such well-known texts as "Trust in the Lord Jesus Christ and thou shalt be saved," maintains that spiritual life is to be acquired by the simple process of Trust in Christ. The other, basing its opinion, partly on a sort of general philosophy of common-sense probabilities, and partly on a particular passage in the Epistle of James—"What doth it profit, my brethren, if a man say he hath trust, but have not works? Can that trust save him?"[3]—contend that spiritual life can only be acquired by "works." The one school, in fact, preaches a doctrine of passivity; the other, a doctrine of activity.

Considering that the question involved in this great controversy lies at the very foundation and starting point of the Christian religion—is, from Religion's point of view, of more practical moment than any other question whatever;

[1] 1 Tim. ii. 5. [2] Heb. xii. 2.
[3] James ii. 14.

indeed, than all other questions put together—it cannot be without interest to enquire into which of the two scales the authority of Science will be thrown. And it is, surely, a matter of the deepest practical significance to find that the verdict of Science, while absolutely endorsing the doctrine of passivity, confirms also the doctrine of activity—but with one all-important qualification, which brings the words of James into complete harmony, not only with Science, but also with the rival theological doctrine.

The truth is that in the evolution of sight there are two distinct stages, which, though at certain points they merge indistinguishably into one another, must, nevertheless, for critical purposes, be carefully distinguished. The first is the initial stage, during which the requisite molecular synchronism is being acquired. The second is the subsequent development and improvement of vision, after this primary molecular mobility has been attained. Now, it is obvious that, at the initial stage, the first acquisition of the required molecular mobility could only be attained by an attitude of passivity. Any active employment of the organ upon surrounding objects must have tended to produce a condition of callosity fatal to the development of vision. The first distinction between the future vibrissa and the future eye was solely due to this difference of activity. This was the point of departure. Here was the dividing of the ways. The organ that was brought into active contact with "the things that are upon the earth," by the very exercise of this activity, hardened and developed into a sightless feeler. But the organ which, in placid quiescence, was subjected to the ethereal impulses that are "from above," gradually acquired, by the simple and passive process of *receptivity*, the requisite molecular constitution. Hour by hour, and day by day, its constitution was moulded into the required mobility, by the tiny impacts of the luminiferous medium that beat upon it; until, at length, the sensory nerve itself became agitated by the heaven-born impulses, and "nascent vision" was the result.

But when once this grand achievement had been effected, when this initial stage had been passed, the position at once became altered. For the higher development of vision, activity was required. To the lowly organism, endowed with these two rudimentary organs, a stupendous choice was presented. Either it might continue to rely, for its guidance and its pursuits, upon its humble organ of touch; or it might rise to the nobler, but infinitely more difficult, task of developing its awakening organ of sight. And how, as a matter of fact, was this development achieved? Mark the answer to this question. It was by *Trust*. This is not a mere straining of words. It is a scientific verity. Every organ requires for its development that it should be *used*; and if it is to develop to any high degree of perfection, it must be constantly and keenly used. And use and trust are inseparables. The exercise of the one simultaneously generates the other. Trust and use, organ and function—these are mutual interdependents. Given a rudimentary organism, exercising rudimentary functions, and no study is so perplexing as to contemplate, in the gradual development of organ and function, the influence which either exercises upon the other. No question is so hopelessly unanswerable, as that which enquires which is the cause, and which the effect. Their inter-relations are such as can only be stated in terms of causal reciprocity.

To take a familiar instance, a public speaker who, distrusting his unaided memory, takes with him into the lecture-room a written *précis* of the principal points which he intends to introduce into his speech, is said to *rely upon* written memoranda; while, conversely, a speaker who ventures to address his audience empty-handed, is said to *trust* entirely to his memory. Now, it is obvious that, in the latter case, the trust which the speaker reposes in his organ of memory is itself generated by use. Past experience on similar occasions has taught him that his memory has never played him false; and thus the successful use of this faculty has

generated the trust which he feels. But, conversely, the trust, thus acquired, induces him to use the organ ; and this use, by strengthening and developing the organ, at once justifies and confirms the trust. Thus the use of the organ develops the function ; and the exercise of the function improves the organ. Use and trust grow ever side by side. Either generates the other.

Applying these principles to the Silurian, it becomes obvious that those beings which preferred to rely for their guidance upon their lower faculty of touch would, as a natural consequence of this reliance, and the habitual exercise of their touch-organs to which it necessarily gave rise, develop those organs to a high pitch of proficiency. But those organisms which, for the purposes of the two great branches of activity —the pursuit of food, and the escape from enemies—chose to trust to that higher organ, which had already given rise to the faculty of "nascent vision," would, as naturally, in the exercise of that trust, bring this organ into constant use ; with the necessary consequence that it, in its turn, would acquire, by degrees, a more perfect development and a higher efficiency. And this trust, it is almost superfluous to reiterate, is a trust in that which, in the physical sphere, is the homologue of Christ in the spiritual sphere—namely, the *ethereal medium.* The trust which induced the habitual exercise of the touch-organ, and the consequent development of that organ, was a trust which rested upon the habitual contact with "the things that are upon the earth." In marked contrast with this earthly trust, the form of trust which induced the use and development of the sight-organ, was a trust reposed in the habitual contact with influences "that are from above"—a reliance on the celestial medium. Science declares that this latter species of trust has been the sole factor in the development of physical sight. Can she be heard to say that a species of trust, exactly homologous in kind, and exercised in exactly homologous conditions in the spiritual sphere, will be inefficacious to produce an exactly

homologous result?—and this, in the face of countless thousands of witnesses, who, having submitted to the conditions, and having practically tested the process, declare with one voice that the expected result has always been obtained?

Here, as elsewhere, the controversial value of the homology is enormously accentuated by the fact that it holds good, not only in general principle, but also in detail. Religion lays a special and peculiar emphasis upon the assertion that spiritual sight will be attained not by all—not even by many. The successful aspirants for this heavenly prize will be a minority—and a small minority. And is not this startling proposition exactly borne out by the corresponding facts in the natural world? How enormously difficult has been the task of sight-development in the physical sphere—how truly physical sight has been the reward of the few—is seldom adequately realized. Yet it is capable of easy demonstration. The number of sightless organisms is almost infinite, as compared with the number of beings that have acquired the higher life of vision. Leaving out of the question the whole of the plant world, and confining ourselves to a single order of animal life—namely, "those simplest forms of life which people an immense extent of the bottom of the sea"[1]—it is demonstrable that the individuals composing this one order of sightless beings outnumber all sight-possessing animals by countless myriads. "It is a fair question," says Professor Huxley, "whether the protoplasm of those simplest forms of life . . . would not outweigh that of all the higher living beings which inhabit the land put together."[2] When we consider the infinitesimal size of these humble individuals, as compared with the higher land animals, and further recollect that an immense number even of land animals (such, for instance, as earth-worms) possess, either no sight at all, or only the most rudimentary form of vision,[3] we may fairly

[1] Huxley, *Lay Sermons*, p. 111 (1891 ed.).
[2] *Ibid.*
[3] See Darwin's *Vegetable Mould and Earth-worms*, pp. 19–25 (1897 ed.).

say that, with respect to the higher life of sight, the proved facts of Science in the physical sphere furnish an exact homology to Christ's melancholy dictum, that "few there be that find it."

Thus once more, and this time in her most central doctrine, the teachings of Religion are confirmed by the facts of Science. The much-reviled doctrine of *Trust in Christ* acquires, in the light of scientific discovery, if not a deeper, at all events a clearer, significance. Who, that has once grasped the scientific import of "Christ the Mediator," in relation to the God of Spiritual Light, dare any longer question the gracious message—"Look unto Me, and be ye saved"? If, to borrow a dictum of Jewish law, the testimony of two witnesses is true, here are two witnesses, of the highest authority, who concur in proclaiming, with a unanimity not to be mistaken, that in the existing order of things, spiritual sight can—and can only—be acquired by the simple, yet infallible, process of "looking unto Jesus."

CHAPTER XXIX

CONCLUSION

"Admitting, or rather asserting, that knowledge is limited to the phenomenal, we have, by implication, asserted that the sphere of knowledge is co-extensive with the phenomenal."—HERBERT SPENCER.

THE promise given in the twenty-first chapter has now been fulfilled. We have examined at some length, and in considerable detail, the alleged constitution of Religion's Spiritual Universe, paying particular attention to her statements concerning spiritual light. We have carefully compared the alleged properties of this spiritual light with the most abstruse, and most recently discovered, properties of physical light; and we have found that, at every point, the two coincide. Leaving out of the question obvious and self-evident phenomena, we have confined our attention exclusively to the recondite and the obscure. And Religion has stood the test. In every case we have found complete congruity between the spiritual doctrines of Religion and the physical discoveries of Science.

We have seen, too, that Religion has reversed the natural order of events. Utterly disregarding the natural dependence of the impalpable upon the palpable, she has given us her spiritual truths first, leaving Science to discover the corresponding physical truths last. And the reality of the homologies, which we have thus traced, is curiously attested by this most significant fact—that Religion has forestalled by thousands of years, not merely the discoveries, but the very terminology, of Science. The full force of this last argument

is seldom realized, but it is immense. For how can Science be heard to deny the reality of the homologies in question, in face of the fact that, in one after another of her physical truths, she has been fain to adopt the very terminology which Religion employed two thousand years ago, in the expression of a corresponding spiritual doctrine? Thus, for instance, the allegation of Religion, made in the first century A.D., that spiritual light requires for its transmission from the light-giver to the light-receiver the intervention of a "*Mediator*," who "*takes up*" (καταλαμβάνει) the light, acquires a wholly new sanction from the scientific discovery, made in the nineteenth century, that physical light requires, as its vehicle, an ethereal "*medium*" which "*takes up* the molecular tremors of the stars."

Further than this, the homologies which we have traced are not few, but many. In whatever aspect we have studied the alleged spiritual Universe, homologies have been found. In the general constitution of that Universe; in the past and future histories of its constituent members; in their respective motions; in the centripetal and centrifugal forces by which they are attracted or repelled; in the constitution of the alleged spiritual light; in its functions, both vitalizing and de-vitalizing; in the origin and development of spiritual sight;—in all these matters Religion furnishes us with doctrines two thousand years old, every one of which finds its exact counterpart in the latest, and least obvious, discoveries of modern Science.

Obviously, the homologies thus adduced are sufficient to satisfy the requirements of our argument as stated in the twenty-first chapter. Each of the religious doctrines here collaborated is of such a nature that, to any reader, possessed of the highest scientific knowledge attainable at the date when the doctrine was first penned, it must inevitably have appeared to be an anomaly—a proposition containing no then known homologue in the physical Universe. It is therefore, impossible that, in propounding it, its author can

have been drawing upon any experience which he had acquired in connection with the physical sphere. The abstruse and recondite nature, as well as the number and completeness of the seemingly anomalous, but really homologous, phenomena in question, precludes the possibility of the homologous doctrines being the product of a series of fortunate guesses. And thus, in seeking to account for their undeniable existence, we are driven to the conclusion, as the only conceivable hypothesis by which that existence can be explained, that they must be the result, either of immediate experience on the part of the author himself or his intellectual predecessors, actually acquired in the spiritual Universe, or else of that mediate experience which is called Revelation. And, as was shown in the twenty-first chapter, it matters little, for the purposes of our argument, which of these two alternative hypotheses we adopt; for either involves, by unavoidable implication, the reality of the alleged spiritual Universe; and, as a necessary consequence, the truth of the doctrines in question.

It will be seen at once that this argument is based upon those materials with which we set out—namely, a composition of the forces of Religion and the forces of Science. The impalpable truths of Theology, viewed by the naked eye of the understanding, produce only a blurred and indistinct image. But when examined by the aid of the refractive, and parallelizing, forces inherent in the palpable phenomena with which Science deals, they at once focus into clear and distinct form. The materials supplied by Science, when duly adjusted, are capable of furnishing a mechanical aid to the intellectual vision, by means of which it is possible to bring near that which is far off—to induce that artificial intensification of sight which is the peculiar property of Astronomy. And thus, though Science can never make known the Unknowable, she can, nevertheless, by a process exactly analogous to that of physical astronomy, extend the natural limit of intellectual sight.

In seeking to establish by the foregoing method the reality of Religion's spiritual life, it scarcely falls within our province to discuss any of the numerous objections which have been taken to Religion, except in so far as they have a direct bearing upon our immediate argument. But it may perhaps be not altogether out of place to here glance very briefly at one objection, which has been so frequently raised against Religion, that any defence of the Bible can scarcely be considered even partially complete which makes no reference to it. We shall, doubtless, be told that the Bible is scientifically untrue in those numerous passages in which the Deity is alluded to under the picturesque figures which modern criticism has branded as "Anthropomorphic"—a term, by the way, which critics of a certain school seem to think is of itself a sufficient refutation of all Religion.

To this objection it is an obvious answer that it fails to recognize the fact that Religion, like all other phenomena, is herself a creature of Evolution ; and that she has grown and expanded with the increasing needs and capacities of the human race. This adaptability to the exigencies of Evolution is one of the secrets of Religion's vitality ; and constitutes, perhaps, her highest claim to our admiration. It is the wonderful province of the Bible to appeal, not to one age, but to all ages ; not to one class, or people, but to all. In its mysterious pages we read a problem, the most profound that the human intellect can fathom, yet stated with such admirable versatility, that it can be comprehended to the fullest possible extent by the humblest intellect as well as—perhaps even better than—by the highest. Of the many charges that have been preferred against Religion, narrowness is the least deserved of all. Her compass embraces the whole gamut of the human understanding. She appeals with equal force to ignorance and to intellect. She has a message for the savage, and a lesson for the sage. In a system thus adapted to the requirements of a progressing humanity, great truths must necessarily be presented in concrete, as well as

in abstract, forms. There must be picture-books for children, as well as abstruse problems for advanced scholars. And the philosopher who resents, as an insult to his intellect, a lesson concerning the relations which exist between God and man, because it is drawn from the relations of a human master to his servant, or of a human father to his child, is acting much like a parent who should insist upon feeding his infant children upon the meat and strong wine intended for himself.

Moreover, the method which Religion has thus adopted, in dealing with the Incomprehensible, is justified by what Science, at all events, must consider to be the highest sanction of all; for she has herself endorsed it by that sincerest form of flattery which consists of imitation. Indeed, it is curious to observe how often Science derides in Religion the very practices which she herself pursues. Let us justify this assertion by an illustration. The Scientist desires to teach his infant pupil a lesson about the Earth. He knows, as Mr. Spencer has very truly pointed out, that to conjure up a mental picture of the earth's size and shape is a task utterly beyond the powers of his own trained and developed intellect; how much more, then, beyond the capacity of his child! What, then, is he to do? Borrowing the homeliest of metaphors, and reducing the problem into terms of one of the most familiar of objects, he tells his pupil that the Earth is like an orange. He knows that the image which this explanation will call up in his child's mind is utterly untrue—untrue in point of size; untrue in point of weight; untrue in point of colour; untrue in point of consistency. Yet he deliberately foists these admitted untruths upon his pupil, and Science applauds his action in so doing.

How comes Science to endorse his conduct? How is it possible to justify what he has done? For, instead of the mass of untruths which he has thus deliberately conveyed into his pupil's mind, he might have expressed the exact fact in terms which contained no untruth at all. If he had

informed his infant scholar that the Earth is "an oblate spheroid having a polar diameter of 41,709,790 feet, and an equatorial diameter of 41,852,404 feet," he would have given his pupil a description every term of which is accurately true, and not one of which can, by any possibility, mislead. Why, then, should he desert truth for untruth? Why should he substitute for a correct description a misleading description? Mark the answer to these questions. It is, that to the infantine mind the untrue concrete is truer than the true abstract, because it suggests the nearest approximation to the truth that the childish intellect is capable of receiving. The partial truth conveyed by the similitude of the orange, sullied though it be by all its associated untruths, conveys, nevertheless, a truer impression than that induced by the unadulterated truth expressed in the scientific formula. The one explanation gives rise to an impression which, though in most respects untrue, is still in some respects true; the other gives rise to no impression at all. And thus is justified the instructor's departure from the truth. The absolutely untrue is relatively truer than the absolutely true.

Turn now to Religion. I desire to teach my child a lesson about God. As in the case of the Professor and the Earth, I know that even to my developed intellect the conception of God is utterly out of reach; how much more, then, beyond the reach of my child! What am I to do? Borrowing the imagery of his nursery, and speaking in the familiar language of his home, I tell him that God is his Father in heaven. I know that this description will produce in his mind a picture which is utterly untrue. I know that my words will induce him to think of heaven much as he thinks of his home, and of God much as he thinks of me—as a Being having hands and feet and passions like my own. I know, too, that I might have avoided all this untrue imagery, and all these false impressions, by telling him that God is "the Infinite Incomprehensible Absolute." And I

know that by these words I should have expressed a truth, certain beyond the highest flights of scientific demonstration and couched in terms which can by no possibility mislead. But, in face of this knowledge, I deliberately desert the truth for the untruth. I prefer the untrue concrete to the abstract true. And I plead as my defence the example—of Religion? Yes; but of Science too. And, in the strength of that two-fold authority, I demand that Science shall reverse her verdict and applaud my deed.

In bidding adieu to the foregoing argument, it may not be out of place to remind ourselves that the argument itself furnishes a justification, which is not, perhaps, wholly unneeded, for its own existence. Impressed by the gravity of the issues which it raises, and the immense difficulties which it involves, not a few theologians are more than half inclined to avoid the whole question, by ignoring it. Discussions of this nature, it is often objected, are worse than unprofitable. Not only are they almost always unproductive of any tangible results, so far as practical religion is concerned; but, by dwelling upon an aspect of the case which is better avoided, they unsettle previously formed convictions, and thus, even when most successful, leave behind them a sense of doubt and insecurity, to which the faith of the devout believer was before a stranger.

Nor is it easy to exaggerate the force of the considerations upon which this cautious policy is based. Why should Religion fear to be confronted by the indisputable truths of Philosophy? What has she to dread, for praise, or blame, from the passionless lips of Science? Everything, we are told. Her credibility, her very existence, her all is at stake. Never was a crisis so momentous. She has everything to hope, and everything to fear. In a conjuncture of such extremity, Religion is surely entitled to our sympathy—if not altogether to our respect—if she shows at times symptoms of a desire to cut asunder the natural ties that bind her to

Science, and take refuge in the forbidden policy of "splendid isolation."

But even if we accept the foregoing as a true statement of the position, the objection is one which admits of several answers. In the first place, observe how much—or, rather, how little—is to be gained by attempting to avoid, or even to postpone, the crisis. In this connection Religion will do well to reflect that the conflict is one from which there is absolutely no escape. Whether for condemnation or acquittal, her judgment day has come. Science is determined to force the issue ; and Religion *must* face it as best she may. Nor is there wanting, in the very necessity of the case, a certain grim consolation. The most timid theologian may draw comfort from the thought that the ordeal before him is absolutely inevitable. In this respect the natural weakness of his position supplies him with a species of artificial strength. If he has not the courage of resolution, he may at least take the courage of despair.

And, in the next place, the theologian who sees, in the utter impossibility of avoiding the contest, a complete justification for fearlessly facing it, will find, upon a nearer view, that the attempted avoidance of the inevitable Conflict of Truth involves, like every other sin against truth, a whole crop of resulting errors ; of which not the least conspicuous is, that it has induced an utterly false conception of the unity of the Universe, and of the closeness of the relationship in which physical phenomena stand to spiritual. It seeks to impose between the spiritual and the physical an artificial dividing line—a dividing line which has no existence in reality, and which is wholly opposed to the first principles of Religion. Nothing in Christ's teaching is clearer than this, that the Supernatural can only be comprehended through the Natural. And it is one of the great merits of Religion that, in recognizing this necessity, she has not shrunk from the responsibilities which it entails. At least since the day when she penned her first grand sermon

on "the Genesis of the Heaven and the Earth," she has recognized that her proper realm extends, from the far-off heights of spiritual mystery, down to the minutest atom that vibrates obedience to divine law. And when, again, in her declaration that "God is light," she descends, from her own exclusive sphere of Pneumatology, to the domain of Physics, she is alighting on a territory which, though now shared with her by Science is still, in her view at least, essentially her own.

Perhaps we should rather say, *was* her own; for in the full sense of the words it is her's no longer. There was, as we have seen, a time when Religion held unrivalled and undisputed sway over the domains of thought now occupied by Science. But when, in consequence of the increasing annexations of knowledge, she was compelled to entrust to Science a portion of her realm, now grown to unmanageable dimensions, she still reserved to herself a sort of right of way over the ceded territory, as a path by which she might conduct her disciples, through the things of Earth, to the things of Heaven.

Here, then, is the supreme importance which the professedly scientific portions of the Bible play in the scheme of Religion. They constitute her title-deeds to this all-essential right of way. And when we see Science ignoring the obligations which she owes to her suzerain, and disputing this right with a constantly augmenting vehemence; while Religion, forgetful of her own necessities, is maintaining it with an ever-increasing feebleness; is it not time to remind ourselves that, at all hazards, the right must be maintained, for that, if it should ever be lost by Religion, the spiritual sphere will thenceforward be a region wholly inaccessible to mankind?

And, lastly, the theologian, who approaches the contest with an open mind, will perceive, upon a closer inspection of the issues which it involves, to what an enormous extent Religion has been the loser by the stand-off attitude which

she has hitherto maintained. In her dread of an immeasurable loss, she has missed an immeasurable gain. It is not true that controversial discussions of this nature are necessarily unprofitable. It is not even true that they are generally unproductive of tangible results to practical Religion. On the contrary, it is only when he stands face to face with Science—only when he continues to pursue that method of Scientific comparison which Christ Himself inaugurated in almost every lesson that He taught—that the theologian acquires those materials which are necessary for a practical understanding of the doctrines of Religion, and without which a practical knowledge of Religion herself is simply a scientific impossibility. Then it is that he perceives, with a force never before realized, how practical is the import of the seemingly most theoretical of Religion's doctrines—how imperative is the sanction which they enjoin upon all who would snatch the prize which Religion holds out. After all, there is really only one point of primary practical importance to Religion—the proof of the existence of the spiritual world. If only that can be established, everything else follows as of course. The acquisition of spiritual life becomes then the most important of all objects, in comparison with which every other pursuit in life sinks into insignificance.

That already modern scientific thought, even apart from direct theological considerations, is drifting towards the belief in the existence of a spiritual world, is a proposition which is becoming more clearly established every day. It is an inevitable consequence of the widening scope of modern research. In the words of Professor Huxley, "Modern science takes into account all the phenomena of the universe which are brought to our knowledge by observation or experiment;" and, as a result of this extended sphere of operations, she now "admits that there are two worlds to be considered, the one physical and the other psychical."[1] Here,

[1] Huxley, *Essays on Controverted Questions*, p. 240 (1892 ed.).

surely, is an admission of immense value to the theologian—an admission which not only carries Science herself to the very portal of the spiritual world, but which concedes in principle, if not in degree, everything for which Theology contends. For does it not, by removing the catastrophic appearance of Religion's central belief, dispose at once, and for ever, of the greatest difficulty with which she has hitherto had to contend? As long as we believe only in the existence of a visible world, the supposition of a second invisible world may appear monstrous. But now that we know it to be an admitted scientific fact that, besides our visible physical world, there *is* an invisible psychical world, the further belief in a third invisible spiritual world acquires an altogether new sanction. Its seemingly anomalous character disappears. It falls into harmony with the now-known order of Nature.

And when from the question of principle we pass to that of degree, it is difficult to see how Science can much longer successfully maintain her rejection of this third invisible spiritual world. On her own showing she is bound to "take into account all the phenomena of the Universe which are brought to her knowledge by observation or experiment." But has she, in her rejection of the spiritual world, acted up to her own principles? Has she, upon this point, taken into account *all* the available phenomena? Can it be said that she has really and truly, with that unselfish and unbiassed impartiality which is elsewhere her grand characteristic, weighed and considered those strange phenomena which the Bible presents, when brought into contact with modern science, and which are as much entitled to consideration as any other phenomenon whatever, that is to be found in the Universe? Must it not rather be admitted that we have here a series of phenomena which, if Science has not entirely ignored, she has at least persistently undervalued?

To those who incline to this latter opinion the foregoing argument is not undeserving of attention. It is based upon phenomena which press for an explanation, and of which no

rational explanation has hitherto been forthcoming. That they are capable of any other interpretation than that here contended for seems, to say the least, improbable. And if that be their true interpretation, then the Spiritual World becomes, not merely a reality, but the most momentous of all realities; Spiritual Life and Spiritual Sight become then, not merely things to be aimed at and struggled for, but the only things that are really worth struggling for at all. For in them lies the key to the riddle of the Universe. And if we miss that, we miss all that gives an object to life—a meaning to existence.

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