SCIENCE AND SPECULATION

PREFATORY NOTE

THE following is a reprint, under a new and—it is believed—appropriate title, of the Prolegomena to George Henry Lewes's *History of Philosophy* (3rd edition). It has only been necessary to make a few verbal alterations to fit the essay for separate publication; since, on the whole, it is a self-contained treatise, distinct from the History and representing the philosophy of modern science, as interpreted by Lewes himself.

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SCIENCE AND SPECULATION

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I.—WHAT IS PHILOSOPHY?

§ 1. THEOLOGY, Philosophy, and Science constitute our spiritual triumvirate. The limits of their several dominions have been insensibly shifting, so that at various epochs in History they have been of very varied importance. For centuries the predominance of Theology was absolute and undisputed. Philosophy, meanwhile, grew apace, till at last it was enabled to assert an independent position; and while these two rivals struggled for supremacy, Science was also quietly and obscurely feeling its way to independence.

§ 2. The office of Theology is now generally recognised as distinct from that of Philosophy and from that of Science. Its ancient claim to authority over all regions of inquiry has long been felt to be untenable, and has been frankly relinquished. Although claiming to hold the keys of the highest Truth, it nevertheless no longer pretends to decide upon the lower, but confesses its inability to furnish Research with effective Methods, or Knowledge with available data. It restricts itself to the region of Faith, and leaves to Philosophy and Science the region of Inquiry. Its main province is the province of Feeling; its office is the *systematisation of our religious conceptions.*

This is the office not of one Theology, but of all. No matter what other functions the various Theologies may assume, they invariably assume this, and give it pre-eminence. It is thus not only their common characteristic, but also their highest characteristic; and now that the course of human evolution has detached both Philosophy and Science from Theology, this systematisation remains its sole function.

§ 3. The office of Science is distinct. It may be defined as the *systematisation of our knowledge of the order of phenomena considered as phenomena.* It co-ordinates common knowledge. It explains the order of phenomena, by bringing them under their respective laws of co-existence and succession, classing particular facts under general conceptions.

§ 4. The office of Philosophy is again distinct from these. It is *the systematisation of the conceptions furnished by Theology and Science.* It is ἐπιστήμη ἐπιστημῶν. As Science is the systematisation of the various generalities reached through particulars, so Philosophy is the systematisation of the generalities of generalities. In other words, Science furnishes the Knowledge, and Philosophy the Doctrine.

Each distinct science embraces a distinct province of knowledge. Mathematics treats of magnitudes, and disregards all other relations; Physics and Chemistry concern themselves with the changes of inorganic bodies, leaving all vital relations to Biology; Sociology

concerns itself with the relations of human beings among each other, and with their relations to human beings in the past and in the future. But Philosophy has no distinct province of knowledge: it embraces the whole world of thought: it stands in the same relation to the various sciences as Geography stands to Topography. All the sciences subserve its purpose, furnish its life-blood. It systematises their results, co-ordinating their truths into a body of Doctrine.

Thus, while Theology claims to furnish a system of religious conceptions, and Science to furnish conceptions of the order of the world, Philosophy, detaching their widest conceptions from both, furnishes a Doctrine which contains an *explanation of the world and of human destiny*.

Although this may appear a novel definition, it will, on examination, be found to characterise the persistent function which in all times Philosophy has exercised. Moreover, it will be found applicable in special cases, such as the philosophy of Science, the philosophy of Religion, the philosophy of History, or the philosophy of Art. Thus, given a science with its generalities laboriously ascertained, the philosophy of that science will be the co-ordination of its highest truths, the methods by which those truths were reached, and the relation which both these bear to the truths and methods of other sciences. I formerly defined Philosophy "an attempt to explain the phenomena of the universe." This is too vague, and fails to mark the point of separation from Science and Theology; but, though vague, it expresses what has been the unconscious and persistent effort of philosophical speculation.

§ 5. Such is the relative position of each of the three great spiritual powers at the present time. These positions were not always thus sharply defined, but the history of thought exhibits a continuous development in these directions. Theology at first was absolute and autocratic, not only furnishing religious doctrine, but dictating generalities to Philosophy, and explanations of all but the commonest phenomena to Science. Philosophy served as a handmaid to Theology, until she grew strong enough to think for herself. Science kept timidly aloof from all questions on which Theology had pronounced, and submitted to a peremptory order to be silent when her conclusions were unacceptable. Fortunately for Humanity, this creeping servitude was incompatible with the continued exercise of reason. As discoveries extended, as more and more phenomena were satisfactorily reduced to order, the widening reach of Inquiry embraced problem after problem, until now all the facts within human ken are assumed to be reducible to order on the scientific Method. With the growing strength came a growing courage, and timidity gave place to a proud self-reliance. Theology was first quietly yet firmly excluded from Cosmology, its explanations of the world being set aside as myths; then it was excluded from Biology; and now even Sociology is claimed as amenable to scientific Methods, because all social phenomena are seen to be under the dominion of law. History shows a curious reversal of the principle of accommodation. Just as Science was formerly compelled to accommodate its conclusions to Theology, no matter at what cost of consistency, with what sophistical excuses, so Theology is now

compelled to accommodate its dicta to the conclusions of Science, by utterly distorting the meaning of words. After having for centuries pursued its researches under the denunciation of Theology, and under the burden of a fear, terrible to delicate consciences, of approaching heresy when it was seeking truth, Science has at length ceased its timorous and futile efforts to reconcile its conclusions with anything but its own principles.[1] The problem is no longer: Given a doctrine of indisputable authority, how to reconcile the conclusions of Experience with its dicta; the problem is: Given certain indisputable conclusions of Experience, how to reconcile the dicta of an ancient doctrine with these irresistible conclusions.[2]

§ 6. The conflict was inevitable, and was foreseen from the first. Inevitable, because the two powers are characterised by two different Methods, that of Theology being the Subjective, that of Science the Objective. These Methods will have to be considered more particularly in a future section; for the present, I merely call attention to the fact of their opposition, and to the fact that Philosophy occupying an intermediate position has necessarily employed both Methods by turns. When it was in alliance with Theology, it adopted the Subjective Method: this was during its ontological phase. When the advance of Science furnished it with more and more material, Philosophy gradually detached itself more and more from Theology, without, however, consciously and completely adopting the Objective Method: this was its psychological phase. Finally, the all-embracing progress of Science has forced Philosophy frankly to adopt the Objective Method: this is its present phase, the Positive Philosophy.

The history of Philosophy is the narrative of its emancipation from Theology and its final constitution through the transformation of Science.

§ 7. The annals are red with the flames of persecuting wrath at every attempt Philosophy made to assert independence. Naturally enough. No autocrat can be lenient to a powerful pretender; and the more reasonable the pretender's claim, the more hateful will be its assertion. Philosophy, in turn, was equally intolerant of its rival Science, and allied itself with its ancient persecutor to persecute the new pretender.

Aloof from the strife of polemics and personal irritations, the wise, calm spirits of our day resign themselves to the Triumvirate, defining for each its separate province, and trusting in a harmony of combined effort which hitherto has been impossible. It is time that the great perturbations should cease, and the only struggles be carried on within the limits of each domain: theologians in controversy with theologians, savans with savans, philosophers with philosophers. The three powers

[1] In 1864 was seen a memorable protest, on the part of scientific men, against every attempt to control their researches. In spite of the theological pressure, which is so powerful in England, our leading savans openly and *indignantly* refused to sign a declaration of dependence.

[2] A somewhat analogous inversion has taken place in the social problem. Formerly the problem was: Given the welfare and advantages of the Few, how best to reconcile with these the welfare of the Many; it now is: Given the welfare of the Many, how best to secure the advantages of the Few. The new Astronomy transferred the centre of the world from the small Earth to the mighty Sun; the new Sociology transfers the centre of social life from the small group of Idlers to the mighty mass of Workers.

have always hitherto been in a state of conflict or of armed peace. The problem of our age is, how to change this conflict into a concourse, to unite the independent and dissident efforts in dependent and harmonious efforts. This problem may be solved by the transformation of Science into Philosophy, and by the transformation of Philosophy into Religion. But whether we reject or accept that solution, the systematisation of our religious conceptions and all its practical applications must be a distinct office from the systematisation of our conceptions of the order of phenomena; and the harmony of the two can only be effected by a Doctrine which combines the generalities of both. The future of Philosophy is in this task of reconciliation.

§ 8. In the early editions of my *History* the word Philosophy carried a more restricted meaning than is assigned to it in the preceding paragraphs. It was used as synonymous with Metaphysics, or more specially with Ontology. That restricted use of the word was forced on me by the practice of all previous historians, and I stated why it was forced upon me, and in what sense the word was to be understood. In vain. The old vague, indissoluble associations could not be escaped. The reader quickly forgot my explanation, and interpreted the word in his vague sense, instead of in my restricted sense. The large latitude in which the word has come to be used all over Europe has obliterated all special meaning, and this notably in England, where, as Hegel sarcastically remarks, microscopes and barometers are dignified as "philosophical instruments," Newton is styled a philosopher, and even parliamentary proceedings are sometimes said to be philosophical.[1] In presence of such looseness of expression what was the historian to do? Obviously, he could only declare the sense in which the word was used in other histories of Philosophy, and abide by that. Had I not fixed a precise meaning to the word, I must have written a History of Knowledge, not a History of Philosophy.

My explanation was of little avail. The object of my work being to show the essential futility of Philosophy, in the restricted sense of that word, I was supposed to have intended a crusade against Philosophy in the wider sense; and readers who no more believed in Ontology than I did were startled by my attacks on it under the name of Philosophy. After this experience I cannot place much reliance on the security of any definition; but for the sake of attentive readers I have stated what position Philosophy holds in relation to Theology and Science; and to avoid equivoque I shall use the words Metaphysical Philosophy, or Ontology, and sometimes simply Metaphysics, to designate inquiries on the Subjective Method into the ultimate essence of things.

§ 9. Unhappily there is no uniformity even in the use of the term Metaphysics. Sometimes it means Ontology. Sometimes it means Psychology. Sometimes it means the highest generalities of Physics. The first of these inquiries I hold to be utterly futile, hopelessly beyond human ken. But the second and third are legitimate inquiries, which take their place in human knowledge whenever they are pursued on the Objective Method, and only deserve

[1] Hegel: *Geshichte der Philosophie*, i. 72. Compare also Hamilton, *Metaphysics*, i. 63.

reproof when pursued on the Subjective Method, upon which *all* problems are insoluble. As I have shown at some length elsewhere,[1] all problems are legitimate which admit Verification of their premisses and conclusions; and no Verification is possible except on the Objective Method.

§ 10. In the arrangement of Aristotle's treatises, those which succeeded the Physics were called τὰ μετὰ τὰ φυσικὰ βιβλία—indicating that they were to be studied *after* the Physics, either because their topics were evolved from physical inquiries, or because their topics were beyond physical inquiry. The equivoque still continues. Metaphysics may concern itself with the last conclusions of Physics, dealing with these results as its elements; or it may concern itself with inquiries beyond the region of Experience, entirely removed from Verification, transcending Sense, and drawing its data from a higher source. Obviously, in proportion as it seeks its elements in the relations of sensible phenomena it forms one branch of legitimate inquiry, and the only question then is as to the validity of the Method it employs. In proportion as it seeks its elements in the relations of supersensible phenomena it separates itself from Experience, ceases to be amenable to the ordinary canons of Research, and grounds its existence on the possession of a peculiar criterion—a direct and immediate knowledge of the Absolute.

The confusion of these two distinct conceptions is very common, and is the source of much perplexity. Those who hold the doctrine of the relativity of knowledge may admit without inconsistency many principles which are metaphysical in the sense of transcending Experience in their generality, although founded on Experience and conformable with it: such, for example, are causality and inertia. There is a large admixture of such Metaphysics, in all philosophical Physics; and in this sense we may call Metaphysics the *prima philosophia*. But Experience is here the source and pattern: the Objective Method with its rigorous tests of Verification rules as absolutely here as in every other department of positive inquiry. The Unknown is only a prolongation of the Known, and is trusted only so far as it is in strict conformity with the Known. The Invisible is but the generalisation of the Visible.

Those who hold that, over and above the conceptions furnished through Experience, the mind brings with it certain conceptions antecedent to and independent of Experience, who hold that, over and above our relative knowledge, we have absolute knowledge, *reverse* this procedure from the Known and Visible to the Unknown and Invisible; and starting from what their rivals declare to be not simply the Unknown but the Unknowable, they deduce from it certain conclusions which they present as ontological truths capable of guiding us in discovering the relations of phenomena. Let Descartes be heard on this point: "Perspicuum est optimam philosophandi viam nos sequuturos, si ex ipsius Dei cognitione, rerum ab eo creatarum explicationem deducere conemur, ut ita scientiam perfectissimam, quæ est effectuum, per causas acquiramus."[1] The fallacy lies in concluding that because, in Mathematics

[1] *Aristotle*, chap. iv.

[1] Descartes: *Princip. Philos.* ii. § 22.

and all deductive operations, we unfold the particulars contained implicitly in the generalities, we should therefore always seek particulars in this way. But the procedure is only justifiable when the generalities are proved to be indisputably true, and when the particulars deduced are by Verification shown to be really as well as verbally contained in them. Now, what are the chief objects of absolute knowledge, the generalities from which ontologists deduce? They are God, Freedom, Immortality, Causality, Existence: the noumena of which all the manifold experiences are phenomena.[1] That it is possible to *infer* these, no one denies; but their value as inferences opens an interminal discussion. The ontologists claim to *know* them directly, immediately, certainly. Their opponents affirm—and endeavour psychologically to prove—that such knowledge is impossible, and that, if possible, it would be infertile, because incapable of being applied to the problems of phenomena except through Experience; infertile, because it can only be a comparison of ideas with ideas, never of ideas with facts; and thus stumbles over the old sceptical objection—*τίς κρινεῖ τὸν ὑγιεινόν*. Suppose, for example, that antecedently to all Experience we know the general law of Causality, it is only through Experience we can enrich this knowledge. We may know that every effect has a cause; this knowledge we may have brought with us into our phenomenal life; but what concerns us is, to know the particular cause of each particular effect, and, if we can ascertain that, the general axiom may be disregarded; if we cannot ascertain that, the general axiom is powerless.

§ 11. The valid objection against Metaphysics is not so much against the subjects of inquiry as against the Method of inquiry; if the Method were legitimate, its results would be legitimated. I shall consider this Method by-and-bye; for the present I invoke the unequivocal verdict of History, which pronounces it to be the prolonged impotence of two thousand years and all its results, as shifting as the visionary phantoms of reverie. When we are awake, says Aristotle, we have a world in common; when we dream, each has his own. Kant aptly applies this to metaphysicians; "when we find a variety of men having various worlds, we may conclude them to be dreaming." It is because the majority of thinking men have been convinced that inquiries conducted on the Metaphysical Method are but as dreams, that they have everywhere in Europe fallen into discredit. Once the pride and glory of the greatest intellects, and still forming an important element of liberal culture, the present decadence of Metaphysics is attested no less by the complaints of its few followers than by the thronging ranks of its opponents. Few now believe in its large promises; still fewer devote to it that passionate patience which is devoted by thousands to Science. Every day the conviction gains strength that Metaphysics is condemned, by the very nature of its Method, to wander for ever in one tortuous labyrinth, within whose circumscribed and winding spaces weary seekers are continually finding themselves in the trodden tracks of predecessors who could find no exit.

Metaphysical Philosophy has been ever in movement, but the movement

[1] *ἔστιν ἐπιστήμη τις ἡ θεωρεῖ τὸ ὂν ᾗ ὂν καὶ τὰ τούτῳ ὑπάρχοντα καθ αὑτό.*—Aristotle: *Met.* iii. 1.

has been circular; and this fact is thrown into stronger relief by contrast with the linear progress of Science. Instead of perpetually finding itself, after years of gigantic endeavour, returned to the precise point from which it started, Science finds itself, year by year, and almost day by day, advancing step by step, each accumulation of power adding to the momentum of its progress; each evolution, like the evolutions of organic development, bringing with it a new functional superiority, which in its turn becomes the agent of higher developments. Not a fact is discovered but has its bearing on the whole body of doctrine; not a mechanical improvement in the construction of instruments but opens fresh sources of discovery. Onward, and for ever onward, mightier and for ever mightier, rolls this wondrous tide of discovery. While the first principles of Metaphysical Philosophy are to this day as much a matter of dispute as they were two thousand years ago,[1] the first principles of Science are securely established, and form the guiding lights of European progress. Precisely the same questions are agitated in Germany at the present moment that were agitated in ancient Greece; and with no more certain Methods of solving them, with no nearer hopes of ultimate success. The History of Philosophy presents the spectacle of thousands of intellects—some the greatest that have made our race illustrious—steadily concentrated on problems believed to be of vital importance, yet producing no other result than a conviction of the extreme facility of error, and the remoteness of any probability that Truth can be reached.[1] The only conquest has been *critical*—that is to say, psychological. Vainly do some argue that Philosophy has made no progress hitherto, because its problems are complex, and require more effort than the simpler problems of Science; vainly are we warned not to conclude from the past to the future, averring that no progress will be made because no progress has been made. Perilous as it must ever be to set absolute limits to the future of human capacity, there can be no peril in averring that Metaphysics never will achieve its aims, because those aims lie beyond all scope. The difficulty is impossibility. No progress can be made because no basis of certainty is possible. To aspire to the knowledge of more than phenomena—their resemblances, co-existences, and successions—is to aspire to transcend the inexorable limits of human faculty. To *know* more, we must *be* more.

In the early days of speculation all Philosophy was essentially metaphysical, because Science had not emerged from Common Knowledge to claim theoretical jurisdiction. The particular sciences then cultivated, no less than the higher

[1] "C'est la honte éternelle de la philosophie de n'avoir pas jusqu'à présent mis au jour un résultat positif, un principe une fois pour toute reconnu et universellement admis. Bien mieux, il n'y a pas même un résultat négatif, une défaite complète, irrévocable d'une doctrine si réfutée qu'elle soit." — Delbœuf: *Essai de Logique Scientifique*, Liège, 1865, p. 10. Compare Kant: *Prolegomena zu einer jeden künftigen Metaphysik*, passim.

[1] Compare Kant in the preface to the 2nd ed. of the *Kritik der reinen Vernunft*: "Der Metaphysik.....ist das Schicksal bisher noch so günstig nicht gewesen, dass sie den sichern Gang einer Wissenschaft einzuschlagen vermocht hätte; ob sie gleich älter ist als alle übrigen. .....Es ist also kein Zweifel, dass ihr Verfahren bisher ein blosses Herumtappen und, was das Schlimmste ist, unter blossen Begriffen gewesen sei."

generalities on Life, Destiny, and the Universe, were studied on one and the same Method; but in the course of evolution a second Method grew up, at first timidly and unconsciously, gradually enlarging its bounds as it enlarged its powers, and at last separating itself into open antagonism with its parent and rival. The child then destroyed its parent; as the mythic Zeus, calling the Titans to his aid, destroyed Saturn and usurped his throne. The Titans of the new Method were Observation and Experiment.

There are many who deplore the encroachment of Science, fondly imagining that Metaphysical Philosophy would respond better to the higher wants of man. This regret is partly unreasoning sentiment, partly ignorance of the limitations of human faculty. Even among those who admit that Ontology is an impossible attempt, there are many who think it should be preserved in, because of the "lofty views" it is supposed to open to us. This is as if a man desirous of going to America should insist on walking there, because journeys on foot are more poetical than journeys by steam; in vain is he shown the impossibility of crossing the Atlantic on foot; he admits that grovelling fact, but his lofty soul has visions of some mysterious overland route by which he hopes to pass. He dies without reaching America; but to the last gasp he maintains that he has discovered the route on which others may reach it.

Let us hear no more of the lofty views claimed as the exclusive privilege of Metaphysics. Ignorant indeed must be the man who nowadays is unacquainted with the grandeur and sweep of scientific speculation in Astronomy and Geology, or who has never been thrilled by the revelations of the telescope and microscope. The heights and depths of man's nature, the heights to which he aspires, the depths into which he searches, and the grander generalities on Life, Destiny, and the Universe, find as eminent a place in Science as in Metaphysics. And even were we compelled to acknowledge that lofty views were excluded from Science, the earnest mind would surely barter such loftiness for Truth? Our struggle, our passion, our hope, is for Truth, not for loftiness; for sincerity, not for pretence. If we cannot reach certain heights, let us acknowledge them to be inaccessible, and not deceive ourselves and others by phrases which pretend that these heights are accessible. Bentham warns us against "question-begging epithets"; and one of these is the epithet "lofty," with which Metaphysical Philosophy allures the unwary student. As a specimen of the sentiment so inappropriately dragged in to decide questions not of sentiment but of truth, consider the following passage delivered from the professorial chair to students whose opinions were to be formed:—

"A spirit of most misjudging contempt has for many years become fashionable towards the metaphysical contemplations of the elder sages. Alas! I cannot understand on what principles. Is it, then, a matter to be exulted in, that we have at length discovered that our faculties are only formed for earth and earthly phenomena? Are we to rejoice at our own limitations, and delight that we can be cogently demonstrated to be prisoners of sense and the facts of sense? In those early struggles after a higher and more perfect knowledge, and in the forgetfulness of every inferior science through the very ardour of the pursuit,

there is at least a glorious, an irresistible testimony to the loftier destinies of man; and it might almost be pronounced that in *such* a view, their very errors evidence a truth higher than all our discoveries can disclose! When Lord Bacon, with his clear and powerful reasonings, led our thinkers from these ancient regions of thought (then newly opened to the modern world) to the humbler but more varied and extensive department of inductive inquiry, I represent to myself that angel-guide, all light and grace, who is pictured by our great poet as slowly conducting the first of our race from Paradise, to leave him in a world, vast, indeed, and varied, but where thorns and thistles abounded, and food—often uncertain and often perilous—was to be gained only by the sweat of the brow and in the downcast attitude of servile toil."[1]

It would be an insult to the reader's understanding to answer the several absurdities and "question-begging" positions of this passage, which, however, is typical of much that may be read in many writers. Contempt for the speculations of the elder sages, or indeed of moderns, is a feeling we should be slow to acknowledge, whatever estimate we formed of their truth. If my polemical tone against a Method I believe to be not only hopeless but nowadays pernicious has sometimes seemed to warrant such an accusation, let me, on personal no less than philosophic grounds, rebut it here. The memory of long, laborious study, ever baffled ever renewed, would alone suffice to create sympathy and respect for all earnest seekers; and if this feeling were not present, the Positive Philosophy would suffice, pointing as it does to all the great metaphysicians as necessary precursors, without whose labours Science would never have existed. It is not because the noble pioneers have perished in the trenches that their renown should fade. If we make a bridge of their dead bodies, we should raise a monument to their devotion.

[1] Archer Butler: *Lectures on the Hist. of Ancient Philosophy*, ii. 109.

II.—THE OBJECTIVE AND SUBJECTIVE METHODS

§ 12. A SPANISH metaphysician truly says that the question of Method rules, and in one sense comprehends, all philosophical questions, being indeed Philosophy in action.[1] As it is a path on which Truth is sought, we must first come to some agreement respecting the object of search.

The question, What is Truth? has been variously answered, but, instead of pausing here to consider the answers, I

[1] Nieto Serrano: *Bosquejo de la Ciencia Viviente*, Madrid, 1867. *Parte primera*, p. 31. "La cuestion de método domina y comprende hasta cierto punto todas las cuestiones filosóficas. Efectivamente el método filosófico es la filosofía misma en accion, la cual aparece ya tal cual es desde los primeros pasos, y no puede desmentirse en lo sucesivo."

will propose one which is sufficiently catholic to be accepted by all schools.

> Truth is the correspondence between the order of ideas and the order of phenomena, so that the one is a reflection of the other—the movement of Thought following the movement of Things.

The correspondence can never be absolute: it must, from the very structure of the mind, be relative; but this relative accuracy suffices when it enables us to foresee with certainty the changes which will arise in the external order under given conditions. If the order in our ideas respecting falling bodies sufficiently corresponds with the order of the phenomena themselves to enable us to express the Law with precision, and foresee its results with certainty, we have in that Law a truth of the only kind attainable by us.

The reader will observe that I have used the phrases "order in ideas" and "movement of thought" instead of adopting the ordinary formula "ideas conformable with objects." If Truth is the conformity of ideas with objects, Truth is a chimera, or Idealism is irresistible. "La notion de *vérité* implique une contradiction," says Delbœuf. "Par définition, une idée n'est vraie qu'à la condition d'être conforme, adéquate à son objet. Mais, par essence, une idée est nécessairement différente d'un objet. Comment donc puis-je parler d'une équation entre l'idée et son objet?"[1] The old sceptical arguments are unanswerable on this ground. We need not, however, rush into Idealism by affirming the identity of ideas and their objects; we need simply give up all pretension to absolute knowledge, and rest contented with relative knowledge, which permits of our adjusting our actions to the external order. Indeed, the ultimate aim of knowledge is adaptation; and we call it Truth when the adaptation is precise. What bodies are in themselves, what falling is in itself, need not properly concern us; only what are the relations in which bodies and their movements stand to our perceptions. If in attempting to comprehend these relations we succeed in so arranging our ideas that their order corresponds with the order of phenomena (as when we think of falling bodies having a velocity proportional to the time), that arrangement is Truth; but if, instead of the movement of Thought being controlled by the movement of Things, our ideas are arranged in an order which does not correspond with the order of phenomena (as when we think of the velocity being proportional to the space fallen through), that is Error. And this discloses the imperfection of the many definitions of Truth which regard it as "conformity among ideas." The conception of velocity proportional to *space* is a conception which would have nothing against it were it not opposed to the facts. As a pure deduction it is inevitable; a movement of Thought determined by some pre-existing thought necessarily takes that course; but a movement of Thought determined by that of Things, following step by step the succession of phenomena, leads to the conclusion of velocity proportional to the *time*.

§ 13. To attain this correspondence between the internal and external order is the object of Search; and the Methods of Search are two:—

α. The Objective Method which moulds its conceptions on realities by closely following the movements of the objects as they severally present themselves

[1] Delbœuf: *Essai de Logique Scientifique*, p. 35.

to Sense, so that the movements of Thought may synchronise with the movements of Things.

β. The Subjective Method which moulds realities on its conceptions, endeavouring to discern the order of Things, not by step by step adjustments of the order of ideas to it, but by the anticipatory rush of Thought, the direction of which is *determined* by Thoughts and not *controlled* by Objects.

Observation of objects presented to the mind must be succeeded by Conjecture respecting the connecting, but unobserved, links. The successive stages of inquiry are from Observation to Conjecture, and from Conjecture to Verification. The Subjective Method stops at the second stage: its function is Hypothesis. The Objective Method passes on to the third stage: its function is Verification. Thus, while the first characterises our spontaneous tendency, and is seen in full vigour in all the early forms of speculation, the second characterises our reflective tendency, and is the source of positive knowledge. The Objective Method thus absorbs what is excellent in the Subjective Method, as Science takes up into itself whatever Metaphysics can establish, rejecting what is irrelevant and completing what is incomplete. Both physicist and metaphysicist employ Observation and Conjecture; but the physicist, if true to the Objective Method, is careful to verify the accuracy of his observations and conjectures, submitting the order of his ideas to the order of phenomena; whereas the metaphysicist, obeying the subjective impulse, is careless of Verification, and is quite ready to rely on data and conclusions which are absolutely incapable of Verification. The one freely employs Hypothesis under the rigorous condition of never relying on a conjecture as a fact, never assuming that a harmony in his conceptions must necessarily imply a corresponding arrangement in phenomena; the other employs Hypothesis under the single condition of not thereby introducing a logical discord. In the one case the "anticipatory rush of thought" is controlled by the confrontation of ideas with objects. In the other case the rush of thought is controlled only by the confrontation of ideas with ideas. Briefly, then, it may be said that the Objective Method seeks Truth in the relations of objects; whereas the Subjective Method seeks it in the relations of ideas.

§ 14. Philosophers expound the objective and subjective elements of which Knowledge is composed, as the *material* and *formal* elements. Things furnish the materials. Thought furnishes the forms. Objects stimulate the activity of the Mind; the Laws of mental action determine the result, in the forms of percepts, concepts, and judgments. But philosophers continually overlook the important consideration that the Mind, besides its laws which determine the forms of the material given by objects, has also a movement of its own; and this movement is determined from within, by some pre-existing movement, just as it may be determined from without, by the stimulus of objects. It is this *subjective current* which, disturbing the clear reflection of the objective order, is the main source of error. It determines those concepts and judgments which have no corresponding objects: hallucinations, reveries, dreams, hypotheses, figments. This being so, we cannot accept the notion adopted by Sir W. Hamilton from Twesten, that "the condition of error is not the activity of

intelligence, but its inactivity." On the contrary, we must assign error to the activity of intelligence when it follows its own impulses in lieu of receiving the direction from objects. "What is actually thought," according to Twesten and his follower, "cannot but be correctly thought. Error first commences when thinking is remitted, and can in fact only gain admission in virtue of the truth which it contains;—every error is a perverted truth."[1] This seems to me so glaringly in opposition to all rational interpretation that I must conclude it to mean something very different from what it says. Hamilton's comment only makes the matter worse.

§ 15. That the source of Error is *the subjective current determining the direction of the thoughts*, is easily shown. Error arises in the substitution of Inference for Presentation. No error can possibly arise in Sensation itself, but solely in the movements of thought which are prompted by the sensation. The immense activity of this subjective current, the large interfusion of Inference in the simplest acts of Perception, has long been recognised; and, as I have said elsewhere, what is called a "fact," and held to be indisputable because it is a "fact," is in reality a bundle of inferences, some or all of which may be false, tied together by sensations, which must be true. Take a case so simple as the sight of an apple on the table. All that is here directly certified by consciousness is the sensation of a coloured surface; with this are linked certain ideas of roundness, firmness, sweetness, and fragrance, which were once sensations, and are now recalled by this of colour; and the whole group of actual and inferred sensations clusters into the fact which is expressed in "there is an apple." Yet any one of these inferences may be erroneous. The coloured object may be the imitation of an apple in wood or stone; the inferences of roundness and solidity would then be correct, those of sweetness and fragrance erroneous; the statement of fact would be false. Or the object seen may be another kind of fruit, resembling an apple, yet in important particulars differing from it. Or the object may not exist, and our perception may be an hallucination. Thus a case seemingly so simple may furnish us with the evidence that Facts express our conception of the order in external things, and not the unadulterated order itself. Should the accuracy of any particular fact happen to be of importance—and in Science all facts are important—we must verify it, before accepting it. How is it verified? By *submitting each of its constituent inferences to the primordial test of Consciousness.* The test with regard to objects within range of sense is obviously the reduction of Inference to Sensation. The test with regard to axioms, or general principles transcending sense, is conformity with the laws of thought; when we have thus verified a fact we have attained the highest degree of certitude.

The mental vision by which in Perception we see the *unapparent* details—*i.e.*, by which sensations formerly coexisting with the one now affecting us are reinstated under the form of ideas, which represent the objects—is a process closely allied to Ratiocination, which also presents an *ideal series* such as, if the objects were before us, would be a series of sensations, or perceptions. A chain of reasoning is a chain of inferences, which are *ideal presentations* of the details now *unapparent to sense.* Could we realise

[1] Hamilton: *Logic*, i. 77.

all the links in this chain, by placing the objects in their actual order as a visible series, the chain of reasoning would be a succession of perceptions, and would cease to be called reasoning. The path of the planets is seen by reason to be an ellipse; it would be perceived as a fact if we were in a proper position, and endowed with the requisite instruments to enable us to follow the planet in its course. Not having this advantage, we infer the unapparent points in its course, from those which are apparent. We see them mentally. In like manner, suppose a human body is discovered under conditions which suggest that it has been burned, but without sufficient indication of the cause—*i.e.*, the facts antecedent to the burning. Some one suggests that these unapparent facts are those of Spontaneous Combustion. Our greater familiarity with the facts of combustion in general, and with the facts of the animal organism, enables us to *see* that this explanation is absurd; we mentally range the supposed objects before us, and see that *such* an order of co-existences and successions is in contradiction to all experience; we cannot see what the actual order was, but see clearly that it was not *that*.

Correct reasoning is the ideal assemblage of objects in their true relations of co-existence and succession. It is seeing with the mind's eye. Bad reasoning results from overlooking either some of the objects, or their relations; some links are dropped, and the gap is filled up from another series. Thus the traveller *sees* a highwayman, where there is truly no more than a sign-post in the twilight; and a philosopher, in the twilight of knowledge, *sees* a pestilence foreshadowed by an eclipse.

These considerations may elucidate the real meaning to be assigned to Facts, which are sometimes taken to express the order of external things, and sometimes our conception of that order—our *description* of it; just as sound means both the vibrations of the air and our sensation of them. There is a general tendency to use the word Fact for a final truth. "This is a fact, not a theory," means, "This is an indisputable truth, not a disputable *view* of the truth." But if, as we have seen, Facts are inextricably mingled with Inferences, and if both Perception and Reasoning are processes of *mental vision reinstating unapparent details*, and liable to error in the inferences, it is clear that the radical antithesis is not between Fact and Theory, but between *verified and unverified Inferences*.

The antithesis between Fact and Theory is untenable, for the same statement may be either a fact or a theory, without any change in its evidence. It is a fact that the earth is globular. It is a fact that this globe is an oblate spheroid. It is a fact that its orbit is elliptical. No one doubts that these are facts, no one doubts that they are theories. Shall we say that they were theories until they were verified, when they became facts? This will not extricate us; since all facts require verification before they are admitted as truths; up to that point they are not less inferential than theories.

I see an apple now falling, and I see an apple which has fallen. These are two facts which ordinary language will not suffer us to call theories. Now consider two theories which ordinary language suffers us to call facts—namely, that all apples when unsupported will fall, and that the spaces fallen through will be as the squares of the times. These

are two theories of extreme generality, which are far more indisputable than the facts we have contrasted them with. They carry such certainty that no mind having the requisite preparation can for a moment hesitate in assenting to them. They are inferences which are necessities. Whereas the inferences involved in the facts before named may very easily be erroneous. The falling object may not be an apple; the apple found at the foot of the tree may not have fallen, but have been plucked and placed there. Thus doubt is permissible; and if the facts carried any importance we should be bound to verify the accuracy of our inferences. No doubt is permissible in respect to the two theories, because the inferences on which they rest have already been vigorously verified. They carry none of those possibilities of error which we know may be carried by individual experiences; all such possibilities have been eliminated in the establishment of the general truth. Should any individual experience seem in contradiction with a thoroughly verified theory, should a hundred individual experiences contradict it, our confidence would suffer no disturbance; we should at once assign them to the interference of some *condition not included in the formula*. That condition might be wholly undiscoverable, but we should be certain that the laws of nature were invariable; and our experience of disturbing influences is sufficiently extensive to invoke them in every apparent exception to a law. If it happened that two magnets placed side by side impressed on a particle of iron a velocity greater, or less, than the sum of the velocity due to each magnate acting separately, and if this were to occur a thousand times, we should not doubt the truth of the law that the velocity is proportional to the force, but should attribute this exception to some exceptional condition, such as the influence of one magnet on the other. The reason is simple: the law has been rigorously verified; the absence of any exceptional condition has not been verified, whereas the presence of such a condition is suggested by manifold experiences in analogous cases.

Failing thus to discover any valid antithesis between Fact and Theory, we must look upon the ordinary distinction as simply verbal. Shall we express it by the terms Description and Explanation, implying that a Fact describes the order of phenomena, and a Theory interprets that order? For many purposes this would suffice. Yet on examination we shall find that an Explanation is only a fuller Description: more details are introduced, greater precision is given, the links in the chain which are unapparent to sense are made apparent to reason; but the essential mystery is untouched; successions are enumerated, but causation escapes. Thus in the description of falling bodies, greater fulness and precision of detail are given when the unapparent links are added, and the law of gravitation is introduced as the explanation. In like manner the description of an event, say the destruction of a house by a fire, acquires greater fulness and precision of detail when the apparent details are completed by some eye-witness who saw the fire break out, and explains it by this enumeration of details. In each case the objects are ranged in their order, and are *seen* thus; but in each case many objects are not seen, many intermediate links are overlooked, or are undiscoverable; and the causal nexus is for ever undiscoverable. Thus it is that explanations are descriptions,

and descriptions are explanations, facts are theories, and theories facts. Science is the explanation of nature; the systematic co-ordination of the facts of co-existence and succession.

§ 16. In the preceding paragraphs we have vindicated the necessity of the subjective current, and its dangers. The weakness of the Subjective Method is its impossibility of applying Verification; whereas the security of the Objective Method lies in its vigilant Verification. In both the mind has to supply the *formal* elements; in both it has to link together sensations by inferences, and to classify objects according to inferred relations. But the Objective Method simply co-ordinates the materials furnished by Experience; it introduces no new materials; or if it admits them, it does so provisionally and hypothetically; they are not accepted as real objects until their reality has been otherwise established. Whereas the Subjective Method is perpetually overstepping the limits that divide the material from the formal; its tendency is to confound concepts with percepts, ideas with objects, conjectures with realities. It commits the fault of drawing *material* from the Subject, instead of drawing only *form*. It takes up an inference and treats it as a fact, and thus gives its own fictions the character of reality. Because it cannot apply Verification it assumes that the order of ideas must correspond with the external order if no disorder (contradiction) be displayed. Hence it is that metaphysical conclusions are sometimes so audaciously at variance with what is known of the external order.[1]

§ 17. The Objective Method is incapable of reaching any results without the large employment of Inference, the successive steps of discovery being Observation, Hypothesis, and Verification. It is distinguished from the Subjective Method, not by its *aim*, which is in both that of co-ordinating the relations of objects, but by its principle of seeking the relations in the order of the objects themselves, instead of in the order of our ideas: submitting therefore every Inference to the control of Verification, and refusing to accept a conjecture as a fact until it has been tested by confrontation with the external order. The cardinal distinction between Metaphysics and Science lies in Method, not in the nature of their topics; and the proof of this is exemplified in the fact that a theory may be transferred from Metaphysics to Science simply by the addition of a verifiable element; or, conversely, may be transferred from Science to Metaphysics by the withdrawal of this same verifiable element. Thus the law of gravitation is a scientific theory; but if we withdraw from it the verifiable formula "inversely as the square of the distance and directly as the mass," there remains only the occult Attraction—which is metaphysical. On the other hand, if to a metaphysical theory of gravitation, which explains the phenomena by Attraction or an "inherent virtue," we add the verifiable formula of its mode of action, the purely subjective conception passes at once into the objective region, and a scientific theory results.

§ 18. In the course of the history of Philosophy we incessantly witness the

[1] Hegel, for instance, bases his system on Contradiction. So far from admitting that a thing cannot be the contrary of that which it is, he affirms, as a fundamental principle, that "everything is at once that which it is and the contrary of that which it is."

disastrous effects of transporting the *formal* elements of knowledge into the region of *material* elements—"realising abstractions," as it is called—and deducing conclusions from unverified inferences as if they had been verified. We witness the efforts of philosophers to interpret the external order by the internal order, animating Nature with human tendencies, interpreting *motors* by *motives*. Thus, because we derive our conceptions of Force and Cause from our own efforts and volitions, we interpret the changes seen without us by the changes felt within us. This is the source of the Fetichism of children and savages; of the Polytheism of early nations; and, by a gradual refinement in abstraction, of the Metaphysics and Physics of philosophers. Causes are first personified; next raised into Deities; then, by gradual elimination of the personal qualities, transformed into Entities; and finally resolved into Forces, which are exponents of relations. Thus first disappears the Will, next the independent existence; and what finally remains is an *abstract expression of the observed order*.

§ 19. To make the two Methods more readily appreciable by exhibiting them in operation, I will select an imaginary case and two real cases.

From a country where clocks are unknown, even by tradition, two travellers arrive, and in the kitchen of the cottage where they are first received they observe with astonishment an eight-day clock. The phenomena it presents are so novel that our travellers at once begin attempting an explanation. Now, all explanation consists in bringing the unknown facts under certain general facts already known; only by finding what the unknown is *like*, can it be classed and known. In the present case the new phenomena resemble certain phenomena observed in animals. Hence the first rough approximation to an explanation is the conjecture that the clock must be alive. Suppose one of the travellers to be uncultivated, and still in the fetichistic stage, he will at once *conclude from his conjecture* that the clock is a fetich, and is inhabited by a good or evil Spirit. Let us, however, suppose him to have emerged from the primitive stage of intellectual development, and to have become a thoughtful metaphysician. His companion we will suppose to have been trained in Science and its methods. Both start from the spontaneous hypothesis that the clock is alive, this being the conjecture which most naturally ranges the new phenomena under known phenomena. Let us now watch their procedure.

A is a subjective philosopher, and, not aware of the absolute necessity of verifying his hypothesis, proceeds to apply it, and to deduce explanations of the clock-phenomena from the known facts of animal life. The ticking resembles the regular sounds of breathing; the beating of the pendulum is like the beating of the heart; the slow movements of the hands are they not movements of feelers in search of food? the striking of the hours are they not cries of pain or expressions of anger? If the hours are struck just as he approaches the clock to examine it, or has laid hold of it, the coincidence easily suggests rage or terror as the cause; and he having once formed that conception, all subsequent experience of the clock striking when he is at a distance from it, or when no one is in the kitchen, will fail to shake it, but will be accommodated to it by other explanations.

By continuing to observe the phenomena his first rough explanation would gradually be modified, and give place to one more consistent with the facts. A variety of ingenious explanations would occur; but they would all be vitiated by the absence of any verification of the data. He observes a certain periodicity in the recurrence of the cries. There is a regularity in the succession of these cries—one being always followed by two, and two by three, and so on up to twelve; after which one recurs and two and three in the old order. To his great delight he at last observes a coincidence between each of these cries and the position of the hands on the dial-plate; the longer hand always pointing to twelve, and the shorter hand to the number corresponding with the cries. Hence he properly infers a causal connection; but *what* that is he can only guess; out of several guesses he selects the most plausible. He propounds his explanation to his friend B with perfect confidence in its truth.

B hereupon impatiently points out the treacherous nature of the procedure A has followed. "My dear fellow, you seem unaware that your starting-point requires strict examination. You assume the vitality of the clock, and, having assumed this, you interpret by it the resemblance of ticking to breathing, and of the sounds to cries of pain and anger. But the clock may be alive, and yet these resemblances may be fallacious; they must be verified before they can be accepted; and if the clock is *not* alive? You muddle yourself with Metaphysics, and amuse yourself with drawing deductions, instead of verifying your data. In classing the new facts under old facts it is necessary that we should assure ourselves that the resemblance we imagine is a real resemblance, and springs from similar roots. To effect this, rigorous Analysis is indispensable. But on your Subjective Method there is no analysis of objects, only of ideas. Let me describe the course of my own investigations, guided by that Method which Science has taught me to rely on.

"Like you, I conjectured that an animal was before me. What animal? I first perceived that in many respects it was unlike all animals known to me; and, pursuing this track, I found so many points of unlikeness, and these of such significance in animal life, that *another* conjecture emerged, and I asked, Is it an animal at all? Here were two starting-points, both conjectural, both needing verification. I chose to begin upon the second, and for this reason: if the clock were not an animal, the natural inference was that it must be a machine. I was already familiar with many machines, more so than with organisms, and I began trying how far the observed phenomena could be brought under the known facts of mechanism. Now observe the operation of scientific method! You might have joined with me in forming precisely the same conjectures, but you would have started off at a tangent, and would have deduced from mechanical facts just as you deduced from vital facts, without troubling yourself about Verification. Had I not employed that potent instrument Analysis, I should never have discovered the truth about the clock. The complex facts had to be decomposed, and their elements ascertained. As this could not (successfully) be done by analysis of my ideas, I had no alternative but to take the clock to pieces, bit by bit, in the search after the objective condition of each element in this complex whole. I removed the

dial-plate, then the back, finally the whole external case; but still the pendulum swung, still the sounds regularly succeeded. Accidentally arresting the pendulum, I found that all the phenomena disappeared; restoring its swing, I restored the phenomena. After repeating this often enough to eliminate all possibilities of coincidence I came to the conclusion that the clock-phenomena were dependent on the motion of the pendulum. This was one step, and an important one; but it was no explanation. There were two questions still to be answered: What makes the pendulum move in this manner? and how does its motion effect the observed results? Had I been deprived of the means of objective analysis, unable to take the clock to pieces, I should have been reduced to your procedure—ingenious guessing. But Observation having disclosed the ascent of one weight and descent of another, I conjectured that this motion was connected with the striking of the hours: I verified it by pulling the descending weight, and I found that, as I pulled, the hands revolved, and the sounds, previously heard at long intervals, now rapidly succeeded each other. Having laid bare the interior, I could trace the action of each part of the mechanism. I found that each beat of the pendulum detached one tooth of a wheel, and thus liberated the arrested movement of that wheel. I observed that these liberations were pulses coinciding with the tickings, and that the movements of the hands coincided with these movements of the wheel, every sixty revolutions of the wheel coinciding with each stroke of the clock. Having thus *explained* the mechanism, I rejected the idea of the clock being an organism, as a needless and unacceptable hypothesis. I found that it resembles other mechanisms in all its essential characters, whereas it wants the primary character of an organism, that of drawing its force from Nutrition."

§ 20. Even those who may object that our scientific traveller has too obviously the advantage in this illustration will admit that the two procedures are characteristically opposed. It is in taking an object to pieces by Analysis, either real or ideal, that we learn to estimate its elements and thus to estimate the whole. The Subjective Method deduces the elements from the whole; and it is confirmed in this procedure by the success of Deductive Science. There is, however, a vital distinction between the Deductive Method and the Subjective Method, and it is this: in the former both data and conclusions are verified by confrontation with the external order. If truth is the correspondence between the order of ideas and the order of phenomena, the only right Method must be that which step by step assures the correspondence, demonstrating that the order of our ideas is also that of the phenomena they represent.

§ 21. I have still to exemplify the operation of the rival Methods by two cases that have not the drawback which may attach to imaginary illustration. The first shall be borrowed from Broussais, in his contrast of Brown's system with his own:—

A survey of the phenomena of life led both to the general conception of Excitation as the constant condition of all vital phenomena, and therefore as a compendious expression which resumed the general facts. Up to this point both followed the Objective Method. *From* this point the divergence was great:

"Nous professons d'abord avec Brown, que la vie ne s'entretient que par l'excitation. Mais nous abandonnons aussitôt cet auteur, parce qu'il prend la voie de l'abstraction en dissertant toujours sur *l'excitation considérée en elle-même;* nous aimons mieux *étudier ce phénomène dans les organes* et dans les tissus qui les composent, ou plutôt observer les organes et les tissus excités."[1]

§ 22. Our second illustration shall be taken from the instructive though deplorable hypothesis of Spirit-rapping, which is an indelible disgrace to the education of our age.

A few persons stand round a table, gently resting their hands on it, but careful not to push in any direction. In a little while the table moves, at first slowly, afterwards with growing velocity. The persons are all of the highest respectability, above suspicion of wilful deceit. The phenomenon is so unexpected, so unprecedented, that an explanation is imperiously demanded. In presence of unusual phenomena, men are unable to remain without some explanation which shall render intelligible to them how the unusual event is produced. They are spectators merely; condemned to witness the event, unable to penetrate directly into its causes, unable to get behind the scenes and *see* the strings which move the puppets, they *guess* at what they cannot see. Man is *interpres Naturæ*. Whether he be metaphysician or man of science, his starting-point is the same; and they are in error who say that the metaphysician differs from the man of science in drawing his explanation from the recesses of his own mind in lieu of drawing it from the observation of facts. Both observe facts, and both draw their interpretations from their own minds. Nay, as we have seen, there is necessarily, even in the most familiar fact, the annexation of mental inference—some formal element added by the mind, suggested by, but not given in, the immediate observation. Facts are the registration of direct observation and direct inference, congeries of particulars partly sensational, partly ideal. The scientific value of facts depends on the validity of the inferences bound up with them; and hence the profound truth of Cullen's paradox, that there are more false facts than false theories current.

The facts comprised in the phenomenon of "Table-turning" are by no means so simple as they have been represented. Let us, however, reserve all criticism, and fix our attention solely on the phenomenon, which, expressed in rigorous terms, amounts to this: the table turns; the cause of its turning is unknown. To explain this, one class of metaphysical minds refers it to the agency of an unseen Spirit. Connecting the spiritual manifestation with others which have been narrated to him, the interpreter finds no difficulty in believing that a Spirit moved the table; for "the movement assuredly issued from no human agency"; the respectable witnesses "declared they did not push." Unless the table moved itself, therefore, his conclusion must be that it was moved by a Spirit.

Minds of another class give another explanation, one equally metaphysical, although its advocates scornfully reject the spiritual hypothesis. These minds are indisposed to admit the existence of Spirits as agents in natural phenomena; but their interpretation, in spite of its employing the language of Science, is as utterly removed from scientific method as

[1] Broussais: *De l'Irritation*, 2nd ed. 1839, i. 55.

the spiritual interpretation they despise. They attribute the phenomenon to Electricity. Connecting this supposed electrical manifestation with some other facts which seem to warrant the belief of nervous action being identical with electricity, they have no hesitation in affirming that electricity streams from the tips of the fingers. It is even suggested by one gentleman that "the nervous fluid has probably a rotatory action, and a power of throwing off some of its surplus force." How entirely these ideas of nervous fluid, rotatory power, and surplus force are additions drawn from the imagination and not supplied in the objects, I need scarcely pause to point out.

Each of these explanations has been very widely accepted by the general public. The obvious defect in both lies in the utter absence of any objective guarantee. We ought to be satisfied with no explanation which is without its valid guarantee. Before we purchase silver spoons we demand to see the mark of Silversmiths' Hall, to be assured that the spoons are silver, and not plated only. The test of the assayer dispels our misgivings. In like manner, when the motion of a table is explained by spiritual agency, instead of debating whether the spirit "bring airs from heaven or blasts from hell," we let our scepticism fall on the preliminary assumption of the spirit's presence. Prove the presence of the spirit before you ask us to go further. *If present*, the spirit is perhaps capable of producing this motion of the table; we do not know whether it is, for we know nothing about spirits; at any rate, the primary point requiring proof is the presence of the spirit; we cannot permit you to assume such a presence merely to explain such a movement; for if the fact to be explained is sufficient proof of the explanation, we might with equal justice assume that the movement was caused by an invisible dragon who turned the table by the fanning of his awful wings. If it is permissible to draw material from the Subject, and to make such assumption valid as regards objects, our right to assume the dragon is on a par with our right to assume the spirit.

A similar initial error is observable in the electrical hypothesis. Electricity may be a less intrinsically improbable assumption, but its presence requires proof. After that step had been taken, we should require proof that electricity could comport itself with reference to tables and similar bodies in this particular manner. We have various tests for the presence of electricity; various means of ascertaining how it would act upon a table. But seeing that the gentleman who spoke so confidently of "currents issuing from the tips of the fingers" never once attempted to prove that there *were* currents; and knowing, moreover, that these currents, if present, would *not* make a table turn, all men of true scientific culture dismissed the explanation with contempt.

Such were the metaphysical explanations of the phenomenon. They are vitiated by their Method. Very different was that pursued by men of science. The object sought was the unknown cause of the table's movement. To reach the unknown we must pass by the Objective Method through the avenues of the known; we must not attempt to reach it through the unknown. Is there any known fact with which this movement can be allied? The first and most obvious suggestion was that the table was pushed by the hands which rested on it. There is a

difficulty in the way of this explanation—namely, "that the persons declare solemnly they did *not* push; and, as persons of the highest respectability, we are bound to believe them." Is this statement of any value? The whole question is involved in it. But the philosophical mind is very little affected by guarantees of respectability in matters implicating sagacity rather than integrity. The Frenchman assured his friend that the earth did turn round the sun, and offered his *parole d'honneur* as a guarantee; but in the delicate and difficult question of science, *paroles d'honneur* have a quite inappreciable weight. We may therefore set aside the respectability of the witnesses, and, with full confidence in their integrity, estimate the real value of their assertion, which amounts to this: they were *not conscious* of pushing. If we come to examine such a case, we find Physiology in possession of abundant examples of muscular action unaccompanied by distinct consciousness, and some of these examples are very similar to those of the unconscious pushing, which may have turned the table; and we are thus satisfied of three important points:—1. Pushing is an adequate cause, and will serve as well as either the supposed spirit or electricity to explain the movement of the table. 2. Pushing *may* take place without any distinct consciousness on the part of those who push. 3. Expectant attention is known to produce such a state of the muscles as would occasion this unconscious pushing.

Considered, therefore, as a mere hypothesis, this of unconscious pushing is strictly scientific; it may not be true, but it has fulfilled the preliminary conditions. Unlike the two hypotheses it opposes, it assumes nothing previously unknown, or not easily demonstrable; every position has been or may be verified; whereas the metaphysicians have not verified one of their positions: they have not proved the presence of their agents, nor have they proved that these agents, if present, would act in the required manner. Of spirit we know nothing, consequently can predicate nothing. Of electricity we know something, but what is known is *not* in accordance with the table-turning hypothesis. Of pushing we know that it can and does turn tables. All, then, that is required to convert this latter hypothesis into scientific certainty is to prove the presence of the pushing in this particular case. And it is proved in many ways, positive and negative, as I showed when the phenomenon first became the subject of public investigation. Positive, because if the hands rest on a loose table-cloth, or on substances with perfectly smooth surfaces which will glide easily over the table, the cloth or the substances will move, and not the table. Negative, because if the persons are duly *warned* of their liability to unconscious pushing, and are told to keep vigilant guard over their sensations, they do not move the table, although previously they may have moved it frequently. When we have thus verified the presence of unconscious pushing, all the links in the chain have been verified, and certainty is complete.

§ 23. Reviewing the three explanations which the phenomenon of table-turning called forth, we elicit one characteristic as distinguishing the scientific or Objective Method—namely, the *verification* of each stage in the process, the guaranteeing of each separate point, the cultivated caution of proceeding to the unknown solely through the avenues of the known. The *germinal* difference, then, between

the metaphysical and scientific Methods is not that they draw their explanations from a different source, the one employing Reasoning where the other employs Observation, but that the one is content with an explanation which has no further guarantee than is given in the logical explanation of the difficulty; whereas the other imperatively demands that every assumption should be treated as provisional, hypothetical, until it has been confronted with fact, tested by acknowledged tests—in a word, *verified*. The guarantee of the metaphysician is purely logical, subjective: it is the *intellectus sibi permissus;* the guarantee of the other is derived from a correspondence of the internal with the external order. As Bacon says, all merely logical explanations are valueless, the subtlety of nature greatly surpassing that of argument: "Subtilitas naturæ subtilitatem argumentandi multis partibus superat"; and he further says, with his usual felicity, "Sed axiomata à particularibus ritè et ordine abstracta nova particularia rursus facilè indicant et designant." It is these "new particulars" which are reached through those already known, and complete the links of the causal chain.

Open the history of Science at any chapter you will, and its pages will show how all the errors which have gained acceptance gained it because this important principle of verification of particulars was neglected. Incessantly the mind of man leaps forward to "anticipate" Nature, and is satisfied with such anticipations if they have a logical consistence. When Galen and Aristotle thought that the air circulated in the arteries, causing the pulse to beat, and *cooling* the temperature of the blood, they were content with this plausible anticipation; they did not verify the facts of the air's presence, and its cooling effect; when they said that the "spirituous blood" nourished the delicate organs, such as the lungs, and the "venous blood" nourished the coarser organs, such as the liver; when they said that the "spirit," which was the purer element of the blood, was formed in the left ventricle, and the venous blood in the right ventricle, they contented themselves with unverified assumptions. In like manner, when in our own day physiologists of eminence maintain that in the organism there is a Vital Force which suspends chemical actions, they content themselves with a metaphysical unverified interpretation of phenomena. If they came to rigorous confrontation with fact, they would see that, so far from chemical action being "suspended," it is incessantly at work in the organism; the varieties observable being either due to a difference of conditions (which will produce varieties out of the organism), or to the fact that the action is masked by other actions.

§ 24. If the foregoing discussion has carried with it the reader's assent, he will perceive that the distinguishing characteristic of Science is its Method of graduated Verification, and not, as some think, the employment of Induction in lieu of Deduction. All Science is deductive, and deductive in proportion to its separation from ordinary knowledge and its co-ordination into System. The true antithesis is not between Induction and Deduction, but between verified and unverified cases of Induction and Deduction. The difference between the ancient and modern philosophies lies in the facility with which the one accepted axioms and hypotheses as the basis for its deductions, and the cultivated caution

with which the other insists on verifying its axioms and hypotheses before deducing conclusions from them.[1] We guess as freely as the ancients; but we know that we are guessing; and if we chance to forget it, our rivals quickly remind us that our guess is not evidence. Without guessing, Science would be impossible. We should never discover new islands did we not often venture seawards with intent to sail beyond the sunset. To find new land, we must often quit sight of land. As Dr. Thomson admirably expresses it: "Philosophy proceeds upon a system of credit, and if she never advanced beyond her tangible capital, our wealth would not be so enormous as it is."[2] While both metaphysician and man of science trade on a system of credit, they do so with profoundly different views of its aid. The metaphysician is a merchant who speculates boldly, but without that convertible capital which can enable him to meet his engagements. He gives bills, yet has no gold, no goods to answer for them; these bills are not representative of wealth which exists in any warehouse. Magnificent as his speculations seem, the first obstinate creditor who insists on payment makes him bankrupt. The man of science is also a venturesome merchant, but one fully alive to the necessity of solid capital which can on emergency be produced to meet his bills; he knows the risks he runs whenever that amount of capital is exceeded; he knows that bankruptcy awaits him if capital be not forthcoming.

§ 25. Astronomy became a science when men began to seek the unknown through the known, and to interpret celestial phenomena by those laws which were recognised on the surface of the earth. Geology became possible as a science when its principal phenomena were explained by those laws of the action of water, visibly operating in every river, estuary, and bay. Except in the grandeur of its sweep, the mind pursues the same course in the interpretation of geological facts which record the annals of the universe, as in the interpretation of the ordinary incidents of daily life. To read the pages of the great Stone-book, and to perceive from the wet streets that rain has recently fallen, are the same intellectual processes. In the one case the mind traverses immeasurable spaces of time, and infers that the phenomena were produced by causes similar to those which have produced similar phenomena within recent experience; in the other case, the mind similarly infers that the wet streets and swollen gutters have been produced by the same cause we have frequently observed to produce them. Let the inference span with its mighty arch a myriad of years, or span but a few minutes, in each case it rises from the ground of certain familiar indications, and reaches an antecedent known to be capable of producing these indications. Both inferences may be wrong: the wet streets may have been wetted by a water-cart, or by the bursting of a pipe. We cast about for some other indication of rain besides the wetness of the streets and the turbid rush of gutters, which might equally have been produced by the bursting of a water-pipe. If we see

[1] Mr. Bayma, *Molecular Mechanics*, 1866, p. 3, speaks of those "modern thinkers who despise the deductive method as a useless relic of the past." They must be very shallow thinkers who do not see that it is the Subjective, not the Deductive, Method which is the useless relic of the past.

[2] Thomson: *Outlines of the Laws of Thought*, p. 312.

passers-by carrying wet umbrellas, some still held above the head, our inference is strengthened by this indication that rain, and no other cause, produced the phenomena. In like manner, the geologist casts about for other indications besides those of the subsidence of water, and as they accumulate his conviction strengthens.

§ 26. While this is the course of Science, the course of Metaphysics is very different. Its inferences start from no well-grounded basis; the arches they throw are not from known fact to unknown fact, but from some unknown to some other unknown. Deductions are drawn from the nature of God, the nature of Spirit, the essences of Things, and from what Reason can postulate. Rising from such mists, the arch so brilliant to look upon is after all a rainbow, not a bridge.

To make his method legitimate, the metaphysician must first prove that a co-ordinate correspondence exists between Nature and his Intuitional Reason,[1] so that whatever is true of the one must be true of the other. The geologist, for example, proceeds on the assumption that the action of waters was essentially the same millions of years ago as it is in the present day; so that whatever can be positively proved of it *now* may be confidently asserted of it *then*. He subsequently brings evidence to corroborate his assumption by showing that the assumption is necessary and competent to explain facts not otherwise to be consistently explained. But does the metaphysician stand in a similar position? Does he show any validity in his preliminary assumption? Does he produce any evidence for the existence of a nexus between his Intuitional Reason and those noumena or essences about which he reasons? Does he show the probability of there being such a correspondence between the two that what is true of the one may be accepted as probable of the other? Nothing of the kind. He assumes that it is so. He assumes, as a preliminary to all Philosophy, that Intuitional Reason is competent to deliver verdicts, even when the evidence is entirely furnished by itself. He assumes that his Intuitions are face to face with Existences, and have consequently immediate knowledge of them. But this immense assumption, this gratuitous begging of the whole question, can only be permitted after a demonstration that the *contrary* assumption must be false. Now, it is certain that we can assume the contrary, and assume it on evidence as cogent as that which furnishes his assumption. I can assume that Intuitions are not face to face with Existences; indeed, this assumption seems to me by far the most probable; and it is surely as valid as the one it opposes? I call upon the metaphysician to prove the validity of his assumption, or the invalidity of mine. I call upon him for some principle of verification. He may tell me (as in past years the Hegelians used to tell me, not without impatience) that "Reason must verify itself"; but unhappily Reason has no such power; for if it had, Philosophy would not be disputing about first principles; and

[1] By Intuitional Reason I here wish to express what the Germans call *Vernunft*, which they distinguish from *Verstand*, as Coleridge tried to make Englishmen distinguish between Reason and Understanding. The term Reason is too deeply rooted in our language to be twisted into any new direction; and I hope by the unusual "Intuitional Reason" to keep the reader's attention alive to the fact that by it is designated the process of the mind engaged in transcendental inquiry.

when it claims the power, who is to answer for its accuracy, *quis custodiet ipsos custodes?* If Ontology is possible, its only basis rests on the *assumed* correspondence of the external and internal orders, a basis shown by Psychology to be excessively treacherous. If all concepts are reducible to percepts, and our widest generalisations are only Re-presentations of what originally was Presentation, Ontology has no standing place. Its data are figments—subjective constructions in which formal elements are transmuted into material elements, relations are transformed into objects, abstractions are personified and endowed with reality.

§ 27. The objects with which Ontology concerns itself do not admit of Presentation (*Anschauung*), consequently its conclusions are incapable of being verified. We can never know whether the assumed correspondence between the order in our thoughts and the order in things is a real correspondence. For example, Cause is a concept constructed out of formal elements—an inference which posits the reality of something over and above the unconditional antecedence and sequence given in Experience. Let us admit the reality; we cannot safely proceed beyond the inference; we cannot justify our transformation of this inference into an object having knowable qualities; we are not entitled to found inferences on this inference. Cause then remains a nebulous thought. If we attempt to define it, our definitions will be arbitrary; if attempt to deduce from it, our deductions will be figments. Herein lies the distinction between Mathematics and Metaphysics: the one can, and the other cannot, be reduced to Presentation; the one has, and the other has not, an objective basis and a constant verification. The material elements of Mathematics are physical facts gained through Sense; the formal elements are simply serial dispositions of the objects; and thus the widest reaches of mathematical speculation are only the *writing out* of objective knowledge, the development of identical propositions.[1]

§ 28. Metaphysicians proceed on the assumption that Intuitional Reason, which is independent of Experience, is absolute and final in its guarantee. The validity of its conclusions is self-justified. Hegel boldly says, "Whatever is rational is real, and whatever is real is rational—*das Vernünftige ist wirklich und das Wirkliche vernünftig.*" And writers of less metaphysical rigour frequently avow the axiom, and always imply it. Thus in a remarkable article on Sir W. Hamilton, which appeared in the *Prospective Review*, we read that Philosophy in England has dwindled down to mere Psychology and Logic, whereas its proper business is with the notions of Time, Space, Substance, Soul, God; "to pronounce upon the validity of these notions as revelations of real Existence, and, if they be reliable, use them as a bridge to cross the chasm from relative Thought to absolute Being. Once safe across, and gazing about it in that realm, the mind stands in presence of the objects of Ontology."

"Once safe across"; this is indeed the step which constitutes the whole journey; unhappily we have no means of getting safe across; and in this helplessness we had better hold ourselves aloof

[1] On the contrast between Mathematics and Metaphysics, see the admirable essay of Kant: *Untersuchungen über die Deutlichkeit der Grundsätze der natürlichen Theologie und der Moral;* and Apelt: *Die Metaphysik*, § 6. Compare Mansel: *Metaphysics*, p. 285. I have argued the point more fully in the chapter on Spinoza, in the *History of Philosophy*, vol. ii., pp. 211-215.

from the attempt. If a man were to discourse with amplitude of detail and eloquence of conviction respecting the inhabitants of Sirius, setting forth in explicit terms what they were like, what embryonic forms they passed through, what had been the course of their social evolution, and what would be its ultimate stage, we should first ask, And pray, Sir, what *evidence* have you for these particulars? what guarantee do you offer for the validity of these conclusions? If he replied that Intuitional Reason assured him these things must be so from the inherent necessities of the case, he having logically evolved these conclusions from the data of Reason, we should suppose him to be either attempting to mystify us, or to be hopelessly insane. Nor would this painful impression be removed by his proceeding to affirm that he never thought of trusting to such fallacious arguments as could be furnished by Observation and Experiment—tests wholly inapplicable to objects so remote from all experience, and accessible only by Reason.

In the present day, speculations on the Metaphysical Method are not, intrinsically, more rational than theories respecting the development of animated beings peopling Sirius; nay, however masked by the ambiguities of language and old familiarities of speculation, the attempt is really less rational, the objects being even less accessible. Psychology has taught us one lesson at least—namely, that we cannot know causes and essences, because Experience is limited to sequences and phenomena. Nothing is gained by despising Experience, and seeking refuge in Intuitional Reason. The senses may be imperfect channels, but at any rate they are in direct communication with their objects, and are true up to a certain point. The error arising from one sense may be corrected by another; what to the eye appears round, the hand feels to be square. But Intuitional Reason has no such safeguard. It has only itself to correct its own errors. Holding itself aloof from the corroborations of Sense, it is aloof from all possible verification, because it cannot employ the test of confrontation with fact.

This conviction has been growing slowly. It could never have obtained general acceptance until the Metaphysical Method had proved its incapacity by centuries of failure. In the course of the history of philosophy we shall see the question of Certitude continually forced upon philosophers, always producing a crisis in speculation, although always again eluded by the more eager and impatient intellects. Finally, these repeated crises disengage the majority of minds from so hopeless a pursuit, and set them free to follow Science which *has* Certitude.

§ 29. History with overwhelming evidence proves the incompetence of the Subjective Method; Psychology with irresistible force displays the cause. It is a common mistake to suppose that this Method is followed by metaphysicians exclusively; they, indeed, have uniformly employed it, and were forced by the nature of their inquiries to employ it; but savans unhappily have shown a fatal facility in employing it likewise, and have thereby obstructed the advance of knowledge. All we can say is that only on the Objective Method has Science been successful; because only by the verification of conceptions can Truth—which is the correspondence of the internal and external orders—be reached.

With the validity of the Subjective

Method stands or falls the truth of Metaphysics, since that is the Method which alone can be employed in such inquiries. There are three grand divisions of Metaphysics, and these are Psychology, Cosmology, and Theology. It is possible to treat all three on the Objective Method by restricting them to their corresponding phenomena, and waiving all inquiry into essential causes; but this is Science, and for the present we are dealing with Metaphysics; we will therefore follow Wolf, and adopt the scholastic terms, Rational Psychology, Rational Cosmology, and Rational Theology. And as many of my readers will probably be more disposed to accept Mr. Mansel's criticism of these delusive efforts to transcend Experience than a criticism from the positive point of view, I will here borrow his remarks:—

"The aim of Rational Psychology is to frame definitions exhibiting the essential nature of the soul and its properties, as realities conceived by the intellect, underlying and implied by the phenomena presented in consciousness; and to prove by a demonstrative process that the notions thus defined necessarily flow one from another. Psychology is thus raised from a science of observation to one of demonstration [more accurately, from a science of observation to one of inference and deduction from inferences]; and its objects are transformed from phenomena presented in experience to realities contemplated by the intellect. The soul, by virtue of its essential nature as a simple substance, is shown to possess, of necessity, certain attributes as rationally conceived and defined—such as sense, imagination, intelligence, will, spirituality, indestructibility, and so forth; and the same conclusions are even demonstrated of other spiritual natures which partake of the generic attribute of the soul." Mr. Mansel hereupon observes: "The weakness of the whole process is that it tacitly postulates as its starting-point a principle which is neither evident it itself, nor such as can be made evident by any process of thought. It assumes, that is to say, a transcendental definition of the real nature of the soul beyond and above the facts and relations which are manifested in consciousness. But how is the truth of such a definition to be guaranteed? Of the soul as a simple substance, apart from its particular modification, consciousness tells us nothing. How, then, is the abstract conception of the nature of the soul to be verified? It cannot be self-evident; for self-evidence is nothing more than the instantaneous assent of consciousness; and the assumption in question cannot be submitted to the judgment of consciousness at all. It cannot be demonstrable; for it could only be demonstrated by the assumption of a higher notion of the same kind, concerning which the same question would then have to be raised. It cannot be generalised from experience; for experience deals with the facts of consciousness only, and tells us not of what *must be*, but only of what *is* or *seems to be*. Unable to verify his fundamental definition by any reference to the reality which it is supposed to represent, the metaphysician is compelled to confine himself to the relations of the language by which it is represented."[1]

Mr. Mansel then examines Rational Cosmology, showing that it can "contain nothing more than an analysis of general notions, and can lead to no conclusions but such as the philosopher has himself virtually assumed in his premises. The

[1] Mansel: *Metaphysics*, p. 293.

abstract notion of the world contains implicitly whatever attributes we choose to assume as its constituents; and the metaphysical or logical analysis of that notion can contain no more."

Still more incisive is his criticism on Rational Theology, which starts from a nominal definition of the Deity. "How do we know," he asks, "that our conception at all corresponds to the nature of the Being whom it professes to represent?"

§ 30. It is the slow rise of the Objective Method and its gradual extension into regions formerly occupied by the Subjective Method which the history of philosophy will have to exhibit; and the exposition will be twofold, showing the failures of the one Method and the successes of its rival. Thus will be established the conclusion that no problem merits our attention unless its solution is verifiable, and all problems are unverifiable on the Subjective Method.

But on what does Verification rest? Before this can be answered it is requisite to discuss the much-debated question of the origin of knowledge, Have we any higher source than Experience? Is there a fountain of Truth which springs from a source independent of Experience? I shall have to treat this question by and by, but it is needed first to consider the nature of our Test of Truth.

III.—THE TEST OF TRUTH

§ 31. TRUTH being the correspondence between the internal and external order, what is the test of that correspondence? Widely as philosophers differ respecting the origin and scope of knowledge, they are unanimous in affirming that the ultimate test must lie in the verdict of Consciousness, whether the verdicts of Consciousness are, or are not, conformable with Objective Reality. Now, Consciousness is a word of delusive vagueness, and moreover some of its "verdicts" are confessedly false; the question thus arises, Which are certainly true? Metaphysicians implicitly, and sometimes explicitly,[1] assume that all "clear and distinct ideas" are true; an assumption which ill accords with the clearness and distinctness of hallucinations, and many false hypotheses. But those who are unprepared for so facile and delusive an answer as this, and who recognise that Consciousness may on occasions deliver false verdicts, desire to fix some criterion of its infallibility, *when* it is infallible.

A startling result discloses itself: Consciousness is only infallible in verdicts limited to identical propositions, or perhaps the better phrase would be propositions of equivalence—*e.g.*, "A is A," "whatever is is."[1] Here, and only here, there is no fallibility. No possibility of error weakens an identical proposition.

[1] As the Cartesians. It is thus boldly stated by Tschirnhausen: "verum est quidquid concipi potest; falsum vero quod non concipi potest."—*De Medicinâ Mentis*, 1687, quoted by Ueberweg: *Logik*. This canon receives its full illustration in Hegel.

[1] χρὴ τὸ λέγειν τε νοεῖν τ' ἐὸν ἔμμεναι. Parmenides: Fragm. v. 43.

Unhappily, this immunity from error accompanies an infertility of knowledge. It cannot serve as guidance, for it leads nowhither. Its security is imperilled by the first step in advance; for no sooner is one thing affirmed of another than, with this commencement of knowledge, fallibility of judgment commences: what is affirmed may be erroneously affirmed; the door has been opened, and error may creep in stealthily, or stalk in imperiously. Our only resource is vigilance: we challenge every object that presents itself, no matter how insignificant its aspect, and force it to declare its quality. This vigilance is Verification, or the ascertainment that every object *is* what it declares itself to be. The famous *principium identatis* is not indeed a *guide*, but it is a *test*.[1] Hegel, denying that it is a law of thought (allowing it only as "a law of the abstract understanding"), affirms that "no man thinks or speaks according to this law; to say that a planet is a planet and magnetism is magnetism every one holds to be frivolous."[2] Perhaps so; and Locke styled such propositions "frivolous";[3] nevertheless, the whole stress of Verification consists in reducing propositions to identity or equivalence.

Error arises with Inference, being indeed nothing but the misstatement of the correspondence between what is inferred and what exists. Only two ways of correcting this misstatement are open; and I formerly called them respectively the Real Test and the Ideal Test. The first is a reduction of the inference to a sensation (§ 15). The second is a reduction of the inference to a necessity of thought. Both are reductions to identical or equivalent propositions, which render their negatives unthinkable. The certainty of feeling *as* feeling cannot be disturbed. It is limpid evidence. If I feel cold, I may indeed err as to the external cause of my feeling, but not as to the feeling itself. The markings of a thermometer may assure me that the temperature of my body during ague-fit is higher than usual; but feeling is its own thermometer, and I am not mistaken in reading its indications when I simply say I *feel* colder, not hotter.

§ 32. This may seem somewhat trite; but if we follow the clue, it will lead us to large issues, one of them being the principle that the infallibility of Consciousness in each instance is the impossibility of a negative being thought. No one denies that an identical proposition is irresistible. Even Hegel, who, among other feats of logical legerdemain, showed that "Every A is at the same time not A," did not deny that A was A, whatever else it might be.

Identical propositions are frivolous when offered as enlargements of knowledge, but not when appealed to as tests of certainty. Condillac, who makes all reasoning consist in a translation of identical propositions, distinguishes between those which are frivolous because their identity is that of terms, and those which are serious because their identity is that of ideas. Thus, to say "six is six" teaches nothing, being only an iteration of the term; but to say "three added to three yield six" enlarges knowledge, by disclosing the same ideas under diversity of terms. "When we judge two men to be of equal size, we see one thing in the two things we compare—that

[1] "Es ist ein Princip des fixirenden Verstandes, nicht der erzeugenden Anschauung; der festen Ruhe, nicht der flüssigen Bewegung." Trendelenburg: *Logische Untersuchungen*, 1862, ii. 155.

[2] Hegel: *Encyclopädie*, § 115.

[3] Comp. Mansel: *Prolegomena Logica*, p. 191.

is to say, one size in two men, and we form an identical proposition."[1] It would be more correct to say that the identity here disclosed is that of *relation;* the ideas of three and three, and of six, and of man and man, are diverse, not identical: the terms "three and three" and "six" *de*note the same relations, *con*note different ideas. The relations are equivalent.

Our knowledge begins with the discernment of resemblances and differences: it ends in the establishment of *equations*, which are the resemblances abstracted from the differences, and raised into equivalents. At first sight no one would conclude that $2+1$ was the same as $4-1$: terms and ideas are obviously different; but that an equality exists we easily disclose: thus $2+1=3$, and $4-1=3$, and the identity becomes visible in the final equation, $3=3$.[2] If I say "Man is Man," it is an identical but uninstructive proposition, having, however, irresistible certainty, because the negative is unthinkable. If I say "Man is an Animal," it is by an equation with abstraction of differences, which may possibly be erroneous and only acquires irresistible force when an equivalence in the terms Man and Animal is disclosed. That if a force of 7 will produce a velocity of 3, another force of 21 will produce a velocity of 91, is an identical proposition, although the identity has to be disclosed in an equation: we cannot say that the ideas of 7, 21, 3, and 9 are the same; but we say that the relation of 7 to 21 being $\frac{1}{3}$, and the relation of 3 to 9 being also $\frac{1}{3}$, then $3=3=$ A is A. It is in the unfolding of such identities—the exhibition of uniform relations under different signs—that mathematics, and indeed all science, consists. Mr. Herbert Spencer has shown with masterly clearness how the establishment of relations of Likeness is the process of all reasoning—passing from Likeness to Identity, as it passes from qualitative to quantitative reasoning.[1] And the history of Science is the history of this process, tending towards that goal conceived by D'Alembert when he said, "L'univers, pour qui saurait l'embrasser d'un seul point de vue, ne serait, s'il est permis de le dire, qu'un fait unique et une grande vérité." We have already reached the sublime height of regarding all phenomena simply as modifications of each other, capable of being substituted for each other, being, indeed, only different *expressions* of equivalent *relations*, different *signs* of the same *quantities.* This is the grand doctrine of equivalents, which is illustrated in the convertibility of forces. It penetrates beneath the diversities of expression, and searches out the identities of nature.

The establishment of equations through abstraction of differences is the product of all reasoning. When the proposition $A=B$ is first presented, it is by no means an identical one: the obvious diversities in the two terms allow me to infer that the resemblances are by no means so great as to amount to *equivalence.* I can therefore easily think the negative of this proposition. But after repeated demonstration of this equivalence (A being indifferently used for B, and B for A, without variation in the result), the resemblance is seen to be so complete that it amounts to identity, and then the negative is unthinkable. To

[1] Condillac: *Langue des Calculs*, p. 64. Compare also D'Alembert: *Discours Préliminaire.*

[2] Comp. Delbœuf: *Logique scientifique*, p. 127.

[1] Herbert Spencer: *Principles of Psychology.*

establish identity under variety is the office of Investigation; to *exhibit* it is the office of Proof.

§ 33. It will doubtless have occurred to the reader that since Consciousness is the ultimate ground of appeal, and since Consciousness can never transcend its own sphere, we cannot possibly have a test of Objective Truth. In one sense this is correct. We never can know more than states of Consciousness; we cannot know Objects *per se*. But to reach the Truth we have no need for deeper knowledge, since Truth is simply *correspondence* between the internal and external order. That correspondence enables us to adjust our actions to external necessities; and we assure ourselves of its accuracy by the certainty of the adjustment. The touchstone of knowledge is *prevision*. I shall shortly have to consider the nature of the proofs which assure us that the subjective order is similar to the objective order; but for the present it is enough to have shown that the subjective test of a Truth is the unthinkableness of its negative; in other words, the reduction to A is A.

If this disclosure startles and discomposes the reader, the fault will lie with his exaggerated pretensions to infallible knowledge, which may be regarded as one of the disastrous errors of Philosophy. Instead of being contented with that degree of relative certainty which contents Science, and which permits prevision, and the adjustments consequent on prevision, Philosophy has been restless under the suggestion of doubt, and has required that its positions should not only be impregnable, but unassailable. There are many questions beyond the reach of demonstration. The existence of an external world, for instance, cannot be proved, if the highest degree of probability is rejected as insufficient. This has been declared a scandal to Philosophy; but the scandal lies in the demand for proof—the desire for better bread than can be made of wheat. We should interdict the question from being asked in terms that cannot be answered; it has no claim to be discussed, because the evidence on which it could be decided is not within the compass of human faculty. No astronomer would attend to the sceptic who should maintain that the law of gravitation was only an hypothesis, capable indeed of colligating the facts so that calculations accurately agreed with observation, and prevision was equal to vision, yet nevertheless, *in itself*, the process formulated in the law might be very different. The astronomer would rebuke such purposeless doubt, and would reply that the hypothesis had the highest degree of probability and the highest scientific effectiveness, so long as it was the basis of exact calculation, and received the corroboration of Observation; let a new hypothesis be proposed which exceeds it in reach and in accuracy, and the old one will give way; and not till then. In like manner the hypothesis of an external world carries conviction, and will not be disturbed until proved unsuitable to our needs.

As there is always room for error wherever the proposition is not identical, and as probability of varying degrees is all that can be attained in the majority of our conclusions, it is easy to extend the logical principle which determines infallibility where error is impossible, to the varying degrees of probability where error is possible. That which is the logical justification of A is A—namely, the *impossibility* of thinking its negative—is also the justification of a proposition constructed out of complex

and remote inferences, which have therefore only more or less probability—*i.e.*, a *difficulty* in admitting its negative. For what is the meaning of probability? The harmony of a conclusion with other and better-established conclusions: the likeness in phenomena to other well-known phenomena. When this likeness is ascertained to be complete, when the analogy is proved to be an equivalence, then probability gives place to certainty.

§ 34. A formidable opponent must now be met, and his challenge answered, before we can venture to proceed to the second part of this inquiry. That opponent is Mr. Stuart Mill, who, both in his *Logic* and in his work on *Hamilton*, argues at great length against the unthinkableness of a negative as any test at all. He considers it a lingering remnant of Metaphysics; and in his work on *Comte* expresses his surprise at finding Mr. Herbert Spencer and myself in company on this point with metaphysicians. At which *we* also feel surprised. Mr. Spencer has replied to Mr. Mill in the *Fortnightly Review* (vol. i., pp. 521–550); in the sixth edition of his *Logic*, Mr. Mill has replied to the reply. I shall only touch upon such points as concern my present purpose. Throughout the discussion Mr. Mill seems to be attacking the supposition that inconceivableness implies non-existence—that what is unthinkable cannot exist. But this does not touch us.

> "Let the galled jade wince:
> Our withers are unwrung."

If Mr. Spencer's language seems occasionally equivocal, the whole scope and spirit of his speculations sufficiently proclaim his restriction of knowledge to relative knowledge, and consequently of every test as relative. He has thus forcibly stated his opinion: "Conceding the entire truth of the position that, during any phase of human progress, the ability or inability to form a specific conception wholly depends on the experience men have had; and that, by a widening of their experiences, they may, by-and-by, be enabled to conceive things before inconceivable to them; it may still be argued that, as at any time the best warrant men can have for a belief is the perfect agreement of all pre-existing experience in support of it, it follows that at any time the inconceivableness of its negation is the deepest test any belief admits of. Objective facts are ever impressing themselves upon us; our experience is a register of these objective facts; and the inconceivableness of a thing implies that it is wholly at variance with the register. Even were this all, it is not clear how, if every truth is primarily inductive, any better test of truth could exist. But it must be remembered that while many of these facts impressing themselves upon us are occasional; while others, again, are very general; some are universal, and are unchanging. These universal and unchanging facts are, by the hypothesis, certain to establish beliefs of which the negations are inconceivable; while the others are not certain to do this; and if they do, subsequent fact will reverse their action. Hence if, after an immense accumulation of experiences, there remain beliefs of which the negations are still inconceivable, most, if not all, of them must correspond to universal objective facts."

On this Mr. Mill remarks: "If our incapacity to conceive the negation of a given supposition is proof of its truth, because proving that our experience has hitherto been uniform in its favour, the real evidence for the supposition is not

the inconceivableness, but the uniformity of experience. Now this, which is the substantial and only proof, is directly accessible. We are not obliged to assume it from an incidental consequence. If all past experience is in favour of a belief, let this be stated and the belief openly rested on that ground; after which the question arises, what that fact may be worth as evidence of its truth?"

§ 35. The first remark needful to be made on this controversy is that, since we all three are thoroughly agreed in maintaining Experience, and Experience only, to be the ground of knowledge, and the Test of Truth to be necessarily an expression of that Experience, there can be little real opposition between us, in spite of some differences in language. Mr. Mill says that the evidence for a proposition is the uniformity of Experience; we say the same, and add that, inasmuch as this uniformity renders the negative unthinkable, it is this unthinkableness of the negative which becomes the Test of Truth. No validity is gained in adducing uniformity of Experience, unless there is a warrant that the experiences which are uniform are themselves beyond question; and this warrant is the unthinkableness of their negation. That some ambiguity will attach itself to the phrase "unthinkable" must be admitted: ambiguities are not to be avoided; and they are even more plentiful if we adopt "uniformity of experience," for that often fails to express the fact. "A is A" does not rest on "uniformity," but on intuition. My belief in my feeling as feeling is as irresistible in one case as after a thousand repetitions. My belief that a body in motion will move for ever, and in a straight line, unless it be influenced by some other body, is a generalisation from Experience, the negative of which is unthinkable as soon as the proposition is clearly apprehended; but it cannot without ambiguity be called an uniformity of Experience, inasmuch as experiences seem momently to contradict it, and this seeming contradiction is only reconciled by an *abstraction of the differences*. Moreover, the test of uniformity can never be irresistible, because a possible diversity is not excluded. The test of identity is irresistible, and excludes all possibility of reversal. A is A for evermore. Not only are there many occasions on which the "unthinkableness of the negative" is a less ambiguous phrase than "uniformity of Experience," but, inasmuch as there are two schools in Philosophy, holding different views respecting the origin of knowledge, one school affirming it to be co-extensive with Experience, the other school affirming it to have an additional source antecedent to and independent of Experience, a Test of Truth ought to find its place in both schools; and this place is found by our Test. So long as discussion is confined to concrete questions, "uniformity of Experience" is as good a test as any; but no sooner does discussion turn upon certain abstract questions—*e.g.*, of Force—than the test of the unthinkable negative resumes its superiority.

Every objection that can be alleged against "unthinkableness" may equally be alleged against "uniformity." That which is unthinkable may turn out to be thinkable, that which has been uniform experience may become diversified. The examples cited of beliefs once universal and now universally rejected are examples of mistaken reliance on uniformity, and of unthinkableness rashly concluded where no equivalence had been established, because the elements were not such as then admitted of an equation.

It is urged that men once believed the sun to move round the earth, and that, when they did so, "the contrary was inconceivable"; yet we now know that "inconceivable" to be true. I answer: When men affirmed that they saw the sun moving from east to west, and revolving round the earth, they affirmed a truth, a subjective, relative truth, indeed, but one which, being translateable into an identical proposition, was placed beyond the assaults of scepticism, and must survive all the changes of Science. What was that truth? It was that they saw the sun moving—*i.e.*, they had certain impressions from certain definite appearances, which followed in a definite order. The fact of their having these impressions was indisputable. How far the actual order corresponded with these impressions, how far their inferences were right or wrong, it was for Science to determine. It did so by proving that these inferences wanted the character of equivalence on which certainty reposes, and by showing that other inferences gave a more consistent explanation. The belief in the *appearance* of the sun's motion continues, and will for ever continue, for it is a truth the negation of which is unthinkable; but the belief in the *cause* of that appearance (which is only an inference) will vary as explanations vary: at each stage the only absolute ground of certainty is the reduction of every inference to sensation or to a necessity of thought; and where this ground cannot be reached, our only ground is *probability*, or such harmony of our explanation with established truths as compels conviction, and thus, for the time, renders the negative, if not unthinkable, yet so difficult of acceptance as to be almost equivalent to it. When asked why a man believes that two multiplied by three gives six as the product, the answer is, Because he must: an alternative is impossible, the negative is unthinkable; he has discovered the equivalence of the relations. If asked why he believes that chemical combinations are uniformly dependent on vibratory calorific actions, the answer likewise will be, Because he must: the negative is unthinkable now that the equivalence of the relations has been exhibited to him. *Before* that exhibition he would have had no more difficulty in thinking the negative than he would have had in thinking the product of two multiplied by three was five before he had ascertained that the relations of multiplied numbers were not the relations of added numbers. The numerical identity is seen to be absolute, whereas the identity of heat and affinity may, in the present state of science, be considered as hypothetical. Nevertheless, in each case the Test applies.

There are, notoriously, cases of inseparable association determined by the structure of our minds, such as no enlargement of experience could loosen, no subtler analysis dissolve, unless the structure of the mind itself were altered. There are also cases of association which are loosened by the recognition of a mistake in the supposition of identity. We supposed that the thunder was identical with the explosion of wrath, and we associated with it the idea of an angry deity, until the recognised identity of thunder and electricity severed the association. Finally, it is notorious that our experience, even when uniform, is narrow; so that, when a man affirms anything on the guarantee of its negative being unthinkable, we can disturb his confidence by showing that the negative *is* thinkable, and conformable with a wider experience.

§ 36. Mr. Mill has noticed several of the inevitable ambiguities of language; yet he has not always succeeded in disentangling himself from them; as, for example, in his objection to Mr. Spencer's assertion that when he feels cold he cannot conceive himself not feeling cold. Mr. Mill replies by saying that he *can* conceive himself not feeling cold; and that he can imagine himself looking into darkness at the very moment that he is actually looking at the sun. The ambiguity of language here permits him to say this, although all that it lawfully expresses is that, while he looks at the sun, he can imagine himself (under *other* conditions) to be looking into darkness; just as it is possible for his thoughts to wander to Nova Zembla while he is sauntering down Regent Street. What Mr. Spencer meant to say was that, during the state of consciousness produced by his looking at the sun, it is impossible for the opposite state of consciousness to emerge; and this Mr. Mill has not answered, nor would he attempt to answer it.

§ 37. This digression ended, we may proceed to the second and more important part of the inquiry: the correspondence of the subjective and objective, as disclosed by our Test.

"Truth relatively to man cannot be defined as consisting in the conformity of knowledge with its object; for to man the object itself exists only as it is known by one faculty or another."[1] This is the old sceptical position, that the agreement can only be agreement of ideas. Kant adopts it by affirming that an universal *material* criterion is impossible, because the conception implies a contradiction; but a *formal* criterion is possible, that being simply the agreement of ideas.[1]

These and other perplexing suggestions are set aside by our regarding Truth as the correspondence between the order of ideas and the order of things; whether ideas and things are or are not alike, it is enough if their *order* is alike. Here an equation can be established, and certainty found. Whether planets are moved by inhabiting spirits, or are whirled in a sling by some distant spirit, whether they are ellipsoid solids or unextended centres of force, whether they are in any respect like or unlike our conception of them, is of little consequence to us, so long as we have ascertained the *order* of the phenomena, the law of their motions. So absolute is this abstraction of differences, that we may admit the real law to be different from the law we conceive, provided only that there is equivalence—*i.e.*, that they numerically correspond, so as to admit of calculations which agree with observation. Hence all that Science needs is correct formulas of the *order* of phenomena: these are truths. How these formulas are reached we have not to consider here; when reached, they are placed by the Test beyond the conflict with doubt.

§ 38. It thus appears that the question which has been debated since the beginning of Philosophy may now receive a decisive answer. This was impossible hitherto, because of the terms in which the question was put. We must no longer seek Truth in the conformity of ideas with objects (which is impossible), nor in the agreement of ideas with ideas (which is a purely subjective condition, carrying no objective validity); we must seek it in the equation of the internal

[1] Mansel: *Prolegomena Logica*, p. 241.

[1] Kant: *Logik*. Einleitung, vii.

and external orders, abstracting all differences. And the proof of this equation is the corroboration of calculation. When we can employ a formula with absolute precision, using it as if it were identical with the order of things, and applying it to events which are to come, we are certain that this formula expresses equivalence and is a truth.

Subjective agreement is as perfect in hallucination as in perception, which M. Taine happily calls "une hallucination vraie."[1] How, then, are we ever to be certain that our formulas are true—that the order of our ideas is in correspondence with the order of things? What is the bridge over the gulf between the subject and object? Let us pause awhile to consider.

I am seated in my study, and, on raising my head from a book, see a man slowly pass out of the room, cross the lawn, and seat himself on the garden wall. This has been the order of my sensations. Considered subjectively, the truth is indisputable. It is an identical proposition to say that I saw what I saw, felt what I felt. But can I with equal certainty say that what I saw had a corresponding reality, that the objective order was the same as the subjective? Not so. As yet no proof exists. I may have had an hallucination. To prove that my subjective state had its correspondent objective, some corroboration is needed. My wife enters the room, and she also sees the man on the garden wall. This proves that I have not had an hallucination of vision; but it does not prove the reality of my inference. Her testimony is not final, because she may misinterpret the appearances, as I misinterpret them. A dog comes in, and, seeing the figure on the wall, begins barking furiously. This shows that, although wife and dog may misinterpret the appearances, there is *some* external object. If I could touch it, the corroboration of one sense by another would be valuable; I can, at any rate, speak to it. I do so; and, asking the man what he does there, he replies by some insulting jest. My conviction becomes deepened with each corroborating fact; and when, finally, I order my servant to fetch a policeman, and the policeman comes, and carries off the struggling intruder, the impossibility of my thinking that the vision had not an objective reality is absolute. When all the senses converge, when all the evidences corroborate, we are forced to believe in the objective reality, unless we declare all existence to be a dream.

§ 39. Inasmuch as all knowledge is the expression of Experience, the truth of any proposition respecting things can only be tested by some term of Experience. The elements of Inference must be severally reduced to Feeling, or must be established by Reason. If I cannot reduce an Inference to Feeling, I can approach it through the Feeling of others; and their corroboration is the stronger in proportion as it concerns the objective nature of the thing inferred. I want no evidence of the fact that sugar is sweet to me; but if everyone everywhere declares sugar to be sweet, Reason tells me there must be some objective something corresponding with this sensation; and when I find that this something, which exists in various fruits and various substances, has in all these the same atomic elements, I have got hold of an equation between the internal and external orders.

§ 40. Mr. Mill insists that a necessity

[1] Taine: *Les Philosophes Français du XIXième siècle.* 1857.

of Thought cannot be accepted as a necessity of Things. Perhaps not; perhaps it can. We are incompetent to decide. To decide it would be to have absolute knowledge. Let me ask, why should not a necessity of Thought be sometimes the expression of an equivalent necessity of Things, since it is the product of Experience, which is determined by objective conditions? And even if we grant that a subjective necessity can never carry with it an objective necessity, we must still say, This is what we are compelled to think, and this for us is Truth. Not that I "erect the incurable limitation of the human conceptive faculty into laws of the outward universe." Far from it. I simply erect them into "laws of the conceptions we form of the universe"; and wherever we find these conceptions so far corresponding with external laws that they enable us to foresee results, and modify phenomena with certainty, we may declare the equivalence of the law and the conception. In such a case the necessity of Thought is the expression of a necessity of Things. The laws of Number, Form, and Motion are necessities of things no less than of Thought, not perhaps existing objectively in the same forms as they exist subjectively, but having an equivalent order; and the proof is that we *discover* them in Things, we do not put them there.

§ 41. And this leads me to remark on Mr. Mill's criticism that I "set up acquired necessities of thought in the minds of one or two generations as evidence of real necessities in the universe." Undoubtedly, the laws of Number, Form, and Motion are *discoveries*, and whether these were early or late in being made nowise affects their truth. Because men, until within the last twenty years, failed to see the equivalence of Heat and Motion, are we to conclude that this equivalence is not a necessity of things? Did not the order in Things proceed on this law (or on a corresponding law) during all the centuries in which men's conceptions of the order were very different? And now that men's conceptions have been readjusted, and they have detected the identity of Heat and Motion, has not the law become a necessity of Thought no less than of Things?

§ 42. What Mr. Mill justly condemns is the tendency to accept necessities of Thought as necessities of Things, *before they have been proved to be identical.* Against this tendency to assume that the order of ideas corresponds with the order in phenomena, and that what is logically valid will always be objectively valid, I have repeatedly protested in the course of my History; for, indeed, the whole body of Metaphysics is a result of that vicious tendency. Nevertheless, believing that Truth is possible—according to the definition I have given of it—and that a correspondence between the internal and external orders, though difficult of attainment, has a decisive Test, I have shown that a proposition is *absolutely true* only when its terms are equivalent, and that as this rests on the impossibility of our thinking a negative of the proposition, the varying degrees of *probability* will depend on the possibility of admitting a negative. This latter condition varies, of course, with the enlargements of knowledge; that negative which was easily thinkable at one epoch becoming unthinkable at another, and that which was unthinkable in the infancy of Science becoming not only thinkable, but irresistible in its maturity. That men should be able to stand at the antipodes was formerly quite unthinkable; they

were conceived under conditions which would necessitate their falling away into space. Science has not disproved *this* necessity, but has displaced the erroneous conception of the facts on which the proposition rested, and replaced it by another proposition. (Compare § 67.) If we now conclude that men will stand as well on the earth at the antipodes as they stand beside us, it is because we believe the conditions to be equivalent in both places, and with equivalent conditions necessarily arise identical results.

§ 43. No one supposes that it will guarantee a truth to say simply that we are compelled to believe it, without exhibiting our grounds of belief.[1] We must show the evidence to be irresistible, displaying our belief as a necessary conclusion, not a mere prejudice or tradition. In adducing our evidence, we have to establish a series of identical propositions; and it is precisely because we cannot do this in complex questions that demonstration halts.

§ 44. We shall have to resume the subject of necessity in a future section, when discussing Necessary Truths in relation to the origin of Knowledge; for the present, therefore, the argument may close. What the preceding paragraphs have attempted to establish is the possibility of Truth and its Test. This Test is absolute and relative: absolute, when the negative of a proposition is unthinkable because the proposition itself is an identical one; relative, when the negative, though not positively unthinkable, is nevertheless so opposed to existing knowledge as to be inadmissible, in which case the Test only reveals a high degree of probability. But in no case is the Test a means of enlarging knowledge; it only determines the degree of certainty. How knowledge is enlarged we have already seen in the exposition of Method.

IV.—SOME INFIRMITIES OF THOUGHT

§ 45. If History is Philosophy teaching by example, the examples of infirmity disclosed in the various systems which have gained acceptance should be carefully analysed. I do not propose to enumerate them here, nor to write a treatise on Error, but a few instructive examples may be specified.

And first of that tendency, already noticed, § 16, to commute the formal into material elements, to raise Relations out of their proper category, and transport them into the category of Things. This is the parent of Metaphysics. It is often called the tendency to "realise abstractions." Having combined certain elements of particular experiences into a single conception, we treat the concept

[1] Kant properly objects, that the proposition "what we cannot but think as true must be true" is no ground of proof, but only a confession of inability. "Nun giebt es freilich wohl viele unerweisliche Erkenntnisse, allein das Gefühl der Ueberzeugung in Ansehung derselben ist ein Geständniss, aber nicht ein Beweisgrund davon, dass sie wahr sind." *Unters. über die Deutlichkeit der Grundsätze.* Werke, i. 89, ed. Hartenstein, 1838. (This is the edition I usually refer to.)

as if it were an individual object.[1] The belief in Universals, which was accepted for centuries, is a well-known example. Professor Bain has truly remarked that "the more we analyse or decompose concrete objects into the abstract qualities that make them up, the more difficult it is to remount to the concrete. Hence the most arduous attempt of all is to make actual nature rise up out of scientific or technical language—to conceive minerals from a book of mineralogy, and the parts of the human body from anatomical description."[2] Why this difficulty? Because we have to undo what has been laboriously done—to immerse the abstractions in the concretes from which they were abstracted. And yet "this process of resolving natural aggregates into their ultimate abstractions" is the great instrument of Philosophy. These abstracts represent the *constants;* whereas the concretes are the *variables;* and these variables, by their multiplicity and change, confuse the eye and distract the attention. But if, as our infirmity tends, we give objective independence to these abstracts, we distort the order of Things; in other words, we follow the movements of Thought, instead of following the movements of Things.

Now, in Science, when pursued on the Objective Method, we are constantly made aware of this tendency, and are forced to correct it by our failures in reconciling calculation with observation; but in Ontology such correction is impossible; accordingly, it is in Metaphysics that we see the most frequent exhibitions of the infirmity.

§ 46. A good example of the tendency is the once popular but now gradually expiring doctrine of a Vital Principle.

Life is the connexus of the organic activities: a complex whole of various particular facts, abstracted from those particulars, and raised into objective reality. Each organ is composed of constituent tissues; each tissue has its constituent elements; each element, each tissue, has its specific properties; the activity of each organ is the sum of these properties; the organism is the connexus of the whole. Life is thus a concept formed out of particulars. And because the functional relation of each organ to the whole, as of each tissue to each organ, is necessarily dependent on the established connexus, both terms of the relation (parts and whole) being inseparable, some physiologists have argued that the connexus is prior to the organs, the whole *generating* the parts, instead of being a *generalisation* from the parts.

Thus, forgetting the simple teachings of experience that Life is the connexus of various phenomena—an abstract from the phenomena—men have realised the abstraction, declared the *resultant* to be a necessary *antecedent*, and have constructed an Entity out of a Relation. They speak of a Vital Principle anterior to, and independent of, all the organic activities—a Plastic Force, which mysteriously shapes the elements into tissues, the tissues into organs, the organs into an organism, and which, while thus

[1] "Toutes les fois que certains éléments d'une représentation sont distingués par une analyse, ou groupés systématiquement dans une synthèse, un tout se forme et se pose; rien de mieux; mais on ne s'arrête pas là; on entend que les relations, sous condition desquelles cette opération s'est faite, disparaissent comme l'échafaudage inutile d'une édifice achevée, et que le tout qu'on a constitué demeure à part, debout, comme de lui-même, en lui-même."—Renouvier: *Essais de Critique Générale*, 1854, i. 9.

[2] Bain: *The Senses and the Intellect*, 2nd ed., 1864, p. 603.

building up the parts, endows them with its own special property—vitality. "In the absence of this Principle," they argue, "all the activities which could be manifested within a tissue, or an organ, would be chemical and physical, not vital. The presence, therefore, of the Principle is presupposed in every atom of the vital organism; and this presence is not a resultant, but a cause."

§ 47. Erroneous as this hypothesis seems to most biologists at the present day, it has been strenuously supported, and even still finds eminent supporters. The main source of its persistence lies in the infirmity we are now considering. Because vital phenomena are only observed under a *special* conjunction of conditions, in which the forces (that are elsewhere observed acting in different directions) are seen to have a specific direction impressed on them, we form an abstract of this special conjunction, and then easily fall into the error of realising our abstraction, giving it objective independence. But let us remount to the source of our abstraction. Let us immerse the abstract once more in the concretes from which it was drawn. Let us follow the movements of phenomena, and the illusion will vanish.

A strip of muscle detached from the organism will manifest all its vital properties, so long as its specific constitution as muscle remains, so long as it resists disintegration; it will absorb oxygen, exhale carbonic acid, and contract under appropriate stimulus. A gland removed from the body continues to be a small laboratory of chemical change, secreting as it secreted in the organism. A nerve removed from the body continues to manifest its specific property of Neurility, and will cause a muscle to contract if stimulated; nay, a nerve-centre removed from its connection with the rest of the body will continue to manifest its specific Sensibility; a decapitated bee will sting with its headless body, or bite with its bodiless head.

These phenomena prove that what each part does *in* the organism, each part does *out* of the organism. In other words, the Life of the animal is the sum of the particular vital activities;[1] not a power anterior to, and independent of, these activities. What is Life, if it is not the sum of vital phenomena? And if it is the sum, it cannot be independent of the integers of which it is the sum. The abstract is of course different from any one of its concretes. The organism as a whole—a combination of activities—presents phenomena which cannot be presented by the parts separately. The animal which has its muscles, glands, nerves, and nerve-centres, all harmoniously working together in one body, in one connexus, is capable of manifesting complex phenomena which could not be manifested by any of its separated organs; and the only question that remains is, whether there may not be a Vital Principle which unites these parts into one harmonious whole? Let the question be distinctly stated: Do we mean by Life the *source* of all vital phenomena, or is it simply a personified expression of the phenomena? If the former, then

[1] "La force vitale peut être conçue comme une formule laconique destinée à exprimer en un seul mot les caractères propres à la matière organisée."—Béclard: *Physiologie*, p. 13. "La vida de la materia es una *funcion:* depende de sus elementos y cada uno de sus elementos depende de los demás y del todo que constituyen. .....El organismo entero es una funcion de funciones orgánicas, un conjunto que depende de sus partes, no pudiendo perder las todas, sin desaparecer como tal conjunto."—Nieto Serrano: *Bosquejo de la Ciencia Viviente*, p. 337.

we mean that anterior to all vital phenomena there is a Principle, or Entity, which is in no wise dependent on these phenomena; and on this Principle all phenomena depend, as effects depend, upon their causes.

§ 48. Before considering this aspect of the old doctrine, there is one objection which must be anticipated. Seeing each part of the organism capable of manifesting vitality, the vitalists may claim that fact as peremptory evidence of the truth of their doctrine. "The parts are alive," they argue; "but how alive? They have been *endowed* with vitality by the Principle which forms the organism; not holding it from any virtue in themselves, but receiving it from the source of all organic activity. Indeed, the conclusive proof of the existence of a Vital Principle is the fact that every atom of the organism is interfused with life."

I will meet this argument by the simple question: Is the Vital Principle identical with, and co-extensive with, the Life manifested by the whole organism, or is it simply the Life manifested by each part? When we speak of a Vital Principle, do we mean the Life of the animal, and is that the same thing as the Life of an isolated muscle, gland, or nerve? Obviously not. In the one we group together various phenomena of sensibility, contractility, nutrition, reproduction, development, and decay. In the other we group together only certain special phenomena. The muscle will contract, will absorb oxygen and exhale carbonic acid; but it will not nourish itself, it will not grow, it will not reproduce other muscles, it will not feel, nor think. If we admit that there is a certain community in all parts of the organism, a community which expresses a fundamental identity, the parts being differentiated from one common mass, we must nevertheless admit the great diversity in the various parts. The organism is the synthesis of these parts, and Life is the synthesis of their properties.

To make this position clearer, let us analyse our knowledge of a locomotive. We find that the fire will heat water out of the machine as in it; the water, when raised to a temperature of 212° F., will pass off into steam; the expansion of this steam will force a piston; the crank will turn a wheel; the wheel will roll a carriage. The skilful adjustment of these various parts results in a whole which we name a locomotive. But no one supposes that the phenomena presented by the locomotive could be presented by any one of its parts. Still less does any one suppose that the phenomena are due to a Locomotive Principle, independent of the parts, which created and adjusted the parts. The engine-maker who adjusted the parts did not give them their properties; he found them, and used them.

Now, the only point in which this parallelism is incomplete is in the community which runs through all the parts of the organism, and is not found in all parts of the machine. As I said before, this arises from the organism being constituted by differentiations of a substance originally homogeneous; whereas the machine is constructed of materials originally heterogeneous. The one was evolved; the other made. If, therefore, the Vital Principle be that which is common to all parts, we shall have to simplify our conception of Life, and reduce it to the properties of a blastema. Eliminating many of the great phenomena of organic activity, we are left with a structureless substance having the properties of Assimilation and Disintegration, from which Development, Reproduction,

and Death result. Nor will even this simplification much assist the doctrine of a Vital Principle. Life is only known in dependence on substance; its activity is accelerated or retarded according to the conditions in which the chemical changes of the substance are facilitated or impeded, and it vanishes with the disintegration of the substance. What, therefore, remains but to conclude that Vitality is the abstract designation of certain *special* properties manifested by matter under certain *special* conditions? Thus conceived, the ascending complexity of vital phenomena with an ascending complexity of organic structure, in harmony with certain special conditions, becomes intelligible, and Vitality distinguishes the simplest living monad no less than the most complex animal organism. Community is thus reconciled with diversity.

§ 49. Metaphysical ghosts cannot be killed, because they cannot be touched; but they may be dispelled by dispelling the twilight in which shadows and solidities are easily confounded. The Vital Principle is an entity of this ghostly kind; and although the daylight has dissipated it, and positive Biology is no longer vexed with its visitations, it nevertheless re-appears in another shape in the shadowy region of mystery which surrounds biological and all other questions. I indicated this region of mystery when I said that the organism differed from all other mechanisms in being evolved from a homogeneous substance, and not made out of heterogeneous substances. How comes this possibility of evolution? Whence the adjustment of part to part and function to function? If the machine requires a mechanist to dispose and adjust the parts, does not the organism require its mechanist or Plastic Principle?

In presence of this question the metaphysiologist, although he may have given up his belief in an Entity, a Life independent of living substances, has ready recourse to another form of the same belief, and substitutes for the Vital Principle the conception of a Plan or *Scheme*, according to which the physical forces are coerced into an organic unity. The same conception has been applied to the Cosmos. It may be here considered solely in reference to the organism, though students will have no difficulty in extending the argument.

§ 50. At the outset note a false analogy, arising from a misconception of Evolution. We see an architect arranging a plan for a house, and a builder arranging the materials in accordance with this plan. Finding in an organism a certain adjustment of parts, which may be reduced to a plan, we are easily led to conceive that this plan was made before the parts, and that the adjustment was determined by the plan. This is what logicians call ὕστερον πρότερον, and ordinary men "putting the cart before the horse"; the resultant is transformed into the cause.

We not only see that the architect's plan determined the arrangement of materials in the house, but we see why it must have done so, because the materials have no spontaneous tendency to group themselves into houses; that not being a recognised property of bricks, mortar, wood, and glass. But what we know of organic materials is that they *have* this spontaneous tendency to arrange themselves in definite forms; precisely as we see chemical substances arranging themselves in definite forms, without the intervention of any extra-chemical agency.

Observe: either the Plan is independent

of the materials, in which case it is an extra-biological agency; or it is the generalised concept of the indwelling tendencies of matter, when under definite conditions. In the one case the analogy of the architectural Plan is correct; but this destroys the idea of *evolution*, and substitutes that of *construction*. In the other case the analogy is seen to be founded on a misconception of organic facts; the parts with their adjustments *evolve a plan*, and are not *constructed after a plan*. From an observed *nexus* men rashly infer a *nisus*, from an actual conjunction a previous intention. If this conception of a Plan be admitted in Biology, it must equally be admitted in Chemistry, Physics, and Astronomy. Matter and Force not being mysterious enough, we must add a new mystery of architectural Plan, shaping Matter and directing Force. There is, however, this dilemma: Is the Plan in itself a shaping Power? It is then only another name for the Universal Cause. Is it without specific power? It is then an impotent overseer.

§ 51. According to the first answer, the Plan is identified with God. But this introduction of God, besides its pantheistic issues, is an evasion of the real question. We did not ask whether God fashions all things, organisms as well as worlds; but whether each organism and each chemical species has over and above its constituent elements and properties a shaping Idea, an independent Plan, which gives specific direction to the constituent elements and properties? This is the question. There are two answers: 1st, *the teleological*. There must be such a Plan, because our examination of an organism discloses its resemblance to mechanisms which we know to have been constructed on a Plan, and we conclude that each adjustment was intended to effect its purpose. 2nd, *the psychological*. The conception of a Plan, when it does not arise from a false analogy (§ 50), is a generalised expression of the observed facts of organic independence: the facts of a nexus. Science finding it indispensable to co-ordinate all the facts in a general concept, such as a Plan, men are led by an infirmity of thought to realise the concept; and having first used it only as a convenient expression, they grow into a belief of this nexus being *also* a nisus.

§ 52. This argument will perhaps be met by the distinction of Potential and Actual, which has played so prominent a part in Metaphysics, and which is itself one of the products of the infirmity now under examination. It will be said "the Plan pre-exists, not as an actual objective fact, but as a Possibility, a Potentiality."

Let us first see what experience tells us of the development of an organism. The ovum and the seed are starting-points from which an animal and a plant may, *under requisite conditions*, be developed. This is the expression of our experience. But now observe the jugglery of thought! One of the elements of the whole result, absolutely necessary to the result (indicated by italics in our statement), is quietly eliminated, and never afterwards restored. By a regressive movement of Thought we carry the developed organism back again to its starting-point (*minus* the conditions of development, therefore), and form a concept of the ovum and seed as *potentially* containing the animal and the plant.

At first this is mental shorthand, useful as an artifice. Unhappily it soon loses its position as an artifice, and passes into

a fallacy. The elements which have been omitted are never restored (compare § 54). If we restore them, if we write out the full meaning of our shorthand notes, what do we read? Assuredly not that the lineaments of the animal are actually present in the ovum. In the ovum they do not exist. When you say that they exist *potentially*, what is the translation of your phrase? It is, that under a given history—under a successive series of particular conditions, a special result will ensue. If we know the conditions and their succession, we may foretell the result. The law of causation determines it. Any variation in any one of the conditions will be followed by a corresponding variation in the result. All this history of development is omitted in the shorthand of Thought. The result is foreseen, because, the conditions being taken for granted, their action is anticipated.

But nature must not be thus distorted and compressed. If our feeble faculties make artifices necessary, we must not forget that they are artifices; we must restore, in a final elaboration, what, in a preliminary elaboration, we rejected. The facts of Nature remain whether we reject them or accept them. Potential existence is ideal, not real. If you adjust your rifle accurately, the animal aimed at may be *potentially* dead, but *is* alive; and the merest trifle, the swerving of your hand, or the dampness of your powder, puts an end to the potential existence. A fact is not a fact until it is accomplished. Nothing exists before it exists. This truism is disregarded by those who talk of potential existence. The conception of a plan preceding the execution of a work does not prove that the plan pre-exists *in re*. The realised plan does not begin to exist, out of Thought, until the work is begun, and is completed with the completion of the work.

§ 52. Potential existence is subjective only. My forecasts of the results of a history may be true or false. I foresee the result by grouping together the facts which *will be* with the facts which *are*, and I make one concept of them. In doing so I annihilate history. I transcend the conditions of Time and the necessities of Causality, and conceive as simultaneously completed that which in Nature must be successive and graduated. So far well. But if I desire to ascertain the actual facts, I must follow the course of Nature, and restore that history which has been left out of sight. Following the development of the ovum, historically, I observe that not only are certain conditions indispensable, but that every variation in the requisite conditions produces a variation in the result—modifies the structure of the animal, arrests or accelerates its development. If I varnish the shell of an egg, I prevent the embryo from developing into a bird. If I varnish one part of the shell, I so alter the requisite conditions that the result is a bird incapable of living, or curiously malformed. In altering the history I have changed the historical result. What, then, has the Plan effected? The Plan has not come into existence. If the conjunction has thus altered with the altered conditions, how can it be the fulfilment of a Plan irrespective of conditions? and a Plan which is strictly dependent on conditions is not a nisus, but a nexus. The inevitable conclusion is that Plan neither shapes the Organism nor determines the conditions through which the development takes place. In mathematical phrase, the Plan is the *function* of Development and Developing

Conditions, and is variable with every variation of either.[1]

The fallacy that a concept has independent existence prior to the particulars out of which it is formed, or that a Plan exists as a potential before it exists as an actual, will frequently be met with in the History of Philosophy. Indeed, Aristotle's distinction of δυνάμις and ἐνεργεία was for centuries regarded as a luminous guide.

§ 53. An infirmity closely connected with the foregoing is forgetfulness of the necessity we are under of dislocating the order of Nature, by Analysis and Abstraction; which artifice, since it leads to discovery, may be copiously used on condition of our remembering that it is an artifice, and that the order we have dislocated must be finally restored, if the order in Thought is to correspond with the order in Things.

Science is distinguished from Common Knowledge by its wider reach and more systematic structure, and also by its conscious employment of artifices which our infirmity renders indispensable, and which the unscientific mind employs unconsciously. Abstraction is one of the necessary artifices of research; and the man of science is conscious of what he is doing when he abstracts certain phenomena from the mass presented to him, and proceeds to deal with those abstractions as if they were the whole reality. Ordinary men do the same, but are unconscious of doing it.

Why must we make this preliminary abstraction—why deviate thus from the actual facts, in order to understand the facts we falsify? The answer is simple. Unless some such simplification be made, all search will be hopelessly baffled by the complexity of phenomena. The parrots of Bacon chatter about Observation; but Observation of cases, however patient and prolonged, will never suffice to disclose the Laws which are enveloped in the cases, and which form the real aim of Science. And what are Laws? They are the *constants* in phenomena, and can only be separated from the *perturbations*, due to other Laws, by a process of abstraction which sets aside all the variable accidents and individual peculiarities accompanying and determining each special case. Let us have Observation, by all means; but of what? Of ore and dross together? or of ore and dross separated? The constants found in every case must be separated from the variables found in varying cases. The mineralogist separates the ore from the dross; and the philosopher separates the constants from the variables. Even the Laws of Motion and Gravitation, universal as they are, could never have been discovered by observation of cases of motion and gravity; a preliminary abstraction eliminated all consideration of the variable resistances. The Laws of chemical affinity could never have been disclosed to Observation, except by a preliminary Analysis, which tore one element away from another, and studied each separately.

[1] Nieto Serrano is worth citing on this question of potentiality: "Es, pues, la fuerza potencial una fuerza que no es tal fuerza, pero que puede serlo; es la posibilidad sobrepuesta por la inteligencia á todo orden determinado. Mas la posibilidad no es absoluta, no es una indiferencia completa respecto del porvenir: esta indiferencia se halla limitada por los hechos, por las fuerzas actuales, por las que aparecen en la totalidad presente, como presentes ó como pasadas, y semejante limitacion constituye una probabilidad, que determina de algun modo la potencia." *Bos uejo de la Ciencia Viviente*, p. 269.

Every one knows that unless Kepler and Newton had boldly disregarded all consideration of planetary perturbations which were nevertheless essential facts in planetary movements, they would have been unable to detect the planetary Laws. But this preliminary falsification was rectified by their successors, who deduced the perturbations from secondary gravitations. It is this twofold process which I propose to erect into a logical canon applicable in all inductive inquiry,[1] the Canon of Restitution :—

§ 54 Every investigation requires for its completion that Analysis be succeeded by Synthesis—*i.e.*, the preliminary abstractions be succeeded by a restoration of the rejected elements, so that the synthesis be made to correspond with reality.

In establishing the Laws of Mechanics philosophers falsify the facts to the extent of assuming that the lines of direction are undisturbed, and that the materials are perfect. In reality, this is never so; and the practical mechanic has to rectify the rational Law by the restitution of the discarded elements. His action is synthetical, and his calculations must be so likewise. At peril of ignoble failure, he has to ascertain what are the actual lines of direction, as determined by the rational Law *and* the perturbing resistances; he has also to ascertain to what extent the materials are uniform.

§ 55 Two illustrations will suffice to exhibit the neglect of this canon. The undulatory theory, of light and heat, is justly regarded among the triumphs of modern science. It starts from oscillating atoms having no dimensions—mere mathematical points. This is a bold disregard of concrete observation; points without form or size are abstractions so entirely removed from reality as to be unimaginable. Nevertheless, Analysis occupied solely with oscillations, and discarding the oscillating atoms, as if they were not elements of the synthesis, has furnished Laws of vibration that explain many of the most remarkable phenomena of light and heat—*e.g.*, polarisation, refraction, interference. This success justifies the falsification. But inasmuch as the theory fails to account for other important phenomena, the Canon of Restitution suggests that the failure may lie in this falsification, and that the outlying elements may furnish a solution of the unexplained difficulties. If the atoms exist at all, it is unthinkable that they should not have certain geometric properties, and these geometric properties entail dynamic properties. If they have Form, they must have a corresponding Movement. As it is impossible to conceive them unextended, as they must have size and form, they must have the motions deducible therefrom.

[1] Compare Auguste Comte : *Synthèse Subjective*, p. 604. Some time after this Canon with its illustrations had appeared in the *Fortnightly Review*, I found this passage in Comte's *Politique Positive*, vol. i., p. 426: "Les événements ne pouvant s'étudier que dans des êtres, il faut écarter les circonstances propres à chaque cas pour y saisir la loi commune. C'est ainsi, par exemple, que nous ignorerions encore les lois dynamiques de la pesanteur si nous n'avions pas fait d'abord abstraction de la résistance et de l'agitation des milieux. Même, envers les moindres phénomènes nous sommes donc obligés de décomposer pour abstraire avant de pouvoir obtenir cette réduction de la variété à la constance que poursuivent toujours nos saines méditations. Or ces simplifications préalables sans lesquelles la vraie science n'existerait jamais exigent partout des restitutions correspondantes quand il s'agit de prévisions réelles." Although I had not marked the passage previously, nor realised its full significance, it is highly probable that I was unconsciously guided by it in the construction of the canon.

But these facts have hitherto been disregarded. Let them be restored, and let mathematical analysis be directed to the problem under this new aspect. The movement of the wave—*i.e.*, the movement of translation—has been sufficiently analysed; now let the movement of the atom—*i.e.*, the movement of rotation, according to Poinsot's immortal principles—be investigated. In the mechanics of translation the form of a body is indifferent, but in the mechanics of rotation the form is everything. If the investigation in this direction failed to clear up the present difficulties, it would at least have this result, that it would prove the rotation of the atoms to be legitimately disregarded in the theory of Light and Heat, because not sensible factors in the result.

§ 56. The second illustration of our Canon shall be the question of the Origin of Species.

Are Species variable or invariable? This question resembles that of planetary perturbation. The abstract Law of Reproduction—that Like produces Like—is unassailable as a Rational Law; and it points to the fixity of Species as a fundamental truth. But the Law is Rational, not Natural. It abstracts the Organism from the Medium—one factor from its coefficient—and thus violates the synthesis of Nature, which never yet presented an Organism independent of the Medium in which it lived. And there is matter for meditation in the fact that only in modern Biology has the necessary reaction of the Medium been steadily conceived as one of the necessary elements of every biological problem; formerly the Organism was always conceived as if it were no less independent really than it was ideally.

The restitution of the discarded elements—namely, the reaction of the Medium and the Struggle for Existence, which act as perturbations of the biological Law—brings forward this problem: What is the sweep of the perturbations? Can these perturbations be assigned to some secondary biological Law (the reaction of the Medium), and can they, by accumulation, determine a change in the primary Law?

At present we have two groups of thinkers, each relying on a group of indisputable facts: one proves the constancy of forms, and another proves the variability of forms. The complete theory must include and reconcile both groups. For this it is necessary that a rational Biology should elaborate a theory of the Organism, and a theory of the Medium; then the Law of Reproduction being completed by the restitution of the Perturbations, also reduced to Law, we shall have a possible synthesis explaining all the cases.

§ 57. The Canon just exhibited is needful as a corrector of our natural infirmity, which first makes the separation necessary, and then forgets that the restitution is no less so. The anthropomorphic infirmity, which suffuses Objects with our Feelings, making Cause inseparably associated with Effort, and Attraction with Desire, is too well known to need more than a passing mention here. It is a fertile source of metaphysical speculation.

Another is the strange assumption, that because knowledge is the bringing of the Unknown under the categories of the Known (for only thus can the Unknown be thinkable at all), therefore we can discover the further relations of this Unknown. For instance, Kant, in the preface to the second edition of the *Kritik*, says that Will, the phenomenon,

is not free, because it is subject to the laws of phenomena; but Will, the thing in itself, may be thought as free, because no longer subject to the laws of phenomena. Now, he admits that things in themselves are beyond knowledge. If we cannot know the *Ding an sich*, how can we predicate anything of them? In his *Prolegomena* he has this illustration of analogy: "I can never do anything to another without thereby giving him the right to do the same under similar conditions; just as no body can act on another without thereby causing an equal reaction on itself. Here Right and Force are two entirely different things, but there is a complete resemblance in their relations. By means of such analysis I can consequently attain conceptions of the relations of things, which things are absolutely unknown to me."[1] If the things were absolutely unknown, how could the relations, upon which the analogy is founded, be known?

The fact is, men are constantly affirming certain existences to be Unknown and Unknowable, yet in the same breath affirming relations of them which presuppose knowledge. They will admit that Matter, as *Ding an sich*, is absolutely and necessarily extruded from the sphere of possible knowledge; yet they will proceed to argue that it must, or must not, be constituted of discrete atoms—that these atoms are, or are not, in contact. They will admit that it is impossible for us to know God otherwise than through Revelation. Yet they have not the slightest misgiving in affirming many things of God's nature, interpreting his intentions, without any warrant in Revelation. Thus implying that they know what they have declared unknowable.

This list of infirmities might be extended, but it may close here. Others will meet us in the *History of Philosophy*.

V.—NECESSARY TRUTHS

§ 58. THE great question which has been debated in the schools respecting the Origin and Limits of Knowledge has of late years resolved itself very much into a debate respecting the nature of Necessary Truths. The philosophers who hold that, over and above the results of Experience, in its widest acceptation, we have truths of a higher authority and a larger reach, springing from a nobler source, invoke, as decisive evidence of their opinion, the existence of Necessary Truths, which cannot (they affirm) be the results of Experience.

This position rests upon a radical misconception of Experience, and a psychological misconception of the nature of Necessary Truths; both of these mistakes it will be important to clear away. We may admit, at the outset, that the mind is in possession of many ideas which could never have been directly given in Experience, if Experience be restricted to Sense. The restriction, however, is unwarranted. Ratiocination is as much

[1] Kant: *Prolegomena zu jeder künftigen Metaphysik*, § 58. Werke, iii. 285.

an organic function as Sensation. Just as the base line gives the indirect, yet certain, measure of the inaccessible line of the triangle, so from the data of Experience may we measure consequences which are not directly accessible. But the analogy must not be perverted: the base line only gives us the directly inaccessible line, it does not give other lines; the data of Experience only give the directly inaccessible consequences of the data, not the consequences of *other* data; and it is owing to an imperfect appreciation of such limits in the deduction of the unknown from the known that the doctrine of Necessary Truths, independent of Experience, has attained currency.

§ 59. What is Experience? It is the sum of the actions of Objects on Consciousness; or—to word it differently—the sum of the modifications which arise from the relations of the Sensitive Organism and its environment. In this sum are included:—1st. The direct affections of Consciousness in its relations to the outer world; 2nd. The results of those affections through the action of Consciousness in combining, classifying, and transforming the materials furnished by Sense. Thus Experience, in its widest acceptation, is the product of two factors: Sensation and Laws of Consciousness.

So far all thinkers are agreed. The point of separation is this: Are the Laws of Consciousness evolved out of the relations of the Sensitive Organism and its environment; or are they pre-existent, and independent of any such relations? When the empirical school declares its acceptance of the former alternative, it seems to proclaim an absurdity—Experience, being a product of Sensations and Laws, is said to produce the Laws of which it is the product. But this verbal contradiction is got rid of when we distinguish Experience from Experiences. Every particular modification of Consciousness is a particular experience. Each modification prepares the way for successors, and influences them. The Laws are evolved through these successive modifications, and Experience is the general term expressing the sum of these modifications.

But are the Laws evolved? The Sensational School has greatly obscured this question by the unscientific conception of the mind as a *tabula rasa* upon which Things inscribe their characters—a mirror passively reflecting the images of objects. This presupposes that Consciousness is absolved from the universal law of action and reaction, presupposes that the Organism has no movements of its own; and thus Psychology is separated from its only true biological ground. The *à priori* School commits the opposite mistake of conceiving Consciousness as a pure spontaneity, undetermined by the conditions of the Organism and its environment; a spontaneity which brings Laws, not evolved from relations, and organised as results, but derived from a supra-mundane, supra-vital source.

§ 60. We cannot take a step unless we admit that Consciousness is an active reagent, even in its first stage of evolution. Sensibility is not passive, cannot be conceived otherwise than as an excitation. Nor is this all. Biology teaches that the Sensitive Organism inherits certain aptitudes, as it inherits the structure, of its progenitors; so that the individual may be said to resume the Experience of the race. Faculties grow up in the development of the race. Forms of Thought, which are essential parts of the mechanism of Experience, are evolved,

just like the Forms of other vital processes. In fact, as Function is only the Form of activity of an Organ, it is obvious that, if the Organ is evolved, the Function is evolved, and with it the Laws of its action.

The *à priori* School denies this, not indeed explicitly, but with energetic implication. It does not boldly affirm that Function can exist without an organ; but it denies that Consciousness is a Function. Hence it has no difficulty in maintaining that the Mind of an infant is full-formed at birth, equipped with all its faculties, though without those materials of Thought which will afterwards be furnished in Experience. How can this be? The Aristotelian refuge of *potential existence* (§ 52) is ready for the escape of the metaphysician pursued by Fact. To us, who decline that refuge, the assertion that the Mind is full-formed at birth is as rational as the assertion that the infant is born a full-formed man, equipped with all his faculties of locomotion, speech, reproduction, etc. The infant may *become* a man, but *is* an infant, and his mind is undeveloped; if the spiritual experiences of the infant were suddenly arrested, does any one suppose that we should find in them those Fundamental Truths and Forms of Thought which Psychologists declare to be the native dowry of the mind?[1] I do not know that any one frankly affirms this; but I know that the *à priori* School implies it, in maintaining that we have within us a source of knowledge which is not evolved in Experience.

§ 61. Kant is the most potent philosopher of this school, and, although in my criticism of the *Kritik* I have had to consider his position, I cannot pass it by here without challenge; referring the reader therefore to what is said (vol. ii., p 460 and pp. 475 sq., *History of Philosophy*, 3rd edition), I will here notice only such points as the argument needs.

Kant says: "There are two branches of knowledge: Sensibility and Understanding—which possibly spring from a common but unknown root. Through the one objects are *given*, through the other they are *thought*."[1] Except for the reservation in the word "possibly," this is unimpeachable; but the reservation was dictated by his exaggerated view of the part played by the Subject in the construction of knowledge. He made an entity out of a relation. He thought the subjective element could be separated from the objective; and, thus separated, it would reveal itself as independent of and antecedent to Experience, constituting indeed the very conditions of Experience. I have shown this to be a fallacy. "The understanding," he says, "does not draw its laws (*à priori*) from Nature, but prescribes them to Nature—*schreibt sie dieser vor*."[2]

§ 62. The error arises from a false point of view, which mistakes Anatomy for Morphology and Logic for Psychology. Accepting the human understanding in its developed forms, he presents us with these *constituent forms* as if they were *initial conditions;* the results which are developed through successive experiences are presented as the primary conditions of Experience: the generalisations are made antecedent to the particulars from which they are drawn. We are told that these Forms are implied in the particular

[1] Compare the striking passage in Mansel's *Metaphysics*, p. 45.

[1] *Kritik.* Einleitung: sub finem.

[2] *Prolegomena zu jeder künftigen Metaphysik*, ii. § 36. Compare also his *Anthropologie*, i. § 9.

experiences. Granted: if they were not implied, they could not have been elicited. Logic is justified in disregarding the process of evolution, content with the result; for Logic has to exhibit the Forms of Thought, not their origin. In like manner, Anatomy has to do with the organs of the body, not with their genesis, which belongs to another branch of the science, Morphology. Now, the question of Experience is a question of origin; and Psychology reveals that Experience is the self-woven garment of Thought in which every thread is an experience. To assert that *à priori* principles or Forms of Thought render Experience possible is to assert either that these Forms exist before Thought itself exists, or else it is to confound the general with the particulars. Let us see this in an analogy.

§ 63. The vertebrate type is by some *à priori* thinkers held to be the necessary Form which renders the vertebrate animal possible. Anatomically, this is acceptable. But what says Morphology? Does it disclose the existence of a Type anterior to the existence of the animal? or does it not disclose the emergence of the typical Form in the successive phases of the animal's development? Obviously, the idea of pre-existences is a figment, a mere ὕστερον πρότερον (§ 50).

Again: a frog breathes by means of lungs. The lungs, once developed and brought into action, become a necessary condition of possible breathing. Ever afterwards the frog's existence is determined by this condition. But if we take the frog in its early stages, we find it breathing by means of gills, the lungs not having yet come into play. At this period it is not a lung-breathing animal; the necessary condition is somewhat different. In the course of development the forelegs begin to press upon the arteries which supply the gills, and the consequence of this pressure is the gradual disappearance of the gills. Meanwhile the lungs pass from their rudimentary inactive state into an active state, and the disappearing gills are replaced by the emerging lungs. It is thus also with the development of Mind: the necessary conditions which render experiences possible in the early stages are not the same in the later stages. Mind is a successive evolution from experiences, and its laws are the action of results. The Forms of Thought are developed just as the Forms of an Organism are developed. The infant Newton is no more the author of the *Principia* than the egg is the game-cock.

Indeed, this notion of *à priori* Forms, connate if not innate, is a violation of the ground-principle of Biology, and consequently, as all but metaphysicians must admit, of Psychology. If there is one lesson taught us everywhere in Biology, it is that nothing which is definitive is primitive—no form characteristic of the developed state is to be found in the germinal state. Therefore, unless we maintain that Mind is, *ab initio*, adult, as to its powers if not as to its Knowledge —that it does not develop, but only appears—we must admit that with Mind, as with Body, there is not preformation or pre-existence, but evolution and epigenesis.

§ 64. What is it prevents some men from accepting this alternative? It is that they discover in the adult mind principles which cannot, they affirm, be evolved from Experience. Necessity and universality point to an *à priori* source. Necessity is not given in any particular experience. Universality is not given in any number of experiences. Hence (here lies the fallacy !) they are not empirical.

We affirm that they belong to Experience, are products of Experience, and of Experience only; they are the results of that movement of Thought which passes from particulars to generals. I shall presently show that they are necessities of Thought under the limitations of Experience. Of course, it is requisite to avoid the common confusions on this subject, and not restrict Experience to Sense, as many unwarrantably restrict it. Thus Dr. Thomas Brown repeats the false statement commonly accepted as an axiom, that "Experience teaches us the past only, not the future." Is this so? Is it not the fact that, although experiences are only past modifications of Consciousness, they have a forward projection, and hence Experience teaches—whether correctly or falsely—the future irresistibly? Expectation is surely a product of experiences. Association is experience. When a dog, having once experienced the pain produced by a stick falling swiftly on his ribs, again sees me about to strike him, is there anything over and above his modified consciousness (Experience) which causes him to foresee pain to himself in that preliminary? The metaphysician wants an occult something to give this simple case the requisite obscurity. "It is not to experience alone," he says, "that we must have recourse for the origin of our belief that the future will resemble the past, but to some other principle which converts the simple facts of experience into a general expectation or confidence."[1] This is easily said, but Brown is forced to add: "This principle, since it cannot be derived from Experience itself, which relates only to the past, must be.....an original principle of our nature." A very typical example of metaphysical logic! If the "original principle" mean something born with us, ready to receive our experiences as in a mould, I affirm this to be the ὕστερον πρότερον fallacy. If it mean no more than that our psychical nature is such as to group together phenomena experienced together, so that when once the stick has been coupled with pain the two ideas are associated, then indeed there is no objection to the phrase, except its mysteriousness.[1]

§ 65. Having thus defined and explained what is the sense in which Experience is legitimately held, we may address ourselves to the question of Necessary Truths, and see whether they point to a source of knowledge which is superior to, or at least independent of, Experience.

It may be convenient to use the term empirical, as opposed to *à priori*, to designate what is contingent, as opposed to what is necessary. But Kant himself saw that the distinction is only verbal, and in the opening section of the *Kritik* says: "We are wont to call many conclusions, which have their source in experience, *à priori*, simply because they are not drawn immediately from experience, but from a general rule, which was, nevertheless, drawn from experience. Thus we say of a man who undermined his house: He might have known *à priori* that the house would fall in—*i.e.*, he need not have waited for the experience of its actual fall. Yet purely *à*

[1] Brown: *Lectures on the Philosophy of the Mind*, vi.

[1] "If we think in relations, and if relations have certain universal forms, it is manifest that such universal forms of relations will become universal forms of our consciousness. And if these further universal forms are thus explicable, it is superfluous, and therefore unphilosophical, to assign them an independent origin."—Spencer: *First Principles*, p. 229.

priori, this could not have been known, for he must have learnt through experience that bodies are heavy, and fall when their supports are removed." Nevertheless, although Kant saw this, he still believed in the existence of *à priori* principles, which are demonstrably not less empirical. What misled him was, I think, the confusion between contingent Knowledge and contingent Truth. He declared Experience to be empirical and contingent, because our experiences could never be necessary and universal; whereas universal and necessary Truths were *à priori*, because they could not be given in particulars, and hence were *anterior* to all Experience. That they might be *posterior* to (*i.e.*, evolved from) Experience was an alternative he omitted to consider.

With these preliminary explanations, let us now examine how far the Necessary Truths are, or are not, capable of reduction to Experience.

§ 66. It appears to me that all writers on this subject have failed to see a distinction which is so obvious when pointed out that the neglect of it seems inexplicable: the distinction is between the (objective) fact and our (subjective) knowledge of the fact. We speak of sound, sometimes meaning the undulation of the air without us, and sometimes meaning the sensation excited within us by that undulation pulsating on our tympanum. By a similar laxity, we speak of a Truth sometimes as the relations of an external fact, and sometimes as the conception we have formed of the fact. Now, in the Truths classified as Contingent, the contingency is never applicable to the relations themselves, but solely to our conceptions of them. That 72 and 140 added together will make 212 is a truth which, objectively, has no contingency whatever; but there is a subjective contingency in this as in all other unverified propositions: namely, the contingency of our miscalculating—misconceiving the objective relations. That "a body moving under certain conditions *as if* attracted by a force varying inversely as the square of the distance will describe an ellipse having the centre of attraction in one of the foci" is a proposition which, *once demonstrated*, has no contingency, although we may easily misconceive the relations it expresses; and that "the earth is a body acted on by such a force under such conditions" is likewise a proposition which is contingent until verified, and is necessary when verified. Assuming that there is an external world, its order must be necessary—*i.e.*, the relations must be what they are; the contingency can only lie in the correctness or incorrectness of our appreciation of those relations. Hence, instead of confusedly speaking of Necessary and Contingent Truths, it will be less ambiguous to speak of Verified and Unverified Propositions. All truths are true, but all propositions do not correctly express the external relations, and the question arises, which propositions are to be accepted as correctly expressing the relations? Obviously those only which have been verified by the equivalence of the internal and the external order, or the reduction to A=A.

Several persons seated at a table are startled by shrill sounds, which they one and all infer to be the shrieks of a child in pain or terror. The fact that they hear the sounds is indisputable, and the expression of this fact is a truth as "necessary" as that "two parallel lines cannot enclose space." Nor is there any contingency in the fact that these sounds are produced by pulsations of the air on their tympanum. Why is there none?

Simply because experience has found that the sensation of Sound *is* produced in this way—the objective relations have been verified. There is, however, some contingency in the proposition, "These sounds are caused by a child in terror or in pain"; not that there is the slightest contingency in the fact itself. On proceeding to the spot, the child is found to be struggling with an animal, and shrieking as it struggles. The truth of the proposition is now verified, and, unless scepticism be extended so far as to doubt whether all the phenomena are not the pageantry of a dream, we may affirm that the proposition is a necessary truth.

It may surprise the reader to see an example of this kind cited as a necessary truth, but I have selected it for the very purpose of my argument, which is to prove that the question of contingency lies solely within the region of all unverified propositions. All verified propositions are necessary truths; all unverified propositions are contingent. This is a complete reversal of the position maintained by metaphysicians, for they affirm that necessary truths are precisely those propositions which cannot be verified (*i.e.*, exhibited in Experience), and that all propositions dependent on the verification of Experience are contingent.

§ 67. Let us now take another step. The advocates of Necessity, as an indication of a source of knowledge superior to Experience, are guilty of a confusion so misleading that I am surprised at neither friend nor foe having pointed it out. It is nothing less than *changing one of the terms of the proposition*, and then concluding as if the terms had remained unaltered. Thus the one argument incessantly brought forward is that some Truths are such as are seen to be not only true, but *necessarily* true; whereas, there are other truths which, however true to-day, are contingent, because changes may occur to-morrow which will reverse them. It is further added that no amount of experience, no number of examples, can establish necessity, but only the fact of generality, and a life-long experience of uniformity cannot exclude the possibility of a sudden reversal. All that Experience can show is that a certain order has been uniformly observed; it cannot show that what has always been must always be.[1] Philosophers have accepted this reasoning as if it were irresistible; every one uses it without suspicion; but no sooner do we examine it closely than we find it rests on the unconscious substitution of one premiss for another. To say that "what has occurred will occur again, will occur always," is to say that "under precisely similar conditions precisely similar results will issue." A is A; and A is A for evermore. But to say that "what has occurred may probably not occur again, will not occur always," is to say that "under *dis*similar conditions the results will not be similar." This proposition is as absolutely true as the former; but who does not see that it is a different proposition? When we declare that the laws of Nature are not necessary truths, but only contingent truths, because the mind readily conceives the possibility of their reversal, readily imagines such a change in the external conditions as would arrest the earth's motion, and with it all the manifold phenomena now resulting from that motion, what is it that we have declared? It is that, the relations

[1] "Tous les exemples qui confirment une vérité générale, de quelque nombre qu'ils soient, ne suffisent pas pour établir la nécessité universelle de cette même vérite: car il ne suit pas que ce qui est arrivé arrivera toujours de même." —Leibnitz: *Nouveaux Essais*, preface.

of phenomena being altered, our conceptions, to be true, must alter with them. It is that, instead of the proposition, "Such *is* the order of Nature, and such it *will be so long as it is unaltered*," we have silently substituted this proposition: "Such is *now* the order of Nature, but *if at any time it should be altered*, it will be different." The only necessity is that a thing is what it is; the only contingency is that we may be mistaken as to *what* it is. The law of gravitation, or the elliptical orbits of the planets, may, or may not, be truths; but if they *are* truths, they are necessary truths. To say that they are "observed facts, nothing more," is all that is required by Necessity; and when we add that there is no proof of the continuance of the observed order, we either deny that "A is A," or we silently change the proposition, and say "if A becomes B, it will no longer be A"; for, if the conditions continue unchanged, the order must necessarily continue unchanged; if the conditions alter, the order necessarily alters with them.

§ 68. The answer to this will probably be, That certain truths have such a character as to render their negation inconceivable, *no* alteration being conceivable in relations so absolute: and it is these truths that involve Necessity and *à priori* inspiration. This leads me to the only distinction between the truths of the two orders—namely, that in those classified as Necessary the relations are abstracted from all conditions, and considered simply in themselves; whereas in those classified as Contingent the relations are mixed with variable conditions; and it is in this variability that the contingency lies. When we say "$2 \times 2 = 4$," or "the internal angles of a triangle are equal to two right angles," we abstract the relations of Number and Form from all other conditions whatever, and our propositions are true, whether the objects counted and measured be hot or cold, large or small, heavy or light, red or blue. Inasmuch as the truths express the abstract relations only, no change in the other conditions can affect these relations; and truths must always remain undisturbed *until* a change take place in their terms. Alter the number 2, or the figure triangle, by an infinitesimal degree, and the truth is thereby altered. When we say that bodies expand by heat, the proposition is a concrete one, including the variable conditions; but, although these variable conditions prevent our saying that "all bodies will, under all conditions, be always and for evermore expanded by heat," the case is not really distinguished from the former one, since both the Contingent and the Necessary Truth can only be altered by an alteration in the terms. If a body which does not expand by heat (there are such) be brought forward as impugning the truth of our proposition, we at once recognise that this body is under different conditions from those which our proposition included. This is the introduction of a new truth, not a falsification of the old. Our error, if we erred, was in too hastily assuming that all bodies were under the same conditions.

Hence the correct definition of a Contingent Truth is "one which *generalises the conditions*"; while that of a Necessary Truth is "one which is an *unconditional generalisation*." The first affirms that whatever is seen to be true, under present conditions, will be true so long as these conditions remain unaltered. The second affirms that whatever is true now, being a truth irrespective of conditions, cannot suffer any change from interfering conditions, and must therefore be universally true.

"The belief in the uniformity of nature is not a necessary truth, however constantly guaranteed by our actual experience. We are not compelled to believe that because A is ascertained to be the cause of B at a particular time, whatever may be meant by that relation, A must therefore inevitably be the cause of B on all future occasions."[1] This will command the assent of every one who fails to perceive the silent change in the terms of the proposition. Instead of saying "on all *like* occasions," which would give necessity to the proposition, Mr. Mansel renders it contingent by saying, "on all future occasions," and the contingency lies in this, that some of the future occasions may be *un*like, in which cases a new proposition replaces the old. "That fire will ignite paper on all occasions when the two may be brought together" is what no one but a child or a savage with limited experience would assert; but that fire will always ignite paper on all future occasions which present conditions precisely similar to those that have once caused the ignition, is a truth having the character of necessity and universality which belongs to all identical propositions, and to those only.

§ 69. It will now be an easier task to criticise the arguments which profess to show that necessity and universality are irresistible marks of an origin superior to Experience. If what has already been said has found acceptance with the reader, he will recognise that every proposition being necessarily true, if it is true at all, the only question that can arise is, *Is* the proposition true? The only answer that can decide this is one which reduces it to an identical proposition; and as this reduction is the process of Verification, and all Verification is through Experience, the conclusion inevitably reached is one directly counter to the *à priori* hypothesis.

Two positions require to be established. First, that we gain our conceptions of Mathematical, no less than Physical, relations through Experience. Secondly, that in those conceptions so gained are involved their characters of universality and necessity.

§ 70. The argument could not indeed be conducted if we allowed Experience to be restricted to Sensation only, as the metaphysicians unwarrantably restrict it. Dr. Whewell finds no difficulty in showing that propositions "obtained by mere observation of actual facts" cannot be necessarily true; for *no* proposition whatever can be thus obtained. His definition of Experience is, "the impressions of sense and our consciousness of our thoughts."[1] A far more accurate and philosophical thinker has defined its wider sense to be "co-extensive with the whole of consciousness, including all of which the mind is conscious as agent or patient, all that it does from within, as well as all that it suffers from without"; and he truly adds, "in this sense the laws of thought, as well as the phenomena of matter—in fact, all knowledge whatever, may be said to be derived from experience."[2] The reader, not familiar with Kant's or Mr. Mansel's speculations, may, perhaps, marvel that, after so comprehensive and just a definition of Experience, Mr. Mansel escapes the conclusion he has himself pointed out as irresistible, and falls back into the *à priori* argument, restricting Experience to "its narrower and more common meaning, as limited

[1] Mansell: *Metaphysics*, 267.

[1] Whewell: *Hist. of Scientific Ideas*, 1858, i. 131.
[2] Mansell: *Prolegomena Logica*, 93.

to the results of sensation and perception only." The explanation is that Mr. Mansel adopts the Kantian conception of Forms of Thought, as conditions of Experience, a conception I have attempted to refute. (Vol. ii., pp. 475 sq.) One passage is all that need be given :—

"That experience," says Mr. Mansel, "is the chronological antecedent of all our knowledge, even of the most necessary truths, is now generally admitted. But a distinction is frequently drawn between truths or notions of which experience is the *source* and those of which it is only the *occasion*.....Every general concept is in one sense empirical; for every concept must be formed from an intuition, and every intuition is experienced. But there are some intuitions which, from our constitution and position in the world, we cannot help experiencing, and there are others which, according to circumstances, we may experience or not. The former will give rise to concepts which, without any great impropriety of language, may be called *native* or *à priori;* being such as *though not coeval with the mind itself* [an important admission] will certainly be formed in every man as he grows up, and such as it was pre-ordained that every man should have. The latter will give rise to concepts which, for a like reason, may be called *adventitious* or *à posteriori;* being such as may or may not be formed according to the special experience of this or that individual."[1]

Inasmuch as I throughout interpret Experience according to the wider definition given by Mr. Mansel, and only differ from him in regarding the Forms of Thought as evolved through Experience, both in the race and the individual, whereas he (confounding, I think, Anatomy with Morphology) regards the Forms as conditions of experience, it will be needless to criticise his defence of Necessary Truths, having an *à priori* source, because the arguments I have urged against Kant are the arguments I should urge against Mr. Mansel.

§ 71. We may thus securely lay down the proposition that whatever can be learned must be learned by and through Experience; and we have then to examine whether we learn Necessary Truths, or bring them with us into the world as the heritage of a higher life.

That two parallel lines can never meet is a Necessary Truth. That is to say, it necessarily follows from the definition of a straight line. To call it, however, an *à priori* truth, a truth independent of Experience, is a very imperfect analysis of the mind's operations. An attempt is made to prove that the idea could never have been gained through Experience, because it commands universal assent, and because Experience itself could never give it necessity. Dr. Whewell's argument is that, let us follow two parallel lines out as far as we can, we are still unable to follow them to infinity; and, for all our experience can tell us to the contrary, these lines may possibly begin to approach immediately beyond the farthest point to which we have followed them, and so finally meet. Now, what ground have we for believing that this possibility is not the fact? In other words, how do we know the axiom to be absolutely true? Clearly *not* from Experience, says Dr. Whewell, following Kant.

We answer, Yes; clearly *from* Experience. For our experience of two parallel lines is precisely this: they do not enclose space. Dr. Whewell says that, for all our experience can tell us to

[1] *Op. cit.*, p. 170.

the contrary, the lines may possibly begin to approach each other at some distant point; and he would correct this imperfect experience by *à priori* truth. The case is precisely the reverse. The tendency of the mind unquestionably is to fancy that the two lines *will* meet at some point; it is enlarged experience which corrects this tendency. There are many analogies in nature to suggest the meeting of the two lines. It is only our reflective experience which can furnish us with the proof which Dr. Whewell refers to ideas independent of all Experience. What proof have we that two parallel lines cannot enclose space? Why this: as soon as they *assume the property of enclosing space*, they *lose the property of parallelism:* they are no longer *straight* lines, but *bent* lines. In carrying out imaginatively the two parallel lines into infinity, we have a tendency to make them approach; we can only correct this by a recurrence to our experience of parallel lines; we must call up a distinct image of a parallel, and then we see that two such lines cannot enclose space.

The whole difficulty lies in the clearness or obscurity with which the mind makes present to itself past experience. "Refrain from rendering your terms into ideas," says Herbert Spencer, "and you may reach any conclusion whatever. 'The whole is equal to its part' is a proposition that may be quite comfortably entertained so long as neither wholes nor parts are imagined."[1] But no sooner do we make present to our minds the meaning of parallel lines than in that very act we make present the impossibility of their meeting, and only as the idea of these lines becomes wavering does the idea of their meeting become possible. A is no longer A, but B.

"Necessary truths," says Dr. Whewell, "are those in which we not only learn that the proposition *is* true, but see that it *must* be true; in which the negation is not only false, but impossible; in which we cannot, even by an effort of the imagination, or in a supposition, conceive the reverse of that which is asserted. That there are such truths cannot be doubted. We may take, for example, all relations of Number. Three and two make five. We cannot conceive it otherwise. We cannot, by any freak of thought, imagine three and two to make seven."

That Dr. Whewell cannot, by any freak of thought, *now* imagine three and two to make seven is very likely; but that he could *never* imagine this is untrue. If he had been asked the question before he had learned to reckon, he would have imagined seven quite as easily as five: that is to say, he would *not* have known the relation of three and two. Children have no intuitions of numbers: they learn them as they learn other things. "The apples and the marbles," says Herschel, "are put in requisition, and through the multitude of gingerbread-nuts their ideas acquire clearness, precision, and generality." But though, from its simplicity, the calculation of three added to two is with a grown man an instantaneous act, yet if you ask him suddenly how many are twice 365, he cannot answer till he has reckoned. He might certainly, by a very easy "freak of thought" (*i.e.*, by an erroneous calculation), imagine the sum-total to be 720; and although, when he repeats his calculation, he may discover the error, and declare 730 to be the sum-total, and say, "It is a Necessary Truth that 365 added to 365 make 730," we

[1] *Principles of Psychology*, p. 49.

should not in the least dispute the necessity of the truth, but presume that he had arrived at it through experience—namely, through his knowledge of the relations of numbers, a knowledge which he remembers to have laboriously acquired when a boy at school.

Dr. Whewell maintains that whereas Contingent Truths are seen to be true only by observation, and could not beforehand have been detected, Necessary Truths are "seen to be true by a pure act of thought." But he overlooks the fact that even the simple truths of Number are not seen to be true *before* these relations have been exhibited; and if they are afterwards seen to be true by a pure act of thought, not less so are physical truths, once demonstrated, seen by a pure act of thought: neither can be seen beforehand. He declares that we cannot distinctly, although we may indistinctly, conceive the contrary of a Necessary Truth. Here again the oversight is the same. We cannot conceive the contrary of a truth *after* its necessity has been demonstrated, but we can distinctly conceive that $17+9=25$ *before* verification. So little does he apprehend the real case that, referring to the mistakes of children and savages, he winds up with the serene remark, "But I suppose no persons would, on such grounds, hold that these arithmetical truths are truths known only by experience."

§ 72. Let us now turn to another argument. Kant says: "Experience, no doubt, teaches us that this or that object is constituted in such and such a manner, but not that it could not possibly exist otherwise." "Empirical universality is only an arbitrary extension of the validity from that which may be predicated of a proposition valid in most cases to that which is asserted of a proposition which holds good in all. When, on the contrary, strict universality characterises a judgment, it necessarily indicates another peculiar source of knowledge—namely, a faculty of cognition *à priori*. Necessity and strict universality, therefore, are infallible tests for distinguishing pure from empirical knowledge, and are inseparably connected with each other."[1] And elsewhere: "If we thought to free ourselves from the labour of these investigations by saying, 'Experience is constantly offering us examples of the relation of cause and effect in phenomena, and presents us with abundant opportunity of abstracting the conception of cause, and so at the same time of corroborating the objective validity of this conception'—we should in this case be overlooking the fact that the conception of cause cannot arise in this way at all; that, on the contrary, it must either have a basis in the Understanding or be rejected as a mere chimera. For this conception demands that something (A) should be of such a nature that something else (B) should follow from it necessarily, and according to an absolutely universal law. We may certainly collect from phenomena a law, according to which this or that *usually* happens; but the element of necessity is not to be found in it. Hence it is evident that to the synthesis of cause and effect belongs a dignity which is utterly wanting in any empirical synthesis."[2]

§ 73. I answer that the very fact of our being compelled to judge of the unknown by the known—of our irresistibly anticipating the future to resemble the past—

[1] Kant: *Kritik: Einleitung*, § ii. (Micklejohn's translation, p. 3).

[2] *Op. cit. Transcendental Logik*, § 9 (Transl., p. 76).

of our incapacity to believe that similar effects will not always follow similar causes—this fact is a proof that we have *no* ideas except such as are acquired through Experience, and that uniformity in Experience irresistibly determines our conceptions of the future. For if we had *à priori* ideas, these ideas, being superior to Experience, would not always inevitably conform to it; they would bring *another* standard by which to judge—a standard which was not that of the already known. Have we such a standard?

§ 74. The school of *à priori* philosophers maintain that we have, and that the standard is the Necessity and Universality which certain truths involve, and which cannot be given in Experience. But we have had abundant evidence that every truth is necessarily true, and the fallacy is, that of first using a proposition in one sense, and then concluding from it in a different sense. It is not Truth which is contingent, but conditions which are variable, and every truth becomes invariable so long as the conditions do not vary. The same argument proves universality. If a truth simply express an unconditional generalisation—if it express an abstract relation, of course it is true for ever without possibility of change. In both cases we say A is A, and will be A for ever. When Kant says Experience cannot be universal, but only general, and cannot therefore bestow universality, because it cannot itself be universal, he forgets that Experience itself is no more general than it is universal—it is particular, and *repeated*. Now, just as a finite line may be produced to infinity although the mind is finite, just as zero may be added to zero, and space to space, without end, by the simple process of repetition, so may a truth, "A is A," though particular in itself, be transformed into an universal.

I close here the discussion of one of the most important topics in the whole range of Metaphysics, and with it these Prolegomena.

When we enter on the scene of History, we see men nobly striving to grapple with the Unknowable. The shadow of the unknown world everywhere mingles with the light of day. It is the dark background on which Phenomena are visible. It is always present, and always limiting—as shadows limit—the objects of our thought. Beyond the Known stretches the vague Mystery, into which our eyes peer vainly, yet persistently. The border-land is ill-defined, and it is so because the sphere of the Known is always becoming larger and larger. We always hope that the Unknown is not also the Unknowable.

Hence Speculation is tempted to enter the realm of shadows, and will not admit the obvious fact that, on quitting *terra firma*, it abuts on vacancy, and peoples an airy void with airy nothings. Psychology has to check this groping amid shadows, by showing that the coast-line of the Knowable is sharply defined from the ocean of the Unknowable by the necessary limitation of human faculties. Between us and that ocean there stretches a vast and fertile region, where golden harvests have already been reaped, and where still richer harvests await the sickle —truths already gathered for the regulation of our Life, and wider truths which will hereafter be gathered for its renovation.

(2)

THE

FUNDAMENTAL PRINCIPLES

OF THE

POSITIVE PHILOSOPHY

BEING THE FIRST TWO CHAPTERS
OF THE
"COURS DE PHILOSOPHIE POSITIVE"

OF

AUGUSTE COMTE

TRANSLATED BY
PAUL DESCOURS AND H. GORDON JONES

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PREFACE

AUGUSTE COMTE was born at Montpellier on January 19th, 1798, five years after the execution of Louis XVI. His father was a revenue officer, of no great means. Both parents were Royalists and strict Catholics, and it is not known that they or any of his relations were distinguished by ability of any kind. He was educated at the *lycée* of his native town, where he showed extraordinary precocity and ardour for study, but a rebellious disposition in matters of discipline. When only fifteen he came out first in the entrance examination to the Polytechnic School, but on account of his youth was not actually admitted till the following year (1814). Here, under the best teachers in France, he studied the higher mathematics, physics, and chemistry with his usual ardour. In 1816 (the year after Waterloo) he took the lead in a demonstration against an unpopular official, and the Government, regarding the Polytechnic as a hot-bed of republicanism, gladly seized the opportunity of dismissing all the students. His prospects in the public service were thus destroyed, and at the age of eighteen he had to support himself by giving private lessons in mathematics, devoting all his spare time to the study of biology and history.

While still under twenty Comte came under the influence of the celebrated Saint-Simon, then his senior by forty years, who, though destitute of real philosophical capacity or scientific instruction, was gifted with a fertile imagination, and had caught a confused glimpse of some of the ideas that Comte was destined to think out and establish. This has led to a needless controversy as to the younger man's originality. To deal with it here is impossible. I am content to quote the judgment of Mr. John Morley, who is not a Comtist: "The most cursory glance into Saint-Simon's writings is enough to reveal the thread of connection between the ingenious visionary and the systematic thinker. We see the debt, and we also see that, when it is stated at the highest possible, nothing has really been taken from Comte's claims as a powerful original thinker, or from his immeasurable pre-eminence over Saint-Simon in intellectual grasp and vigour and coherence." Saint-Simon saw that theology no longer supplied a sufficient basis for social order, still less for social progress, and that such a basis could only be obtained by applying to social phenomena the methods that had successfully created

the simpler sciences. But he and his followers had neither the scientific training nor the patience to perform this work. They preferred the easier course of starting fantastic plans of social reorganisation suggested only by their uninstructed imagination, and they tried to bring these into immediate practice by fervid and anarchical appeals to popular sentiment.

Comte looked on this as quackery, and, while equally bent on social regeneration, set himself to lay the intellectual foundation for it by creating the science of Sociology; a work that could not have been originally performed by anyone not versed in the principal doctrines of the simpler sciences, and in the methods by which they had been established. For this work Comte was qualified by the encyclopædic training which, while still a young man, his quick apprehension, his prodigious memory, and his ardour for study had enabled him to acquire.

His earliest publications were essays which appeared in various periodicals. Six of them, written between 1819 and 1828, contain the leading ideas which he subsequently co-ordinated and developed in his larger works. In one of them, the "Plan of the scientific works necessary for the Reorganisation of Society," published in 1822, will be found the first announcement of the two famous laws of the Three States and the Classification of the Sciences. These six essays Comte reprinted long afterwards as an appendix to the fourth volume of the *Positive Polity*, in order to prove, as they most clearly do, that the regeneration of society had been his aim from the first, and that his "fundamental" treatise on Positive Philosophy had always been meant as preliminary to his "principal" treatise on Positive Polity.

In the spring of 1826 the outlines of the Philosophy were already so clearly mapped out in his mind that he could undertake to expound it orally in a course of seventy-two lectures, to be completed in twelve months; a prodigious effort, since the lectures did not exist on paper, and he always spoke without notes. It may here be mentioned that each volume of his most important works was completely composed in long meditations without putting pen to paper. When this mental composition of the volume was finished, he wrote it out without pause as if he was copying it. The lectures, begun in May, 1826, were attended by several eminent scientists. According to the programme, two were to be introductory; sixteen were allotted to mathematics; ten each to astronomy, physics, chemistry, and biology; and fourteen to social physics, or, as he afterwards called it, sociology.[1] But after the third lecture the mental strain, aggravated by domestic and other quarrels, brought on an attack of insanity which lasted for some months. In January, 1829, he resumed the interrupted course, and carried it out successfully in exact accordance with the original programme.

[1] Comte coined the word "sociologie" in 1839. See *Phil. Pos.*, chap. xlvii.

These oral lectures were a first sketch of his famous "fundamental" work, the *Positive Philosophy*, of which the first volume appeared in 1830, the sixth and last in 1842. Soon afterwards he published his *Discourse on the Positive Spirit*, a little book intended to furnish those who are unable to read the larger work with its principal conceptions.[1]

The task which Comte had originally marked out for himself was divided into two undertakings—the one mental, the other social. In the first he set himself to co-ordinate the several abstract sciences into a philosophical system. This having been now accomplished, he had next to construct, upon the foundation so laid, a social and religious system; in other words, the theory of a State and a Church fitted to take the place of those that were no longer capable of securing order and progress in modern Europe. This was to be the subject of his *Positive Polity*. But before that work could be begun three changes, all of them important, though in different degree, took place in his life.

He had contracted an unfortunate marriage in 1825. His whole life since then had been made miserable by continual quarrels with his wife. In 1842 she left him, as she had several times done before. This time he refused to let her return. But to the end of his life he made her such a pecuniary allowance as his means permitted, and for some years he continued to correspond with her. The separation was a profound relief to him, for their quarrels had, in his opinion, prolonged the time occupied in the composition of the *Positive Philosophy* by at least a third.

Comte's philosophy was very displeasing to both the theologists and the scientific specialists of his time. Their influence predominated in the Académie des Sciences, and prevented his obtaining a mathematical professorship in the Polytechnic School, for which he was admirably qualified. Always the most fiery of men, and incapable of yielding to any fear of consequences, Comte unwisely denounced his enemies in the preface to the last volume of his *Positive Philosophy*, and they very meanly retaliated by depriving him, in 1844 and 1852, of two mathematical posts in the Polytechnic which he had held for several years. The present fame and influence of Comte rest upon a much broader and deeper foundation than his services to any branch of natural science. But it is worth mentioning that candidates for the degree of Licencié ès Sciences are now expected to show a knowledge of the chapters on mathematics in the *Positive Philosophy*.

By these successive spoliations, and by the loss in 1848 of employment in a private school, he would have been reduced to destitution if friends had not come to his aid. In 1844–5 Mr. John Stuart Mill, who had read the *Positive Philosophy* with great admiration, induced Mr. Grote, Sir W. Molesworth, and Mr. Currie to make him two donations amounting together

[1] Translated, with explanatory notes by E. S. Beesly; cr. 8vo, 2s. net. (W. Reeves, 83, Charing Cross Road.)

to £240. In 1848 a subscription was got up for him, which was continued annually to the end of his life. This "sacerdotal subsidy," as he called it, produced at first £120, and latterly about £300. He was thus enabled to devote his time entirely to his philosophic work.

In October, 1844, Comte made the acquaintance of Madame Clotilde de Vaux. He was then forty-six; she was thirty. Her life had been blighted by marriage with a man who turned out badly, became a criminal, and had disappeared. She was at this time living with her parents. Like Comte, she had no child. There was, therefore, a certain similarity in their positions. Their more intimate friendship, which may be dated from April, 1845, was cut short only eleven months later by her death. On his part, there was the most ardent love; on hers, admiration and friendship, feelings which, as she told him from first to last, did not amount to love. Divorce not being then legalised in France, marriage was impossible, and he at first pressed her to become his mistress. To this she would not consent; their friendship remained a perfectly chaste one; and at length, as he came to feel the value of the discipline, he thanked her for having imposed it. Before he knew her his life, from the sexual point of view, had been faulty. Thenceforward it was one of strict continence.

The early death of Madame de Vaux only intensified his love and gratitude. He found his chief happiness in that daily communion with her to which he gave the name of prayer. Every morning and evening a certain time was devoted to this sacred exercise, and every week he visited her tomb. All his subsequent work he regarded as inspired by her. That his love for her had a profound effect upon his moral nature is evident. It produced the inner change which, in the language of Christians, is called "conversion." Hitherto, though the ultimate object of his speculations had been to place morality on a firm basis of science, and though, in labouring for that end, he had been animated by a noble social spirit, he had not professed to be a religious teacher, or to set in his own person any special example of a good life. He was simply a philosopher working out a system which he believed would be of great benefit to the human race. But what he had before recognised as a philosophical truth—that love should be the moving principle of our lives—was now brought home to his heart. And this was fruitful of good.

It was in this period that he executed the second of his great works, his *Positive Polity*. His philosophical system was not the least altered, though his new experience coloured both thought and language. The four volumes were published between 1851 and 1854. Vol. IV. contains the proposals for social and religious reorganisation. They had already been partially set forth in two little treatises—the *General View of Positivism*,[1] published in 1848, and after-

[1] Translated by J. H. Bridges, 2s. 6d. (W. Reeves, 83, Charing Cross Road.)

wards prefixed to Vol. I. of the *Polity*, and the *Catechism of Positive Religion*,[1] which appeared in 1852.

Steadily executing the plan of work announced in 1842 at the end of the *Philosophy*, Comte next proceeded to write his *Subjective Synthesis*. The first and only volume appeared in 1856. On September 5th, 1857, he was overtaken by death at the age of fifty-nine.

Comte's tomb is in the cemetery of Père-Lachaise. Positivists from all parts of the world meet there on the anniversary of his death. His apartment, 10, Rue Monsieur-le-Prince, is piously preserved, just as he left it, by the Positivist Society of Paris, which he founded in 1848. Information about the London Positivist Society will be found in the *Positivist Review*, published monthly (3½d. post free) by W. Reeves, 83, Charing Cross Road.

A translation of Comte's *Philosophie Positive* will perhaps seem to many people unnecessary. It will be said that everyone, or almost everyone, who may desire to study that work will have sufficient acquaintance with the French language to be able to read it in the original. I suspect that this assumption is far from being well grounded. A knowledge of French which is more or less sufficient for enjoying a novel, a play, or a history may not carry the reader with sure step and unflagging attention through a lengthy philosophical work; and, although Comte's style is forcible, occasionally even pungent and epigrammatic, it must be confessed that, for the most part, it is ponderous and fatiguing. Sometimes so compressed as to be obscure, more frequently redundant and verbose, often provokingly allusive, it makes demands upon the attention which discourage all but the most persevering readers.

These are faults which a translator who understands his business can, and should, do something to amend. If he contents himself with a literal rendering of every cumbrous, long-spun sentence, he is wasting his labour, for his version will be considerably less intelligible and attractive than the original. It is essential that he should not only be skilled in the art of turning the idioms of one language into those of another, but that he should have made a wide and careful study of Comte's other writings, so as to be competent to expand what is over-compressed, to condense what is verbose, and to substitute direct statements for indirect allusions. If this is done with judgment, the translation will be a boon to the English reader, even though he may be not unable to read the original.

The *Philosophie Positive* is known in England chiefly—it may be suspected, almost exclusively—through Miss Martineau's "Condensed Translation," in two volumes. When this first appeared in 1853, Comte praised it highly, going so far as to say: "My fundamental treatise will henceforth be best studied, at least by the majority of readers, in this unexampled translation, the reading

[1] Translated by Richard Congreve, 2s. 6d. (Kegan Paul & Co.)

of the original being reserved for theoricians properly so-called."[1] His examination of it, he says, had been "summary but sufficient." If he had read it through, he would have found that it is not free from mistakes, and that the omissions, necessarily extensive, often detract from the force and completeness of the reasoning.

In 1852, writing to a young banker, Comte had suggested what seems to me a better mode of abridging the six volumes of the *Philosophie Positive* than that adopted by Miss Martineau. "I am very glad that you are so zealously studying my *Philosophie Positive*. But I would suggest a quicker and less laborious process as regards the first three volumes of this fundamental treatise. It is only theoricians who will need to read the whole of it without omitting anything. Practicians, after reading the two introductory chapters, had better confine themselves to the general chapter which begins each of the five preliminary sciences—Mathematics, Astronomy, Physics, Chemistry, Biology. That is enough, and even better, for the purpose which you very sensibly describe to me. Nevertheless, looking at the logical importance of Mathematics, I advise you to read, besides the chapter dealing with that subject as a *grand* whole, the three treating of Calculation, Geometry, and Mechanics as subordinate wholes. You have thus to read in the first volume six chapters, including the introduction, and only two chapters in each of the two following volumes. This preparation will qualify you (as an experience of ten years has shown me in the case of several practicians) to read the whole of the three remaining volumes dealing with the science of Society."[1]

The chapters thus selected by Comte as essential amount to twenty-five out of the sixty contained in the *Philosophie Positive*. It is hoped that an English version of them will be gradually completed. The present little volume is a first instalment. It contains the two introductory chapters, the first dealing with the Law of Intellectual Evolution, the second with the complementary Law of Classification; the two taken together forming the basis of the Positive Philosophy. In the French these two chapters have already been published separately by Littré. I have carefully compared the present translation with the original, and can bear testimony to its accuracy. I think, too, that it often affords the kind of help which I have said is desirable.

E. S. Beesly.

[1] Tenth letter to M. Papot.

[1] Eleventh letter to M. Deullin.

TRANSLATORS' NOTE

THE Author's Preface and Part I. were translated by Paul Descours.

The Synoptical Table and Part II. were translated by H. Gordon Jones, who also supplied the Analytical Table of Contents.

P. D.
H. G. J.

June, 1905.

AUTHOR'S PREFACE

THIS course of lectures was first begun in April, 1826, and is the outcome of all my studies since I left the Polytechnic School in 1816. I was only able to give a few lectures at that time, because I had a serious illness; but I had the honour of having among my audience several scientific men of the first rank, among whom I may mention MM. Alexander von Humboldt, Blainville, and Poinsot, members of the Academy of Sciences, who were good enough to follow the course with unflagging interest. However, I gave the whole course last winter, the first lecture taking place on January 4th, 1829. My audience included MM. Fourier (Perpetual Secretary of the Academy of Sciences), Blainville, Poinsot, and Navier (members of the same Academy), also Professors Broussais, Esquirol, Binet, etc.; all of whom I must here publicly thank for the way in which they welcomed this new philosophical scheme.

Encouraged by their approval, I thought that this course might with advantage be made more widely known, and I am giving it again this winter at the Royal Athenæum of Paris, where I began the lectures on December 9th.

The plan of the course has remained the same; but in such a place it was necessary to omit some of the developments of my course. They are, however, given in this work in full just as the lectures were delivered last year.

In order to complete this historical account, I must say that some of the fundamental ideas expounded in this course had already been expressed by me, in the first part of a work called *System of Positive Polity*, of which an edition of one hundred copies was printed in May, 1822, and a larger edition afterwards in April, 1824. This first part has not yet been formally published, but copies have been presented to a large number of European scientists and philosophers. It will only be published with the second part, which will, I hope, appear towards the end of 1830.

I have thought it necessary here to state the facts as to the publicity of this first work, because some ideas which somewhat resemble mine are expounded in several works which have been since published, especially as regards the renovation of social theories, though no mention is made of my researches. Although the history of the human mind shows that different persons may, quite independently, arrive separately at similar conclusions while working at the same kind of studies, yet I am obliged to insist on the real priority of a work little known by the world, because it might otherwise be thought that I had found the germ of certain ideas in writings which are really more recent than mine.

As I have on several occasions been

asked for some explanations referring to the title of this course, I think it may be useful to briefly explain it.

The expression *positive philosophy* is constantly used throughout this course, and always with strictly the same meaning. I think, therefore, it would be superfluous to define it otherwise than by the uniform use I have made of it. The whole of the first chapter in particular may be considered as a development of the exact definition of what I mean by the phrase "positive philosophy."

I regret, however, to have been obliged to employ, for want of another, a word like *philosophy*, which has been so improperly used in a multitude of different meanings. But the qualifying adjective *positive* appears to me to clearly prevent any misconception, at all events on the part of those who know its proper meaning. I will, therefore, in this Preface simply say that I use the word *philosophy* in the sense in which it was employed by the ancients, and especially by Aristotle, as comprising the general system of human conceptions; and by adding the word *positive* I wish to denote that I am considering that particular manner of philosophising which holds that the purpose of theories, in any class of ideas, is to co-ordinate facts. This is the third and last state of general philosophy, the first being theological, and the second metaphysical, as I shall explain in the first chapter.

There is no doubt a good deal of analogy between my Positive Philosophy and what English scientists, especially since the time of Newton, mean by "natural philosophy." But I was unable to use the latter phrase or the term "philosophy of the sciences," which would be perhaps still more precise, because neither of them is yet understood to include all classes of phenomena. On the other hand, the Positive Philosophy, by which I understand the study of social phenomena as well as of all others, refers to a uniform mode of reasoning on all subjects open to human investigation. Besides, the expression "natural philosophy" is used in England to designate the different sciences of observation, considered in the greatest detail; while by Positive Philosophy as compared to the Positive Sciences, I mean only the special study of the generalities of the different sciences—looked upon as following one method and as constituting the different parts of a general scheme of researches. The expression which I have been led to construct is, therefore, both wider and more restricted than the other two expressions, which, being analogous as to the fundamental character of the ideas, might at first sight be considered as equivalent.

AUGUSTE COMTE.

Paris, December 18th, 1829.

SYNOPTICAL TABLE

Of the Whole Course of Positive Philosophy by Auguste Comte (former Pupil of the Polytechnic School).[1]

General considerations — Lectures: 2

1. Explanation of the object of this course, or general considerations on the nature and importance of the Positive Philosophy.
2. Explanation of the plan of this course, or general considerations on the hierarchy of the Positive Sciences.

Inorganic Sciences.

Mathematics — Lectures: 16

- Philosophical considerations on Mathematics as a whole — 1
- General considerations on
  - The Calculus — 6
    1. General view of Mathematical Analysis — 1
    2. The Calculus of Direct Functions — 1
    3. The Calculus of Indirect Functions — 2
    4. The Calculus of Variations — 1
    5. The Calculus of Finite Differences — 1
  - Geometry — 5
    1. General view of Geometry — 1
    2. Geometry of the Ancients — 1
    3. Fundamental conception of Analytical Geometry — 1
    4. General study of lines — 1
    5. General study of surfaces — 1
  - Rational Mechanics — 4
    1. Fundamental principles of Mechanics — 1
    2. General view of Statics — 1
    3. General view of Dynamics — 1
    4. General theorems of Mechanics — 1

Astronomy — Lectures: 9

- Philosophical considerations on Astronomy as a whole — 1
- General considerations on
  - Geometrical phenomena — 4
    1. General exposition of methods of observation — 1
    2. Study of the elementary geometrical phenomena — 1
    3. Theory of the earth's movement — 1
    4. The laws of Kepler — 1
  - Mechanical phenomena — 3
    1. Law of Universal Gravitation — 1
    2. Philosophical estimate of this law — 1
    3. Explanation of celestial phenomena by this law — 1
- Considerations on positive Cosmogony — 1

Physics — Lectures: 9

- Philosophical considerations on Physics as a whole — 1
- General considerations on
  - Barology — 1
  - Thermology — 2
    1. Experimental study of the phenomena of heat — 1
    2. Mathematical theory of these phenomena 1
  - Acoustics — 1
  - Optics — 2
  - Electricity — 2

Chemistry — Lectures: 6

- General considerations on Chemistry as a whole — 1
- General considerations on
  - Inorganic Chemistry — 3
    1. General view of Inorganic Chemistry — 1
    2. The doctrine of Definite Proportions — 1
    3. The Electro-chemical theory — 1
  - Organic Chemistry — 2

Organic Sciences.

Physiology — Lectures: 12

- Philosophical considerations on Physiology as a whole — 1
- General considerations on
  - The structure and composition of living bodies — 1
  - The classification of living bodies 1
  - The Organic Life — 2
  - The Animal Life — 3
  - The Cerebral Functions — 4
    1. Examination of the older theories — 2
    2. Explanation of the positive theory — 2

Social Physics — Lectures: 15

- Introduction — 2
  1. General considerations on the necessity and opportuneness of Social Physics 1
  2. Examination of the principal attempts made hitherto to establish such a science 1
- Method — 3
  1. Characteristics of the Positive Method in its application to social phenomena 2
  2. The relations of Social Physics to the other sciences — 1
- Doctrine — 10
  - Considerations on the general structure of human societies — 1
  - The fundamental natural law of the development of the human species as a whole 1
  - Historical study of the progress of civilisation.
    - Theological stage
      - Fetichism — 1
      - Polytheism — 1
      - Monotheism — 1
    - Metaphysical stage — 2
    - Positive stage — 3

General Summary and Conclusion — Lectures: 3

1. Summary of the Positive Method.
2. Summary of the Positive Doctrine.
3. Future of the Positive Philosophy.

[1] This Table represents the oral course, which was in seventy-two lectures, and not the written course, which is in sixty.

ANALYTICAL TABLE OF CONTENTS

PART I.

THE NATURE AND IMPORTANCE OF THE POSITIVE PHILOSOPHY

1–3. Preliminary considerations.

4. The Law of the Three States: Theological, Metaphysical, Positive.

5. Character of the Theological State.

6. „ „ Metaphysical State.

7. „ „ Positive State.

8. The final stage of each of the three systems of Philosophy.

10. Truth of the Law proved by the history of the sciences.

11. Individual experience as a proof of the Law.

12. The necessity for the Three States can also be shown as a matter of theory.

13–14. It is necessary to observe facts in order to form a theory; and, on the other hand, it is equally necessary to have a theory in order to observe facts.

15. Hence the necessity for the theological character of the primitive philosophy.

16. Theological philosophy is also specially suited to the character of the primitive mind, which prefers to discuss insoluble and inaccessible questions.

17. This form of philosophy afforded a powerful stimulus to early research.

18. Such a stimulus was absolutely necessary at first, although now no longer needed.

20. The theological form of philosophy was therefore necessary as a provisional method and doctrine.

21. It was impossible to pass directly from the Theological to the Positive state; the transition was effected by the Metaphysical state. Character of this transition.

22–23. The Positive Philosophy rejects the search into ultimate *causes*, and confines itself to the investigation of *laws*.

24. The Law of Gravitation as an example of scientific *law*.

25. Fourier's researches on Heat as another example.

26–27. The various sciences have passed through the three states at different rates. The order in which the sciences reached the positive state is as follows: Astronomy, Physics, Chemistry, and Physiology. This order is determined by the degree of generality, of simplicity, and independence of the respective phenomena.

28. History of the Positive Philosophy.

29. The growing influence of this philosophy accompanied by the decadence of the two other forms of philosophy. The Positive Philosophy is destined to prevail universally.

30. It does not, however, yet embrace all classes of phenomena.

31. Social phenomena are still treated by theological and metaphysical methods.

32. The Positive Philosophy must, therefore, be completed by the addition of a new science—Social Physics. The first and special aim of this work is to found such a science.

33. With this addition the Positive Philosophy will acquire the character of universality. It will therefore be able to completely displace its two rivals.

34–35. The second and general aim of this work is to constitute a philosophy of the sciences by exhibiting them as branches of a single trunk.

36. The course will be one on Positive Philosophy, and not on the Positive Sciences. Only the methods, chief results, and mutual relations of the sciences will be considered, not their details.

37. The two aims of this work are inseparable, although distinct. Without Social Physics the Philosophy would be incomplete; on the other hand, Social Physics must be based upon the other sciences.
38. No fundamental science must, therefore, be omitted from our study.
39–40. The present development of the sciences is due to the division of intellectual labour among scientists.
41. But this division has its drawbacks, for it gives rise to excessive specialisation.
42. The remedy for this evil is the creation of a new class of students. Their business would be to deal with the generalities of science. They would connect the various special discoveries with the general system.
43. The principle of division of labour would, therefore, be carried a step further, since the mutual relations of the sciences would thus give rise to a new order of specialists.
45. Four general advantages of the Positive Philosophy.
46. (1) First advantage—it exhibits the logical laws of the human mind.
47. Every living being has two aspects—the Statical and Dynamical.
48. Application of this fact to intellectual phenomena. Psychology must be based on Physiology, and on a study of scientific theories viewed as intellectual products.
49. The unsoundness of introspective psychology.
50–52. This kind of psychology is based on an illusion. The organ observed and the observing organ being identical, no proper observations can be made.
53. Introspective psychology is also self-contradictory.
54. There is no agreement among its followers.
55. What little we owe to these men is due to their being unfaithful to their own method.
56–57. To understand the Positive Method properly we must study its applications in the various sciences.
58. Such study is essential for the formation of good intellectual habits.
59. The first great result of the Positive Philosophy is, then, to give us a knowledge of intellectual laws and sound rules for the investigation of truth.
60. (2) A second advantage resulting from it will be the regeneration of Education.
61. The present system of teaching the sciences is too specialised. What is wanted is a knowledge of the chief methods and results of the sciences.
62. (3) Third advantage—the progress of the sciences will be advanced by combining them.
63. Many problems need for their solution a combination of two or more sciences.
64. Descartes's discovery of Analytical Geometry—*e.g.*, was due to a combination of Geometry with Algebra.
65–66. Further example—many chemical problems need a union of Physiology with Chemistry.
68. (4) Fourth advantage—a solid basis will be provided for the Reorganisation of Society.
69–70. The Social Order rests upon Ideas or Opinions. But there is a lack of agreement upon First Principles. Hence the prevalent social disorder.
71. This disorder is due to the simultaneous existence of three incompatible philosophies—the theological, metaphysical, and the positive. The Positive Philosophy is destined to prevail. We have only to complete it by the addition of Social Physics.
72. It has discredited its rivals completely.
75. All attempts at the universal explanation of phenomena by a single law are chimerical.
76. It will therefore be impossible to obtain scientific perfection in this respect. Even the law of gravitation, *e.g.*, cannot give us scientific unity.
77. The only necessary Unity is that of Method. It is sufficient that the doctrine should be *homogeneous*.
78. The object, general character, and influence of the Positive Philosophy have now been described.
79. The next step is to determine the general plan of the work.

PART II.

THE CLASSIFICATION OF THE SCIENCES

1–2. All existing Classifications of the Sciences are defective.
3. This is partly due to ignorance of the sciences on the part of the classifiers. The chief reason is, however, the want of homogeneity in the intellectual system. The first condition of success was that all our principal conceptions should become positive in character.
4. This condition has now been fulfilled.
5. The True Principle of Classification.
6. Our classification must be based upon the mutual dependence of the sciences. This dependence results from that of the corresponding phenomena with which the sciences deal.
7. The limits of the proposed classification must first be determined.
8. Human knowledge is divided into two branches—Theoretical and Practical. This inquiry deals only with Theoretical knowledge.
9. A knowledge of the laws of phenomena enables us to act effectively upon nature. Science is, therefore, the basis of the Arts.
10. But Science has the still more important function of satisfying our mental craving to know the laws of phenomena.
11. The study of science for its own sake has in the past led to numerous improvements in the Arts.
12. We are concerned here only with Theory, leaving its practical applications on one side.
13. To unite the generalities of both Theory and Practice in the same course would at present be out of the question. The special theories of the Arts have, in fact, not yet been formed.
14. The class of engineers has to settle the relations between Theory and Practice. But scientific theories of the Arts are as yet incoherent and scattered.
15. Every Art needs a combination of several Sciences. Hence the true theories of the Arts must be a future consequence arising out of the construction of the Positive Philosophy.
16–17. We must further distinguish two classes of natural Sciences—the Abstract and Concrete. We are concerned only with the Abstract Sciences.
18–19. Physiology, *e.g.*, will be dealt with, but not Botany or Zoology.
20. Chemistry comes into our scheme, but not Mineralogy.
21–23. The Concrete Sciences, like the Theories of the Arts, are based upon the Abstract Sciences. They must therefore be omitted.
24. General conclusion — Theory alone concerns us in this work, and Theory of an Abstract kind only.
25. The next step is to classify the Sciences.
26–27. Our classification cannot be a perfect one.
28. Reasons for this necessary imperfection. The Historical and Dogmatic methods of studying a science.
29. Nature of the Historical Method.
30. Nature of the Dogmatic Method.
31. New sciences must be studied by the Historical Method
32. The more advanced sciences only admit of the Dogmatic Method being used.
33. Example of the two Methods—the education of an ancient geometer compared with that of a modern geometer.
34. The Dogmatic Method is constantly superseding the other method.
35. It places even an average intellect in possession of all the work of past generations.
36. Sciences in an advanced state must be learned by a use of the Dogmatic Method, combined with the Historical Method in the case of the most recent discoveries.
37. The Dogmatic Method does not show how the sciences were built up, but that is also true of the ordinary Historical Method.
38–39. The true history of the progress of a science belongs to Social Science.

40. No science can be properly understood apart from its history. Therefore the subject will be treated incidentally throughout the course. The true study of the history of the sciences is, however, reserved for Social Physics.
42. It is impossible to adhere strictly to the historical order in an exposition of the sciences, for an earlier often borrows from a later science.
43. Astronomy and Physics as an example.
44. Such defects are due to the artificial element in our classification.
45. The classification, however, agrees in the main with the history of science.
46–47. There are 720 possible ways of arranging the six fundamental sciences. The problem is to find the one order which fulfils the necessary conditions.
48. The true principle of classification must be obtained by a comparison of the different order of phenomena with which these sciences deal.
49. So compared, we find that the sciences can be arranged in an order of mutual dependence. This order is determined by the degree of simplicity or generality of the respective phenomena.
50. The most simple are necessarily also the most general phenomena. The order is, then, from the most simple or general to the most complex and special phenomena.
51. The simplest sciences, being the furthest removed from the human order, have naturally been the earliest to develop.
52. We can now proceed to the actual construction of the encyclopædic scale.
53. Two classes of phenomena—Inorganic and Organic.
54. Organic phenomena are more complex and less general than Inorganic. They also depend upon the Inorganic. Therefore, the study of Inorganic phenomena must precede the other.
55. This division into Inorganic and Organic will not be affected by any further modification of our views as to the nature of living bodies, should such take place.
56. In any case, we know that the one order of phenomena depends upon the other.
58. Inorganic Physics must be divided into Astronomy and Terrestrial Physics.
59. Nature of Astronomical phenomena. Their study must precede that of Terrestrial Physics.
60. Terrestrial Physics must be further divided into Physics proper and Chemistry. Chemical phenomena are more special than physical. Physics must, therefore, precede Chemistry.
61–62. Organic phenomena are divided into those relating to the individual and those dealing with the species. In the case of Man this distinction is a fundamental one. Hence Organic Physics is divided into Physiology proper and Social Physics.
63. Social Physics is not a mere appendage to Physiology. Although based upon Physiology, it is a separate science. Social laws cannot be deduced from physiological ones.
64. Physiology can be divided into vegetable and animal. But for our present purpose this division is inapplicable.
65. Physiology, therefore, will be regarded as a single science in this work.
66. Hence the order of the sciences is—Astronomy, Physics, Chemistry, Physiology, and Social Physics. This order exhibits a regular gradation from the most general, simple, and abstract phenomena to the most special, complex, and concrete.
67. The sub-divisions of each science may also be arranged on the same principle.
68. The chief characteristic properties of this classification are four in number.
69. (1) This classification agrees with the existing empirical classification which has spontaneously arisen among scientists.
70. Such an accordance is the surest sign of a good classification.
71. But the accordance does not in the least degree make the performance of our encyclopædic task unnecessary.
72. (2) This classification follows the historical order of development of the sciences.
73. That order was necessitated by the fact that the later sciences could not be constituted, until a considerable development of the earlier ones, upon which they depended, had taken place.

74. It is impossible to verify the Law of the Three States properly unless we combine it with this encyclopædic formula.
75. (3) This classification marks the degree of perfection of each science.
76. The most perfect sciences are those which are least dependent on the other sciences, and *vice versâ*.
77. The great means of perfecting a science is Mathematical Analysis. The sciences admit of the application of Mathematics in proportion as they are occupied with very simple and general phenomena.
78. The difference between the degree of precision which a science admits of and its certainty. All the sciences are equally certain; they only differ in their degree of precision.
79. (4) This classification furnishes us with the plan of a really Scientific Education—general and special.
80. (*a*) The effect of the classification on Doctrine. No science can be properly studied without a knowledge of the sciences preceding it in our classification. This principle is especially applicable to the case of the special education of scientists.
81. Examples of the need for an orderly study of the sciences.
82. At present a really rational scientific education does not exist. Hence the imperfect condition of the more important sciences.
83. The need for this orderly study is just as necessary in respect of general education.
84. (*b*) We must consider the encyclopædic formula from the standpoint of Method as well as Doctrine.
85. The proposed course will result in giving us a perfect knowledge of the Positive Method.
86. By studying the sciences in the proposed order, we shall obtain a knowledge of the various modifications which the general Positive Method undergoes.
87. Although the general method is the same in all cases, each science contributes a special development of its characteristic procedures.
88. A study of all the fundamental sciences is therefore indispensable.
89. Not only must all the sciences be studied, but they must also be studied in their proper order.
90. The importance of the proposed classification has now been dealt with under four aspects.
91. But Mathematics has been omitted from the scale of the sciences.
92. This omission was intentional, on account of the extreme importance of that science. Its general character and encyclopædic rank will form the subject of the next chapter. The general conclusions of that chapter are, however, given here.
93. Mathematics is not a mere part of natural philosophy; it is really its basis. It is of more importance as Method than as Doctrine.
94. It must be divided into Abstract Mathematics, or the Calculus, and Concrete Mathematics. Concrete Mathematics consists of General Geometry and Rational Mechanics.
95. Abstract Mathematics is purely instrumental. Geometry and Mechanics are true natural sciences. But they are more important as Method than as Doctrine.
96. Mathematics must be placed at the head of the Positive Philosophy. This is in accordance with our general principle of classification. This science has long been the starting-point of a scientific education. We now see the rational grounds for this practice.
97. The plan which must guide us in our study of Positive Philosophy has now been laid down. The true encyclopædic formula which we must follow is, therefore—Mathematics, Astronomy, Physics, Chemistry, Physiology, and Social Physics.
98. This chapter has then justified the preceding Synoptical Table. In constructing this Synoptical Table, the sub-divisions of each science have been arranged in accordance with the same principle of classification which furnished the encyclopædic scale itself.

The Fundamental Principles of the Positive Philosophy

Part I.

EXPLANATION OF THE OBJECT OF THIS COURSE, OR GENERAL CONSIDERATIONS ON THE NATURE AND IMPORTANCE OF THE POSITIVE PHILOSOPHY

1. The object of this first chapter is to indicate clearly the purpose of the course, by an exact determination of the spirit in which we shall consider the various fundamental branches of natural philosophy, set forth in the preceding Synoptical Table.

2. It is true that the nature of this course can only be completely realised, so as to enable us to form a definite opinion of it, when its different parts have been developed in due order. That is the usual disadvantage of definitions relating to very extensive systems of ideas, when the definition precedes the exposition. But general principles may be conceived under two aspects—either as the sketch of a doctrine which it is proposed to establish, or as the summary of an already-established doctrine. It is true that it is only from the last point of view that they acquire their full value, yet they already possess under the first aspect an extreme importance, since they serve to characterise from the outset the subject to be considered. The general limitation of the field of our researches—carried out with the utmost strictness—is a preliminary mental operation, which is especially necessary in a study so vast, and hitherto so indeterminate, as that which we are about to undertake. In order to comply with this logical necessity, I think it necessary to begin by at once pointing out the series of fundamental considerations which gave rise to this course; they will be subsequently specially developed with all the detail which their great importance demands.

3. In order to explain properly the true nature and peculiar character of the Positive Philosophy, it is indispensable that we should first take a brief survey of the progressive growth of the human mind, viewed as a whole; for no idea can be properly understood apart from its history.

4. In thus studying the total development of human intelligence in its different

spheres of activity, from its first and simplest beginning up to our own time, I believe that I have discovered a great fundamental Law, to which the mind is subjected by an invariable necessity. The truth of this Law can, I think, be demonstrated both by reasoned proofs furnished by a knowledge of our mental organisation, and by historical verification due to an attentive study of the past. This Law consists in the fact that each of our principal conceptions, each branch of our knowledge, passes in succession through three different theoretical states: the Theological or fictitious state, the Metaphysical or abstract state, and the Scientific or positive state. In other words, the human mind—by its very nature—makes use successively in each of its researches of three methods of philosophising, whose characters are essentially different, and even radically opposed to each other. We have first the Theological method, then the Metaphysical method, and finally the Positive method. Hence there are three kinds of philosophy or general systems of conceptions on the aggregate of phenomena, which are mutually exclusive of each other. The first is the necessary starting-point of human intelligence: the third represents its fixed and definitive state: the second is only destined to serve as a transitional method.

5. In the Theological state, the human mind directs its researches mainly towards the inner nature of beings, and towards the first and final causes of all the phenomena which it observes—in a word, towards Absolute knowledge. It therefore represents these phenomena as being produced by the direct and continuous action of more or less numerous supernatural agents, whose arbitrary intervention explains all the apparent anomalies of the universe.

6. In the Metaphysical state, which is in reality only a simple general modification of the first state, the supernatural agents are replaced by abstract forces, real entities or personified abstractions, inherent in the different beings of the world. These entities are looked upon as capable of giving rise by themselves to all the phenomena observed, each phenomenon being explained by assigning it to its corresponding entity.

7. Finally, in the Positive state, the human mind, recognising the impossibility of obtaining absolute truth, gives up the search after the origin and destination of the universe and a knowledge of the final causes of phenomena. It only endeavours now to discover, by a well-combined use of reasoning and observation, the actual *laws* of phenomena—that is to say, their invariable relations of succession and likeness. The explanation of facts, thus reduced to its real terms, consists henceforth only in the connection established between different particular phenomena and some general facts, the number of which the progress of science tends more and more to diminish.

8. The Theological system arrived at its highest form of perfection, when it substituted the providential action of a single being, for the varied play of the numerous independent gods which had been imagined by the primitive mind. In the same way, the last stage of the Metaphysical system consisted in replacing the different special entities by the idea of a single great general entity—Nature—looked upon as the sole source of all phenomena. Similarly, the ideal of the Positive system, towards which it constantly tends, although in

all probability it will never attain such a stage, would be reached if we could look upon all the different phenomena observable as so many particular cases of a single general fact, such as that of Gravitation, for example.

9. This is not the place to give a special demonstration of this fundamental Law of Mental Development, and to deduce from it its most important consequences. We shall make a direct study of it, with all the necessary details, in the part of this work relating to social phenomena.[1] I am only considering it now in order to determine precisely the true character of the Positive Philosophy, as opposed to the two other philosophies which have successively dominated our whole intellectual system up to these latter centuries. For the present, to avoid leaving entirely undemonstrated so important a law, the applications of which will frequently occur throughout this work, I must confine myself to a rapid enumeration of the most evident general reasons which prove its exactitude.

10. In the first place, it is, I think, sufficient merely to enumerate such a law for its accuracy to be immediately verified, by all those who are fairly well acquainted with the general history of the sciences. For there is not a single science which has to-day reached the Positive stage, which was not in the past —as each can easily see for himself— composed mainly of metaphysical abstractions, and, going back further still, it was altogether under the sway of theological conceptions. Unfortunately, we shall have to recognise on more than one occasion in the different parts of this course, that even the most perfect sciences still retain to-day some very evident traces of these two primitive states.

11. This general revolution of the human mind can, moreover, be easily verified to-day, in a very obvious, although indirect, manner, if we consider the development of the individual intelligence. The starting-point being necessarily the same in the education of the individual as in that of the race, the various principal phases of the former must reproduce the fundamental epochs of the latter. Now, does not each of us in contemplating his own history recollect that he has been successively— as regards the most important ideas—a *theologian* in childhood, a *metaphysician* in youth, and a *natural philosopher* in manhood? This verification of the law can easily be made by all who are on a level with their age.

12. But, in addition to the proofs of the truth of this law furnished by direct observation of the race or the individual, I must, above all, mention in this brief summary the theoretical considerations which show its necessity.

13. The most important of these considerations arises from the very nature of the subject itself. It consists in the need at every epoch of having some theory to connect the facts, while, on the other hand, it was clearly impossible for the primitive human mind to form theories based on observation.

14. All competent thinkers agree with Bacon that there can be no real knowledge except that which rests upon observed facts. This fundamental

[1] Readers who desire to have a fuller explanation of this subject, without delay, may consult with advantage three articles entitled "Philosophical Considerations on the Sciences and Men of Science," which I published in November, 1825, in a journal called the *Producer* (numbers seven, eight, and ten), and especially the first part of my *System of Positive Polity*, addressed in April, 1824, to the Academy of Sciences, where I placed on record for the first time my discovery of this Law.

maxim is evidently indisputable if it is applied, as it ought to be, to the mature state of our intelligence. But, if we consider the origin of our knowledge, it is no less certain that the primitive human mind could not, and indeed ought not to, have thought in that way. For if, on the one hand, every Positive theory must necessarily be founded upon observations, it is, on the other hand, no less true that, in order to observe, our mind has need of some theory or other. If in contemplating phenomena we did not immediately connect them with some principles, not only would it be impossible for us to combine these isolated observations, and therefore to derive any profit from them, but we should even be entirely incapable of remembering the facts, which would for the most part remain unnoted by us.

15. Thus there were two difficulties to be overcome: the human mind had to observe in order to form real theories, and yet had to form theories of some sort before it could apply itself to a connected series of observations. The primitive human mind, therefore, found itself involved in a vicious circle, from which it would never have had any means of escaping, if a natural way out of the difficulty had not fortunately been found by the spontaneous development of Theological conceptions. These presented a rallying-point for the efforts of the mind, and furnished materials for its activity. This is the fundamental motive which demonstrates the logical necessity for the purely Theological character of Primitive Philosophy, apart from those important social considerations relating to the matter which I cannot even indicate now.

16. This necessity becomes still more evident, when we have regard to the perfect congruity of Theological Philosophy, with the peculiar nature of the researches on which the human mind, in its infancy, concentrated to so high a degree all its powers. It is, indeed, very noticeable how the most insoluble questions—such as the inner nature of objects, or the origin and purpose of all phenomena—are precisely those which the human mind proposes to itself, in preference to all others, in its primitive state; all really soluble problems being looked upon as hardly worthy of serious thought. The reason for this is very obvious, since it is experience alone which has enabled us to estimate our abilities rightly, and if man had not commenced by over-estimating his forces, these would never have been able to acquire all the development of which they are capable. This fact is a necessity of our organisation. But, be that as it may, let us picture to ourselves as far as we can this early mental disposition, so universal and so prominent, and let us ask ourselves what kind of reception would have been accorded at such an epoch to the Positive Philosophy, supposing it to have been then formed. The highest ambition of this Philosophy is to discover the *laws* of phenomena, and its main characteristic is precisely that of regarding as necessarily interdicted to the human reason, all those sublime mysteries which Theological Philosophy, on the contrary, explains with such admirable facility, even to the smallest detail. Under such circumstances, it is easy to see what the choice of primitive man would be.

17. The same thing is true, when we consider from a practical standpoint the nature of the pursuits which the human mind first occupies itself with. Under that aspect, they offer to man the strong

attraction of an unlimited control over the exterior world, which is regarded as being entirely destined for our use, while all its phenomena seem to have close and continuous relations with our existence. These chimerical hopes, these exaggerated ideas of man's importance in the universe, to which the Theological Philosophy gives rise, are destroyed irrevocably by the first-fruits of the Positive Philosophy. But, at the commencement, they afforded an indispensable stimulus without the aid of which we cannot, indeed, conceive how the primitive human mind would have been induced to undertake any arduous labours.

18. We are at the present time so far removed from that early state of mind—at least as regards the majority of phenomena—that it is difficult for us to appreciate properly the force and necessity of such considerations. Human reason is now so mature that we are able to undertake laborious scientific researches, without having in view any extraneous goal capable of strongly exciting the imagination, such as that which the astrologers or alchemists proposed to themselves. Our intellectual activity is sufficiently excited by the mere hope of discovering the laws of phenomena, by the simple desire of verifying or disproving a theory. This, however, could not be the case in the infancy of the human mind. Without the attractive chimeras of Astrology, or the powerful deceptions of Alchemy, for example, where should we have found the perseverance and ardour necessary for collecting the long series of observations and experiments which, later on, served as a basis for the first Positive theories of these two classes of phenomena?

19. The need of such a stimulus to our intellectual development was keenly felt long ago by Kepler in the case of astronomy, and has been justly appreciated in our own time by Berthollet in chemistry.

20. The above considerations show us that, although the Positive Philosophy represents the true final state of human intelligence—that to which it has always tended more and more—it was none the less necessary to employ the Theological Philosophy at first and during many centuries, both as a method and as furnishing provisional doctrines. Since the Theological Philosophy is spontaneous in its character, it is, for that reason, the only one possible in the beginning; it is also the only one which can offer a sufficient interest to our budding intelligence. It is now very easy to see that, in order to pass from this provisional form of philosophy to the final stage, the human mind was naturally obliged to adopt Metaphysical methods and doctrines as a transitional form of philosophy. This last consideration is indispensable, in order to complete the general sketch of the great law which I have pointed out.

21. It is easily seen that our understanding, which was compelled to progress by almost insensible steps, could not pass suddenly, and without any intermediate stages, from Theological to Positive philosophy. Theology and Physics are so profoundly incompatible, their conceptions are so radically opposed in character, that, before giving up the one in order to employ the other exclusively, the human intelligence had to make use of intermediate conceptions, which, being of a hybrid character, were eminently fitted to bring about a gradual transition. That is the part played by

Metaphysical conceptions, and they have no other real use. By substituting, in the study of phenomena, a corresponding inseparable entity for a direct supernatural agency—although, at first, the former was only held to be an offshoot of the latter—Man gradually accustomed himself to consider only the facts themselves. In that way, the ideas of these metaphysical agents gradually became so dim that all right-minded persons only considered them to be the abstract names of the phenomena in question. It is impossible to imagine by what other method our understanding could have passed from frankly supernatural to purely natural considerations, or, in other words, from the Theological to the Positive *régime*.

22. I have thus established, as far as it is possible to do so without entering into a special discussion, which would be out of place at the present moment, what I conceive to be the general Law of Mental Development. It will now be easy for us to determine precisely the exact nature of the Positive Philosophy. To do that is the special object of this chapter.

23. We have seen that the fundamental character of the Positive Philosophy is to consider all phenomena as subject to invariable natural *Laws*. The exact discovery of these Laws and their reduction to the least possible number constitute the goal of all our efforts; for we regard the search after what are called *causes*, whether first or final, as absolutely inaccessible and unmeaning. It is unnecessary to dwell much on a principle which has now become so familiar to all who have made anything like a serious study of the observational sciences. Everybody, indeed, knows that in our positive explanations, even when they are most complete, we do not pretend to explain the real *causes* of phenomena, as this would merely throw the difficulty further back; we only try to analyse correctly the circumstances of their production, and to connect them together by normal relations of succession and similarity.

24. Thus, to cite the best example, we say that the general phenomena of the universe are *explained*—as far as they can be—by the Newtonian Law of Gravitation. On the one hand, this admirable theory shows us all the immense variety of astronomical facts as only a single fact looked at from different points of view; that fact being the constant tendency of all molecules towards each other, in direct proportion to their masses and inversely as the squares of their distances. On the other hand, this general fact is shown to be the simple extension of an extremely familiar and, therefore, well-known phenomenon—the weight of a body at the earth's surface. As to determining what attraction and weight are in themselves or what their causes are, these are questions which we regard as insoluble and outside the domain of the Positive Philosophy; we, therefore, rightly abandon them to the imagination of the theologians or the subtleties of the metaphysicians. That it is clearly impossible to solve such questions is shown by the fact that, whenever an attempt has been made to give a rational explanation of the matter, the greatest thinkers have only been able to define one of these principles by the other. Attraction is defined as nothing else than universal weight, and weight is said to consist simply in terrestrial attraction. Explanations of this kind raise a smile, if put forward as furnishing us with a knowledge of "things-in-themselves" and the mode of causation of phenomena. They

are, however, the only satisfactory results obtainable, for they present as identical two orders of phenomena which were for so long a time regarded as unconnected. No sensible person would nowadays seek to go beyond this.

25. It would be easy to multiply these examples, which will occur very frequently throughout this treatise, for at the present day all great intellectual operations are conducted in this spirit. To take a single example of this from contemporary works, I will choose the fine series of researches made by Fourier on the Theory of Heat. This affords us an excellent verification of the preceding general remarks. In this work, the philosophical character of which is so eminently positive, the most important and most precise laws of thermal phenomena are disclosed; but the author has not once inquired into the intimate nature of Heat in itself, nor has he mentioned, except to point out its uselessness, the warm controversy between the partisans of Heat as a material substance and those who make it consist in the vibrations of an universal ether. And yet that work treats of the most important questions, several of which had never even been raised before; a clear proof that the human mind, by simply confining itself to researches of an entirely positive order, can find therein inexhaustible food for its highest form of activity, without attacking inaccessible problems.

26. Having thus indicated, so far as it was possible to do so in this general sketch, the spirit of the Positive Philosophy, which the whole of this course is intended to develop, we must next consider what stage in the formation of that Philosophy has now been reached, and what remains to be done in order to constitute it fully.

27. For this purpose, we must, in the first place, remember that the different branches of our knowledge were not able to pass at the same rate through the three great phases of their development indicated above, and that consequently they did not arrive simultaneously at the Positive state. There exists in this respect an invariable and necessary Order which our various classes of conceptions have followed, and were bound to follow, in their progressive course; and the exact consideration of this Order is the indispensable complement of the fundamental mental law previously enunciated. That Order will form the special subject of the next chapter. At present it is sufficient to know that it conforms to the diverse nature of the phenomena, and that it is determined by their degree of generality, of simplicity, and of reciprocal independence—three considerations which, although quite distinct, lead up to the same result. Thus, Astronomical phenomena, being the most general, the simplest, and the most independent of all others, were the first to be subjected to positive theories; then followed in succession and for the same reasons the phenomena of Terrestrial Physics, properly so called, those of Chemistry, and finally Physiological phenomena.

28. It is impossible to fix the precise date of this mental revolution; we can only say that, like all other great human events, it took place continuously and at an increasing rate, especially since the labours of Aristotle and the Alexandrian school, and afterwards from the introduction of natural science into the West of Europe by the Arabs. However, as it is better to fix an epoch in order to give greater precision to our ideas, I would select that of the great movement imparted to the human intellect two centuries

ago, by the combined influence of the precepts of Bacon, the conceptions of Descartes, and the discoveries of Galileo. It was then that the spirit of the Positive Philosophy began to assert itself in the world, in evident opposition to the Theological and Metaphysical spirit; for it was then that Positive conceptions disengaged themselves clearly from the superstitious and scholastic alloy, which had more or less disguised the true character of all the previous scientific work.

29. Since that memorable epoch, the increasing influence of the Positive Philosophy and the decadent movement of Theological and Metaphysical Philosophy have been extremely marked. These movements have at last become so pronounced that, at the present day, it is impossible for any observer acquainted with the spirit of his age, to fail to recognise the final bent of the human mind towards Positive studies, and the irrevocable break henceforth from those fruitless doctrines and provisional methods which were only suited to its first flight. This fundamental mental revolution will therefore necessarily be carried out to the fullest extent. If, then, there still remains some great conquest to be made, some important division of the intellectual domain to be invaded, we can be certain that the transformation will take place there also, as it has been carried out in all the other branches of science. It would evidently be absurd to suppose that the human mind, which is so disposed to unity of method, would yet preserve indefinitely, in the case of a single class of phenomena, its primitive mode of philosophising, when it has once adopted for the other classes a new philosophic path of an entirely opposite character.

30. The whole thing reduces itself, therefore, to a simple question of fact: Does the Positive Philosophy, which, during the last two centuries, has gradually acquired so great an extension, embrace at the present day all classes of phenomena? It is evident that it does not; and there still remains, therefore, a great scientific work to be executed, in order to give the Positive Philosophy that universal character indispensable for its final constitution.

31. In the four principal categories of natural phenomena enumerated above, astronomical, physical, chemical, and physiological, we notice an important omission relating to social phenomena. Although these are implicitly comprised among physiological phenomena, yet, owing to their importance and the inherent difficulties of their study, they deserve to form a distinct class. This last order of ideas is concerned with the most special, most complicated, and most dependent of all phenomena; it has, therefore, necessarily progressed more slowly than all the preceding orders, even if we do not take into account the more special obstacles to its study which we shall consider later on. However that may be, it is evident that it has not yet been included within the domain of Positive philosophy. Theological and metaphysical methods are never used now by anyone in dealing with all the other kinds of phenomena, either as a means of investigation or even as a mode of reasoning. But these discarded methods are, on the contrary, still exclusively used for both purposes in everything which concerns social phenomena, although their insufficiency in this respect has been already fully felt by all good judges, such men being tired of these empty and endless

discussions about divine right and the sovereignty of the people.

32. Here, then, is the great, but evidently the only, gap which has to be filled up in order to finish the construction of the Positive philosophy. Now that the human mind has founded celestial physics, terrestrial physics (mechanical and chemical), and organic physics (vegetable and animal), it only remains to complete the system of observational sciences by the foundation of Social Physics. This is at the present time, under several important aspects, the greatest and most pressing of our mental needs, and to meet this need is, I make bold to say, the first purpose of this work, its special object.

33. The conceptions which I shall endeavour to present relating to the study of social phenomena, and of which I hope that the present chapter will already enable us to see the germ, cannot be expected to raise Social Physics at once to the degree of perfection which has been reached by the earlier branches of natural philosophy. Such a hope would be evidently chimerical, seeing that these branches still differ widely from one another in perfectness, as was, indeed, inevitable. But I aim at impressing upon this last branch of our knowledge the same Positive character which already marks all the other branches. If this condition is once really fulfilled, the philosophical system of the modern world will be at last founded in its entirety; for there is no observable fact which would not then be included in one or other of the five great categories of astronomical, physical, chemical, physiological, and social phenomena. All our fundamental conceptions having thus been rendered homogeneous, philosophy will be finally constituted in the Positive state. Its character will be henceforth unchangeable, and it will then only have to develop itself indefinitely, by incorporating the constantly-increasing knowledge which inevitably results from new observations or more profound meditations. Having by this means acquired the character of universality which as yet it lacks, the Positive Philosophy, with all its natural superiority, will be able to displace entirely the Theological and Metaphysical philosophies. The only real property possessed by Theology and Metaphysics at the present day is their character of universality, and when deprived of this motive for preference they will have for our successors only an historical interest.

34. The first and special object of this course having been thus set forth, it is easy to comprehend its second and general aim, that which constitutes it a course of Positive Philosophy, and not merely a course on Social Physics.

35. The formation of Social Physics at last completes the system of natural sciences. It, therefore, becomes possible and even necessary to summarise these different sciences, so that they may be co-ordinated by presenting them as so many branches of a single trunk, instead of continuing to look upon them as only so many isolated groups. Therefore, before proceeding to the study of social phenomena, I shall successively consider, in the encyclopædic order given above, the different positive sciences already formed.

36. It is, I think, unnecessary to warn the reader that I do not claim to give here a series of special courses of lectures on each of the principal branches of Natural Philosophy. Not to speak of the enormous time that such an enterprise would take it is clear that I cannot

claim to be equipped for it, nor, I think I may add, can anyone else in the present state of human education. On the contrary, a course of the kind contemplated here requires, if it is to be properly understood, a previous series of special studies on the different sciences which will be treated therein. In the absence of this condition, it is very difficult to realise, and impossible to properly estimate, the philosophical reflections which will be made upon these sciences. In one word, it is a course on Positive Philosophy, and not on the Positive Sciences, that I propose to give. We shall only have to consider here each fundamental science in its relations with the whole positive system, and as to the spirit characterising it; that is to say, under the two-fold aspect of its essential methods and its principal doctrines. As to the doctrines, indeed, I shall often do no more than mention them as known to specialists, though I shall try to estimate their importance.

37. In order to sum up the ideas relating to the two-fold purpose of this course, I must call attention to the two objects—the one special, the other general—which I have in view, and which, although distinct in themselves, are necessarily inseparable. On the one hand, it would be impossible to conceive of a course of Positive Philosophy unless Social Physics had first been founded, since an essential element would then be lacking; consequently, the conceptions of such a course would not have that character of generality which ought to be their principal attribute, and which distinguishes our present study from any series of special studies. On the other hand, how can we proceed with sure step to the positive study of social phenomena, if the mind has not been first prepared by the thorough consideration of positive methods in the case of less complex phenomena, and furnished in addition with a knowledge of the principal laws of earlier phenomena, all of which have a more or less direct influence upon social facts?

38. Although all the fundamental sciences do not inspire ordinary minds with an equal interest, there is not one of them which should be neglected in such a study as we are about to undertake. As regards the welfare of the human race, all of them are certainly of equal importance, when we examine them thoroughly. Besides, those whose results seem at first sight to offer only a minor practical interest are yet of the greatest importance, either owing to the greater perfection of their methods, or as being the indispensable foundation of all the others. This is a consideration to which I shall have special occasion to refer in the next chapter.

39. To guard, as far as possible, against the misconceptions likely to arise respecting a work so novel as this, I must add a few remarks to the explanations already given. I refer especially to that universal predominance of specialism which hasty readers might think was the tendency of this course, and which is so rightly looked upon as wholly contrary to the true spirit of the Positive Philosophy. These remarks will, moreover, have the more important advantage of exhibiting this spirit under a new aspect, calculated to make its general idea clearer.

40. In the primitive state of our knowledge, no regular division exists among intellectual labours; all the sciences are cultivated simultaneously by the same minds. This method of organising human studies is at first inevitable and

even indispensable, as I shall have occasion to show later on; but it gradually changes in proportion as the different orders of conceptions develop themselves. By a law whose necessity is evident, each branch of the scientific system gradually separates from the trunk when it has developed far enough to admit of separate cultivation—that is to say, when it has arrived at a stage in which it is capable of constituting the sole pursuit of certain minds. It is to this division of the various kinds of research among different orders of scientists that we evidently owe the development which each distinct class of human knowledge has attained in our time; but this very division renders it impossible for modern scientists to practise that simultaneous cultivation of all the sciences which was so easy and so common in antiquity. In a word, the division of intellectual labour, carried out further and further, is one of the most important and characteristic attributes of the Positive Philosophy.

41. But, while recognising the prodigious results due to this division, and while seeing that it henceforth constitutes the true fundamental basis of the general organisation of the scientific world, it is, on the other hand, impossible not to be struck by the great inconveniences which it at present produces, on account of the excessive specialisation of the ideas which exclusively occupy each mind. This unfortunate result is no doubt inevitable up to a certain point, as being inherent in the very principle of the division of labour. Do what we will, therefore, we shall never be able to equal the ancients in this respect, for their general superiority was due to the slight degree of development of their knowledge. Yet, I think we can, by proper means, avoid the most pernicious effects of an exaggerated specialism, without doing injury to the fruitful influence of the division of labour in research. There is an urgent need for considering this question seriously, for these inconveniences, which, by their very nature, tend constantly to increase, are now becoming very apparent. Everyone agrees that the divisions which we establish between the various branches of Natural Philosophy, in order to make our labours more perfect, are at bottom artificial. In spite of this admission, we must not forget that the number of scientists who study the whole even of a single science is already very small, although such a science is, in its turn, only a part of a greater whole. The majority of scientists already confine themselves entirely to the isolated consideration of a more or less extensive section of a particular science, without concerning themselves much about the relation between their special work and the general system of positive knowledge. Let us hasten to remedy this evil before it becomes more serious. Let us take care that the human mind does not finish by losing its way in a mass of detail. We must not conceal from ourselves that this is the essentially weak side of our system, and that this is the point on which the partisans of Theological and Metaphysical philosophy may still attack the Positive Philosophy with some hope of success.

42. The true means of arresting the pernicious influence which seems to threaten the intellectual future of our race, on account of a too great specialisation of individual researches, is clearly not to return to the ancient confusion of labours. This would tend to put the human mind back; and, besides, such a return has happily become impossible

now. The true remedy consists, on the contrary, in perfecting the division of labour itself. All that is necessary is to create one more great speciality, consisting in the study of scientific generalisations. We need a new class of properly-trained scientists, who, instead of devoting themselves to the special study of any particular branch of Natural Philosophy, shall employ themselves solely in the consideration of the different Positive Sciences in their present state. It would be their function to determine exactly the character of each science, to discover the relations and concatenation of the sciences, and to reduce, if possible, all their chief principles to the smallest number of common principles, while always conforming to the fundamental maxims of the Positive Method. At the same time, the other scientists, before devoting themselves to their respective specialities, should have received a previous training embracing all the general principles of positive knowledge. This would enable them henceforth to make immediate use of the light thrown on their work by the scientists devoted to the study of generalities, whose results the specialists would, in turn, be able to rectify. That is a state of things to which the existing scientists are drawing nearer every day. If these two great conditions were once fulfilled, as they evidently can be, then the division of labour in the sciences could be carried on, without any danger, as far as the development of the different kinds of knowledge required. There would be a distinct class of men (always open to the criticism of all the other classes), whose special and permanent function would consist in connecting each new special discovery with the general system; and we should then have no cause to fear that too great an attention bestowed upon the details would ever prevent us from perceiving the whole. In a word, the modern organisation of the scientific world would then be accomplished, and would be susceptible of indefinite development, while always preserving the same character.

43. To make the study of scientific generalisations a distinct department of intellectual labour is merely a further extension of the same principle of division which led to the successive separation of the different sciences. As long as the different Positive Sciences were only slightly developed, their mutual relations were not important enough to give rise, at all events permanently, to a special class of workers; nor was the need of this new study nearly so urgent as it is now. But, at the present day, each of the sciences has developed on its own lines to such an extent that the examination of their mutual relations affords material for systematic and continued labour, while at the same time this new order of studies becomes indispensable, to prevent the dispersion of human ideas.

44. Such, in my view, is the office of the Positive Philosophy in relation to the Positive Sciences properly so called. Such, at all events, is the aim of the present work.

45. I have now determined, as exactly as it was possible for me to do in a first sketch, the general spirit of a course of Positive Philosophy. In order to bring out its full character, I must state concisely the principal general advantages which such a work may have—if its essential conditions are properly fulfilled—as regards intellectual progress. I will mention only four. They are fundamental qualities of the Positive Philosophy.

46. In the first place, the study of the Positive Philosophy, by considering the results of the activity of our intellectual faculties, furnishes us with the only really rational means of exhibiting the logical laws of the human mind, which have hitherto been sought by methods so ill calculated to reveal them.

47. To explain what I mean on this point, I must first recall a philosophical conception of the highest importance, set forth by Blainville in the fine introduction to his *Principles of Comparative Anatomy*. According to him, every active being, and especially every living being, may be studied in all its manifestations under two fundamental relations —the Statical and the Dynamical; that is, as fitted to act and as actually acting. It is clear that all the considerations which might be presented will necessarily fall under the one or the other of these heads. Let us apply this luminous fundamental maxim to the study of intellectual functions.

48. If these functions are regarded from a Statical point of view, their study can only consist in determining the organic conditions on which they depend; it thus forms an essential part of anatomy and physiology. When considering the question from a Dynamical point of view, we have merely to study the actual march of the human intellect, in practice, by examining the procedures used by it in order to acquire a knowledge of the various sciences; this constitutes essentially the general object of the Positive Philosophy, as I have already defined it in this chapter. In brief, we must look upon all scientific theories as so many great logical facts; and it is only by a thorough observation of these facts that we can rise to the knowledge of logical laws.

49. These are evidently the only two general methods, complementary to each other, by the use of which we are able to arrive at any really rational ideas concerning intellectual phenomena. We see that in no case is there room for that illusory psychology—the last transformation of theology—to revive which attempts are being made so vainly at the present day. This theory, while ignoring and discarding the physiological study of our intellectual organs, and the observation of the rational methods which actually direct our various scientific researches, claims that it can discover the fundamental laws of the human mind, by contemplating it in itself, without paying any attention either to the causes or the effects of its activity.

50. The preponderance of the Positive Philosophy has been steadily growing since Bacon's time. It has to-day acquired, indirectly, so great a hold over even those minds which are the least familiar with its immense development that the metaphysicians devoted to the study of the intellect could only hope to check the decadence of their pretended science, by presenting their doctrines as being also founded upon the observation of facts. In order to do this, they have recently attempted to distinguish, by a very singular subtlety, two kinds of observation of equal importance, the one exterior, the other interior, the last being solely devoted to the study of intellectual phenomena. To enter into a special discussion of this fundamental sophism would be out of place here. I must be content with indicating the principal consideration which proves, clearly, that this pretended direct contemplation of the mind by itself is a pure illusion.

51. It was thought, until quite recently, that vision was explained by saying that

the luminous action of bodies produces on the retina actual pictures, representing exterior forms and colours. To this the physiologists have reasonably objected that, if the luminous impressions produced real paintings on the retina, we should need another eye to see them. Is not this reasoning still more applicable in the present instance?

52. It is clear that, by an inevitable necessity, the human mind can observe all phenomena directly, except its own. For by whom would the observation be made? As far as moral phenomena are concerned, it may be granted that it is possible for a man to observe the passions which animate him, for the anatomical reason that the organs which are their seat are distinct from those whose functions are devoted to observation. Everyone has had occasion to notice this fact for himself, but such observations would evidently never possess much scientific value. The best way of knowing the passions will always be to observe them from the outside; for a person in any state of extreme passion—that is to say, in precisely the state which it is most essential to examine—would necessarily be incapacitated for observing himself. But in the case of intellectual phenomena, to observe them in this manner while they are taking place is clearly out of the question. The thinking individual cannot cut himself in two—one of the parts reasoning, while the other is looking on. Since in this case the organ observed and the observing organ are identical, how could any observation be made?

53. The principle of this so-called psychological method is therefore quite worthless. Besides, consider to what thoroughly contradictory proceedings it immediately leads! On the one hand, you are recommended to isolate yourself, as far as possible, from the outer world, and you must especially give up all intellectual work; for if you were only engaged in making the simplest calculation, what would become of the *interior* observation? On the other hand, after having, by means of due precautions, at last attained to this perfect state of intellectual slumber, you must then occupy yourself in contemplating the operations which will be taking place in a mind supposed to be blank! Our descendants will no doubt see such pretensions ridiculed on the stage some day.

54. The results of such a strange procedure are in thorough accordance with the principle. For the last two thousand years the metaphysicians have in this manner been cultivating psychology, and yet they have not been able to agree on one single intelligible and sound proposition. They are, even at the present day, divided into a multitude of schools which are incessantly disputing on the first elements of their doctrines. In fact, *interior observation* gives rise to almost as many divergent opinions as there are so-called observers.

55. The true scientists—the men devoted to the positive sciences—are still calling in vain on these psychologists to cite a single real discovery, great or small, due to this much-vaunted method. It does not follow that all their labours have been absolutely fruitless as regards the general progress of our knowledge, and we must remember the valuable service which they rendered in sustaining the activity of human intelligence, at a time when it could find no more substantial aliment. But their writings largely consist of what an illustrious positive philosopher, M. Cuvier, has well

called "metaphors mistaken for reasoning." We may safely affirm that any true notions they present have been obtained, not by their pretended method, but by those actual observations on the progress of the human mind to which the development of the sciences has from time to time given birth. And even these ideas, so scanty in number, although proclaimed with so much emphasis, and only due to the unfaithfulness of the psychologists to their pretended method, are generally either greatly exaggerated or very incomplete, and they are very inferior to the remarks which scientists have already unostentatiously made upon the methods which they employ. It would be easy to cite some striking examples of this, if I did not fear that I should be prolonging the discussion of the point too much: take, for instance, the treatment of the theory of algebraical signs by metaphysicians and geometers respectively.

56. The considerations relating to logical science which I have just indicated become still more evident when we deal with the art of logic.

57. For when we want not only to know what the Positive Method consists in, but also to have such a clear and deep knowledge of it as to be able to use it effectively, we must consider it in action; we must study the various great applications of the method which the human mind has made and already verified. In a word, it is only by a philosophical examination of the sciences that we can attain the desired result. The method does not admit of being studied apart from the researches on which it is employed; or, at all events, it is only a lifeless study, incapable of fertilising the mind which resorts to it. Looking at it in that abstract way, the only real information that you can give about it amounts to no more than a few general propositions, so vague that they can have no influence on mental habits. When we have thoroughly established, as a logical thesis, that all our knowledge must be founded upon observation, that we must proceed sometimes from facts to principles, at other times from principles to facts, and some other similar aphorisms, we still know the method far less clearly than he who has studied at all completely a single positive science, even without any philosophical purpose in view. It is because they have failed to recognise this essential fact that our psychologists have been led to take their reveries for science, in the belief that they understood the Positive Method because they have read the precepts of Bacon or the discourse of Descartes.

58. I do not know if, in the future, it will become possible to construct by *à priori* reasoning a genuine course on Method, wholly independent of the philosophical study of the sciences; but I am quite convinced that it cannot be done at present, for the great logical methods cannot yet be explained with sufficient precision apart from their applications. I venture to add, moreover, that, even if such an enterprise could be eventually carried out, which is conceivable, it would nevertheless only be through the study of regular applications of scientific methods that we could succeed in forming a good system of intellectual habits; which is, however, the essential object to be gained by studying method. There is no need to insist further just now on a subject which will frequently recur throughout this work, and in regard to which I shall present some new considerations in the next chapter.

59. The first great direct result of the

Positive Philosophy is, then, the manifestation by experience of the laws which our intellectual functions follow in their operations; and, consequently, a precise knowledge of the general rules which are suitable for our guidance in the investigation of truth.

60. A second consequence of no less importance and of much more urgent concern, which must immediately result from the establishment of the Positive Philosophy as defined in this chapter, is the recasting of our educational system.

61. Competent judges are already unanimous in recognising the necessity of replacing our European education, which is still essentially theological, metaphysical, and literary, by a *positive* education in accordance with the spirit of our time and adapted to the needs of modern civilisation. Various attempts have been made in increasing number during the last hundred years, and especially during recent years, to spread and augment, without ceasing, instruction of a positive kind. Such attempts, which the different European Governments have always eagerly encouraged and often initiated, are a sufficient testimony that the spontaneous feeling of this necessity is everywhere growing. But, while supporting these useful enterprises as much as possible, we must not conceal the fact that, in the present state of our ideas, they are not at all capable of attaining their principal object—namely, the fundamental regeneration of general education. The exclusive speciality, the too rigid isolation, which still characterises our way of conceiving and of cultivating the sciences has necessarily a marked influence upon the mode of teaching them. An intelligent person who wishes at the present day to study the principal branches of Natural Philosophy, in order to acquire a general system of positive ideas, is obliged to study each separate science in the same way, and with the same amount of detail, as if he wished to become an astronomical or chemical specialist, etc. This renders such an education almost impossible and necessarily very imperfect, even in the case of the most intelligent minds, placed in the most favourable circumstances. Such a mode of proceeding would, therefore, be wholly chimerical as regards general education; and yet an essential requirement of the latter is a complete body of positive conceptions on all the great classes of natural phenomena. It is such a general survey, on a more or less extended scale, which must henceforth constitute, even among the mass of the people, the permanent basis of all human combinations; it must, in short, constitute the mental framework of our descendants. In order that Natural Philosophy may be able to complete the already partially accomplished regeneration of our intellectual system, it is, therefore, indispensable that the different sciences of which it is composed—regarding them as the different branches of a single trunk—should be first reduced to what constitutes their essence—that is, to their principal methods and most important results. It is only in this way that the teaching of the sciences can become the basis of a new general and really rational education for our people. Of course, each individual, after receiving this general education, will have to supplement it by such special education as he may require, in which he will study one or other of the special sciences. But the essential consideration which I wished to point out here is that all these special studies, even if by great labour

all of them were mastered, would be necessarily insufficient to really renew our educational system, if they did not rest on the preliminary basis of this general education, itself the direct result of the Positive Philosophy as defined in this discourse.

62. The special study of scientific generalities is not only destined to reorganise education, but it will also contribute to the particular progress of the different Positive Sciences. This constitutes the third fundamental property which I have to point out.

63. The divisions which we establish between the sciences, although not arbitrary, as some people suppose, are yet essentially artificial. In reality, the subject of all our researches is one; we only divide it so that we may, by separating the difficulties, resolve them more easily. And so it occasionally happens that these established divisions are a hindrance, and that questions arise which need to be treated by combining the points of view of several sciences. This cannot be easily done when scientists are so addicted to specialism. Hence the problems are left unsolved for a much longer time than would otherwise be necessary. Such an inconvenience must make itself especially felt in the case of the more essential doctrines of each positive science. Very striking examples of this fact could be easily cited, and I shall carefully call attention to them as they occur in the course of this work.

64. I could cite a very memorable example of this in the past, in the case of the admirable conception of Descartes relating to analytical geometry. This fundamental discovery, which has changed the aspect of mathematical science, and in which we should see the true germ of all the great subsequent progress, is simply the result of establishing a closer connection between two sciences which had hitherto been regarded from separate standpoints. But the case will be still more decisive if we consider some questions which are still under discussion.

65. I will take the case, in Chemistry, of the important doctrine of Definite Proportions. It is certain that the memorable discussion which has been raised in our own time, relating to the fundamental principle of this theory, cannot yet be considered, in spite of appearances, as irrevocably terminated. For this is not, in my opinion, a simple question of chemistry. I venture to assert that, in order to settle the point definitively—that is, to determine whether it is a law of nature that atoms necessarily combine together in fixed proportions—it will be indispensable to unite the chemical with the physiological point of view. This is shown by the fact that, even in the opinion of the illustrious chemists who have most powerfully contributed to the formation of this doctrine, the utmost that can be said is that it is always verified in the composition of inorganic bodies; but it is no less constantly at fault in the case of organic compounds, to which up to the present it seems quite impossible to extend the doctrine. Now, before erecting the theory into a truly fundamental principle, ought not this immense exception to be first considered? Does it not belong to the same general characteristic of all organic bodies, that in none of their phenomena can we make use of invariable numbers? However that may be, an entirely new order of considerations, belonging equally to chemistry and physiology, is evidently necessary in order to decide finally, in some way or

other, this great question of natural philosophy.

66. I think it will be well to consider here a second example of the same kind, which, since it relates to a subject of much more limited scope, shows even more conclusively the special importance of the Positive Philosophy in the solution of questions which need the combination of several sciences. This example, which I also take from Chemistry, is the still controverted question as to whether, in the present state of our knowledge, nitrogen should be regarded as an element or a compound. The illustrious Berzelius, differing from almost all living chemists, believes it to be a compound; and the reasons, of a purely chemical nature, which he gives for his opinion are so weighty as to balance those of his opponents. But what I want particularly to point out is that Berzelius, as he admits himself—and a most instructive admission it is—was greatly influenced by the physiological observation that animals which feed on non-nitrogenous matter contain in their tissues just as much nitrogen as the carnivorous animals. It is therefore quite clear that, in order to decide whether nitrogen is or is not an element, we must necessarily call in the aid of physiology, and combine with chemical considerations, properly so-called, a series of new researches on the relation between the composition of living bodies and the nature of their food.

67. It would be superfluous now to go on multiplying examples of these complex problems, which can only be solved by the intimate combination of several sciences which are at present cultivated in a wholly independent manner. Those which I have just cited are sufficient to show, in a general way, the importance of the function which the Positive Philosophy will perform in perfecting each of the natural sciences, since it is directly destined to organise in a permanent manner combinations of this kind, which could not be suitably formed without its aid.

68. There is a fourth and last fundamental property of what I have called the Positive Philosophy, to which I must thus early draw attention, and which no doubt deserves our notice more than any other property, since it is to-day the most important one from a practical point of view. We may look upon the Positive Philosophy as constituting the only solid basis of the social reorganisation, which must terminate the crisis in which the most civilised nations have for so long found themselves. The last part of this course will be specially devoted to establish and develop this proposition. But the general sketch of my great subject which I have undertaken to give in this chapter would lack one of its most characteristic elements if I failed to call attention here to such an essential consideration.

69. It may be thought that I am making a too ambitious claim for the Positive Philosophy. But a few very simple reflections will suffice to justify it.

70. There is no need to prove to readers of this work that the world is governed and overturned by ideas, or, in other words, that the whole social mechanism rests finally on opinions. They know, above all, that the great political and moral crisis of existing societies is due at bottom to intellectual anarchy. Our gravest evil consists, indeed, in this profound divergence which now exists among all minds, with regard to all the fundamental maxims whose fixity is the first condition of a true

social order. As long as individual minds are not unanimously agreed upon a certain number of general ideas capable of forming a common social doctrine, we cannot disguise the fact that the nations will necessarily remain in an essentially revolutionary state, in spite of all the political palliatives which may be adopted. Such a condition of things only really admits of provisional institutions. It is equally certain that, if this general agreement upon first principles can be once obtained, the appropriate institutions will necessarily follow, without giving rise to any grave shock; for the greater part of the disorder will have been already dissipated by the mere fact of the agreement. All those, therefore, who feel the importance of a truly normal state of things should direct their attention mainly to this point.

71. And now, from the lofty standpoint to which the various considerations indicated in this chapter have step by step raised us, it is easy both to characterise clearly the present state of society as regards its inner spirit, and to deduce therefrom the means by which that state can be essentially changed. Returning to the fundamental law enunciated at the commencement of this chapter, I think we may sum up exactly all the observations relating to the existing situation of society, by the simple statement that the actual confusion of men's minds is at bottom due to the simultaneous employment of three radically incompatible philosophies — the Theological, Metaphysical, and Positive. It is quite clear that, if any one of these three philosophies really obtained a complete and universal preponderance, a fixed social order would result, whereas the existing evil consists above all in the absence of any true organisation. It is the existence of these three opposite philosophies which absolutely prevents all agreement on any essential point. Now, if this opinion be correct, all that is necessary is to know which of the three philosophies can and must prevail by the nature of things; every sensible man should next endeavour to work for the triumph of that philosophy, whatever his particular opinions may have been before the question was analysed. The question being once reduced to these simple terms, the issue cannot long remain doubtful, because it is evident for all kinds of reasons, some of the principal of which have been indicated in this chapter, that the Positive Philosophy is alone destined to prevail in the ordinary course of things. It alone has been for many centuries making constant progress, while its antagonists have been as constantly in a state of decay. Whether this is a good or a bad thing matters little; the general fact cannot be denied, and that is sufficient. We may deplore the fact, but we are unable to destroy it; nor, consequently, can we neglect it, on pain of giving ourselves up to illusory speculations. This general revolution of the human mind is, at the present time, almost entirely accomplished. Nothing more remains to be done, as I have already explained, than to complete the Positive Philosophy by including in it the study of Social Phenomena, and then to sum them up in a single body of homogeneous doctrine. When these two tasks have made sufficient progress, the final triumph of the Positive Philosophy will take place spontaneously, and will re-establish order in society. The marked preference which almost all minds, from the highest to the lowest, show, at the present day, for positive knowledge, as contrasted with

vague and mystical conceptions, augurs well for the reception which awaits this Philosophy when it shall have acquired the only quality which it still lacks—a character of suitable generality.

72. To sum the matter up: the Theological and Metaphysical philosophies are now disputing with each other the task of reorganising society, although the task is really too hard for their united efforts; it is between these schools only that any struggle still exists in this respect. The Positive Philosophy has, up to the present, only intervened in the contest in order to criticise both schools; and it has accomplished this task so well as to entirely discredit them. Let us now put it in a condition to play an active part, without paying any further attention to debates which have become useless. We must complete the vast intellectual operation commenced by Bacon, Descartes, and Galileo, by furnishing the Positive Philosophy with the system of general ideas which is destined to prevail henceforth, and for an indefinite future, among the human race. The revolutionary crisis which harasses civilised peoples will then be at an end.

73. Such are the four principal advantages which will follow from the establishment of the Positive Philosophy. I have thought it well to mention them at once, because they supplement the general definition which I have tried to give of it.

74. Before concluding, I desire to caution the reader briefly against an erroneous anticipation which he might form as to the nature of the present work.

75. In saying that the aim of the Positive Philosophy was to sum up, in a single body of homogeneous doctrine, the aggregate of acquired knowledge relating to the different orders of natural phenomena, I did not mean that we should proceed to the general study of these phenomena, by looking upon them all as so many different effects of a single principle, as reducible to one sole law. Although I must treat this question specially in the next chapter, I think it necessary to say so much at once, in order to avoid unfounded objections which might otherwise be raised. I refer to those critics who might jump to the conclusion, that this course is one of those attempts at universal explanation by a single law, which one sees daily made by men who are entire strangers to scientific methods and knowledge. Nothing of that kind is intended here; and the development of this course will furnish the best proof of it, to all those whom the explanations contained in this chapter might have left in any doubt on the subject.

76. It is my deep personal conviction that these attempts at the universal explanation of all phenomena by a single law are highly chimerical, even when they are made by the most competent minds. I believe that the resources of the human mind are too feeble, and that the universe is too complicated, to admit of our ever attaining such scientific perfection; and I also think that a very exaggerated idea is generally formed of the advantages to be derived from it, even were it attainable. In any case, it seems to me evident that, considering the present state of our knowledge, we are yet a long way off from the time when any such attempt might be reasonably expected to succeed. It seems to me that we could only hope to arrive at it, by connecting all natural phenomena with the most general positive law we are acquainted with—the Law of Gravitation—which already links all astronomical phenomena to some of the phenomena of terrestrial physics. Laplace has

actually brought forward a conception by which chemical phenomena would be regarded as purely simple molecular effects of Newtonian attraction, modified by the figure and mutual position of the atoms. This conception would probably always remain an open question, owing to the absence of any essential data respecting the intimate constitution of bodies; and it is almost certain that the difficulty of applying the idea would be so great that we should still be obliged to retain, as an artificial aid, the division which is at present regarded as natural between astronomy and chemistry. Accordingly, Laplace only presented this idea as a mere philosophical pastime, which was incapable of really exercising any useful influence on the progress of chemical science. The case is, however, really still stronger, for even if we supposed this insurmountable difficulty overcome, we should still not have attained scientific unity, since it would be necessary next to connect the same law of gravitation with the whole of physiology; and this would certainly not be the least difficult part of the task. And, yet, the hypothesis which we have just been discussing would be, on the whole, the most favourable to this much-desired unity.

77. I have no need to go further into details in order to convince the reader that the object of this course is by no means to present all natural phenomena as being at bottom identical, apart from the variety of circumstances. The Positive Philosophy would no doubt be more perfect if this were possible. But this condition is not at all necessary, either for its systematic formation or for the realisation of the great and happy consequences which we have seen that it is destined to produce. The only indispensable unity for those purposes is that of Method, which can and evidently must exist, and is already largely established. As to the Doctrine, it is not necessary that it should be *unified*; it is sufficient if it be *homogeneous*. It is, therefore, from the double standpoint of unity of method and homogeneity of doctrines that the different classes of positive theories will be considered in the present work. While trying to diminish, as far as possible, the number of general laws necessary for the positive explanation of natural phenomena—which is the real philosophic purpose of all science—we shall think it rash ever to hope, even in the most distant future, to reduce these laws rigorously to a single one.

78. I have attempted in this chapter to determine, as exactly as I could, the aim, the spirit, and the influence of the Positive Philosophy. I have, therefore, indicated the goal towards which my labours have always tended, and always will tend unceasingly, in this course or elsewhere. No one is more profoundly convinced than myself of the inadequacy of my intellectual powers, even if they were far superior to what they are, to undertake such a vast and noble work. But although the task is too great for a single mind or a single lifetime, yet one man can state the problem clearly, and that is all I am ambitious of doing.

79. Having thus expounded the true aim of this course, by settling the point of view from which I shall consider the various principal branches of Natural Philosophy, I shall in the next chapter complete these general preliminaries by explaining the plan I have adopted—that is to say, by determining the encyclopædic order which should be established among the several classes of natural phenomena, and consequently among the corresponding Positive Sciences.

Part II.

EXPLANATION OF THE PLAN OF THIS COURSE, OR GENERAL CONSIDERATIONS ON THE CLASSIFICATION OF THE POSITIVE SCIENCES

1. The considerations to be presented in this course on all the principal branches of Natural Philosophy have been characterised as exactly as possible in the preceding chapter. We must now determine the plan which we should follow, by finding what is the most suitable rational Classification of the different fundamental Positive Sciences, so that we may study them in succession from the standpoint which we have adopted. This second general discussion is indispensable, in order to make clear at the outset the true spirit of this course.

2. We can easily see, in the first place, that there is no need to criticise here the numerous Classifications which have been successively proposed during the last two centuries as general systems of human knowledge, regarded in its entirety. We are at the present time thoroughly convinced that all the encyclopædic scales—such as those of Bacon and D'Alembert—which are based upon any distinction between the different faculties of the human mind, are for that reason alone radically defective. That is true even when this distinction is not, as is often the case, more subtle than real; for in each of its spheres of activity our understanding makes simultaneous use of all its principal faculties. As to all the other Classifications which have been proposed, it is sufficient to observe that the definite result of the different discussions raised upon this subject has been to demonstrate in each of them some radical defect or other; so that not one of them has been able to command universal assent, there being in this respect almost as many opinions as there are individuals holding them. These different attempts have, indeed, been as a rule so badly conceived that a prejudice has involuntarily arisen in most intelligent minds against every undertaking of this kind.

3. Without dwelling further on such a well-established fact, it is more essential to seek the cause of it. We can easily account for the profound imperfection of those attempts at classification which have been so often renewed up to the present time. I need hardly say that, owing to the general discredit into which works of this nature have fallen, due to the inadequacy of the earlier schemes, these Classifications are now seldom attempted, except by persons almost entirely ignorant of the sciences which they undertake to classify. But, putting this personal consideration on one side, there is a much more important one, drawn from the very nature of the subject, which shows clearly why it has not hitherto been possible to rise to an encyclopædic conception of a really

satisfactory character. It consists in the want of homogeneity which has always existed until recently between the different parts of the intellectual system, some having successively become Positive, while others remained Theological or Metaphysical. In such an incoherent condition of things, it was evidently impossible to establish any rational Classification. How could one succeed in arranging in a single system conceptions so profoundly contradictory? It is a difficulty which necessarily proved a stumbling-block to all the classifiers, and none of them were able to perceive its nature distinctly. It was very evident, however, for anyone who had grasped the true state of the human mind, that such an enterprise was premature, and could not be successfully attempted until all our principal ideas had become Positive.

4. The explanations given in the preceding chapter show that this fundamental condition can now be regarded as fulfilled; it is therefore possible to form a truly rational and stable arrangement of a system whose parts have at last become homogeneous.

5. On the other hand, the general Theory of Classification which the philosophical labours of botanists and zoologists have established in modern times encourages us to hope for real success in such a task, since it offers us a sure guide in the true fundamental principle of the art of classifying, which had never been clearly conceived until then. This principle is a necessary consequence of the only direct application of the Positive Method to this question of Classification, which, like every other question, should be treated as a matter of observation, instead of being determined by *à priori* considerations. The principle is this—the Classification must proceed from a direct study of the objects to be classified, and must be determined by the real affinities and natural connections which they present. In this way, the Classification will itself become the expression of the most general fact which is manifested by a profound comparison of the objects embraced by it.

6. Applying this fundamental rule to the present case, it follows that the mutual dependence which actually exists between the different Positive Sciences must determine our Classification of them; and this dependence, if it is to be real, can only result from that of the corresponding phenomena.

7. But, before proceeding in this observational spirit to the important work of Classification, it is indispensable, if we are not to lose our way in a work of too great compass, that we should circumscribe more precisely than we have yet done the subject that we propose to classify.

8. All human works deal either with Speculation or Action, and the most general division, therefore, of our knowledge is into Theoretical and Practical. If, in the first place, we consider this primary division, it is clear that we need only concern ourselves with Theoretical knowledge in a course of this kind. It is not a question of dealing with the entire system of human ideas, but only with those fundamental conceptions of the different orders of phenomena, which furnish a solid basis to all our other mental combinations of whatever kind, while being themselves independent of any antecedent intellectual system. Now, in such a study, it is theory which we have to consider, and not the application of it—except in so far as the

application may elucidate the theory. This is probably what Bacon understood, although very imperfectly, by that First Philosophy which he said should be extracted from the whole of the sciences, and which has been so differently, and always so strangely, conceived by the metaphysicians who have undertaken to explain his idea.

9. No doubt, when we embrace in our view human labour as a whole, whether Theoretical or Practical, we must regard our study of nature as intended to furnish us with the true rational basis for acting upon Nature. For it is only by knowing the laws of phenomena, and so foreseeing their occurrence, that we are able in active life to make these phenomena modify one another for our advantage. Our direct natural power of acting upon our environment is extremely feeble, and wholly disproportioned to our needs. Whenever we succeed in accomplishing anything great, it is due to the fact that our knowledge of natural laws allows us to introduce, among the fixed conditions under whose influence the different phenomena take place, some modifying elements. These, however feeble they may be in themselves, are in certain cases sufficient to turn to our advantage the final results of the sum-total of external causes. We may sum up very exactly the general relation of Science to Art, using these two words in their widest sense, by the following very simple formula: from Science comes Prevision; from Prevision comes Action.

10. But in spite of the vital importance of this relation, which must never be ignored, we should form a very imperfect idea of the Sciences if we were to regard them only as the bases of the Arts, an error to which our Age is, unhappily, too much inclined. Immense as are the services rendered to Industry by Science, and although according to the striking aphorism of Bacon—Knowledge is Power—we must never forget that the sciences have a yet higher and more direct destination, that of satisfying the craving of our minds to know the laws of phenomena. To feel how deep and urgent this craving is, it is sufficient to reflect for a moment upon the physiological effects of *astonishment*, and to recollect that the most terrible sensation which we can experience is that which occurs, whenever any phenomenon appears to take place in violation of the natural laws which are familiar to us. This need of arranging facts in an easily comprehended order—which is the proper object of all scientific theories—is so inherent in our organisation that, if we could not succeed in satisfying it by Positive conceptions, we should have to return inevitably to those Theological and Metaphysical explanations which, as I explained in the last chapter, had their origin in this need.

11. I have thought it well to point out expressly at this stage a consideration which will frequently recur in the course of this work, in order to indicate the necessity of guarding against the undue influence of the habits of the present day, which tend to prevent the formation of just and noble ideas on the importance and destination of the Sciences. The general tendency of our time is, in this respect, defective and narrow. But, in the case of scientists, it is corrected, consciously or not, by the strong natural craving of which I have spoken. Otherwise the human intellect would be confined to researches of immediate practical utility, and, as Condorcet very justly remarked, would for that reason alone be completely arrested in its progress. This

would be the case even as regards those practical applications to which we should have imprudently sacrificed the purely theoretical labours; for the most important practical applications are constantly derived from theories formed for purely scientific purposes, and which have often been cultivated during many centuries without producing any practical result. A very remarkable example of this can be cited in the beautiful speculations of the Greek geometers on Conic Sections. These, after a long series of generations, effected the renovation of astronomy, and so finally enabled the art of navigation to reach that degree of perfection to which it has in modern times attained, and which would never have been reached without the aid of such purely theoretical labours as those of Archimedes and Apollonius. As Condorcet truly said: "The sailor who is preserved from shipwreck by an exact observation of the longitude owes his life to a theory conceived two thousand years before, by some men of genius who had in view simply geometrical speculations."

12. It is, therefore, evident that, after the *study* of Nature has been conceived in a general way as serving for the rational basis of our *action* upon it, we must next proceed to theoretical researches, leaving wholly on one side every practical consideration. Our means for discovering truth are so feeble that if we do not concentrate them exclusively upon this object, and if we hamper our search for truth with the extraneous condition that it shall have some immediate practical utility, it would be almost always impossible for us to succeed.

13. However that may be, it is certain that the aggregate of our knowledge about Nature, and the aggregate of practical procedures which we deduce from that knowledge in order to modify the natural order for our advantage, form two essentially distinct systems, which it is convenient to conceive of and to cultivate separately. Besides, the first system being the base of the second, it is clearly the one which should be considered first in a methodical course of study, even if it were proposed to embrace therein the whole of Human Knowledge, both Theoretical and Practical. It appears to me that this Theoretical system should be the only subject dealt with at the present day in a truly rational course of Positive Philosophy; at least, that is the way in which I regard the matter. No doubt it would be possible to imagine a more extended course, dealing with the generalities of both Theory and Practice. But I do not think that such an enterprise, even apart from its vast extent, could be suitably attempted in the present condition of the human mind. It seems to me, indeed, to demand previous work of a very important and wholly special nature, which has not yet been accomplished—that of constructing, in accordance with scientific theories proper, the special conceptions intended to serve as direct bases for the general operations of Practice.

14. In the present condition of mental development, the Sciences are not directly applicable to the Arts, at least in the most perfect cases. Between these two orders of ideas there lies a third, which, although still ill-determined in its philosophical character, is yet very apparent when we consider the class of persons who are specially occupied with it. Between the scientists proper and the actual directors of industry an intermediate class is rising up—that of the *engineers*, whose particular function is to

settle the relations between Theory and Practice. Unconcerned with the progress of scientific knowledge, they study it in its present state for the purpose of deducing from it the industrial applications which it can furnish. Such, at least, is the natural tendency of things, although there is still much confusion in this respect. The body of knowledge which should form the equipment of the engineering class, and which should establish the true direct theories of the different Arts, might no doubt give rise to philosophical considerations of great interest and real importance. But a work which should embrace them together with the theories founded on the pure Sciences would at present be altogether premature; because these doctrines, intermediate between pure theory and direct practice, are not yet formed. Such imperfect elements of them as at present exist relate to the more advanced Sciences and Arts, and these merely allow us to conceive the nature and possibility of similar labours dealing with the whole body of human operations. It is thus—to cite the most important example—that we must regard the fine conception of Monge, relating to Descriptive Geometry, which is really nothing else than a general theory of the arts of construction. Very few similar ideas have as yet been formed in other departments; I shall take care to notice them at their proper places in this course, and to point out their importance. But it is clear that conceptions which, up to the present, are so incomplete, should not enter as an essential part into a course of Positive Philosophy, which should, as far as possible, be confined to such doctrines as have a fixed and clearly determined character.

15. How difficult it is to construct these intermediate doctrines will be the better realised if we consider that every Art depends not only upon a certain corresponding Science, but upon several sciences simultaneously, so that the most important Arts borrow direct help from almost all the different principal Sciences. For example, the true theory of Agriculture—to confine myself to the principal case—demands an intimate combination of physiological, chemical, physical, and even astronomical and mathematical knowledge. The same thing is true in the case of the fine arts. Bearing this fact in mind, we easily perceive why these theories could not yet have been formed, since they assume the previous development of all the different fundamental Sciences. Here, then, is another reason for not including such an order of ideas in a course of Positive Philosophy, since, far from being able to contribute to the systematic formation of this Philosophy, the general theories peculiar to the different principal Arts must, on the contrary, be a future consequence, and one of the most useful consequences, of its construction.

16. In this course, then, we must consider only scientific theories, and not their practical applications. But a further distinction has still to be drawn with respect to the theories themselves. When this has been done, the field of our inquiry will at last be duly limited, and we shall be able to proceed to a methodical Classification of the Sciences with which Positive Philosophy is concerned.

17. We must distinguish, with reference to all kinds of phenomena, two classes of natural science. The first consists of the Abstract or General Sciences, whose object is the discovery of the laws

regulating the different classes of phenomena in all conceivable cases. The other group comprises the Concrete, Special, or Descriptive Sciences, sometimes called the Natural Sciences proper, whose function consists in applying these laws to the actual history of the different existing beings. The Abstract Sciences are, therefore, fundamental ones, and our studies in this course are concerned with them alone; the others, whatever may be their intrinsic importance, are really only secondary sciences, and, consequently, should not form part of a work whose great natural extent compels us to reduce it to the least possible development.

18. The distinction just drawn cannot present any difficulty to those who are at all familiar with the different Positive Sciences, since it is almost equivalent to the distinction which is usually made in nearly all scientific works between Dogmatic Physics and Natural History properly so-called. The importance of this division of the sciences into two groups is not yet sufficiently appreciated, and some examples will serve to render its nature more evident.

19. The distinction may, in the first place, be perceived very clearly by comparing, on the one hand, general Physiology, and, on the other, Zoology and Botany. Studying the laws of life in general, and determining the mode of existence of each living being as an individual, are evidently two works of very different character. The second study is besides necessarily founded on the first.

20. The same thing is true in the case of Chemistry as contrasted with Mineralogy; the first science is evidently the rational basis of the second one. In Chemistry we consider every possible molecular combination in every imaginable circumstance; in Mineralogy we consider only those combinations which are actually found to occur as constituents of the Earth, and as subject to terrestrial influences alone. The difference between the chemical and mineralogical standpoint, although both sciences deal with the same objects, is clearly shown by the circumstance that the majority of the facts considered in chemistry have only an artificial existence; so that a body such as chlorine or potassium may possess great chemical importance owing to the extent and energy of its affinities, while its mineralogical interest may be almost nil. On the other hand, although a mineralogist would have a great deal to say about a compound such as granite or quartz, such a substance would be of little interest from a chemical standpoint.

21. What makes still more evident the logical necessity of this fundamental distinction between the two great sections of Natural Philosophy is the fact that not only does each section of Concrete Physics presuppose the previous study of the corresponding section of Abstract Physics, but that it also demands a knowledge of the general laws relative to all orders of phenomena. Thus, for example, the special study of the earth considered under every possible aspect not only demands a previous acquaintance with physics and chemistry, but it cannot be properly accomplished without introducing, on the one hand, astronomical, and, on the other hand, physiological, knowledge; so that Geology is related to the entire system of fundamental sciences. The same thing is true of each of the other Concrete Sciences. It is precisely for this reason that Concrete Physics has up to the

present made so little real progress, because its study could not be begun in a truly rational manner until all the different principal branches of Abstract Physics had acquired a definite character, which did not occur until our own time. Until that had taken place, it was only possible to collect upon this subject some more or less unco-ordinated materials, which are still very incomplete. The known facts cannot be co-ordinated in such a way as to form true special theories of the different beings of the universe, until the fundamental distinction between the Abstract and Concrete sciences is more profoundly felt and more regularly organised, and until the scientists who are specially devoted to the study of the Concrete Sciences recognise the necessity of founding their researches upon a thorough knowledge of all the fundamental Abstract Sciences. The latter is a condition which is still very far from being properly fulfilled at the present day.

22. Examining this condition, we find a confirmatory reason why, in this course of Positive Philosophy, we should confine ourselves to considering the Abstract or General sciences, and not include at the same time the Descriptive or Special sciences. We discover that a new essential property of the study of the generalities of Abstract Physics is to furnish the rational basis of a truly systematic Concrete Physics. In the present condition of human intelligence there would, therefore, be a species of contradiction in wishing to unite the two orders of science in a single course. We can say, moreover, that, even if Concrete Physics had already attained the same degree of perfection as Abstract Physics, so that it would consequently be possible to embrace both at the same time in a course of Positive Philosophy, it would be evidently none the less necessary to commence with the Abstract section, for that would remain the invariable base of the other. It is clear, besides, that the study of the generalities alone of the fundamental sciences is so extensive by itself that it is important to set aside as much as possible all considerations which are not indispensable; now, those relating to the secondary sciences will always be in any case of a distinct order. Since the philosophy of the fundamental sciences presents a system of positive conceptions upon all the categories of real knowledge, it is for that reason alone sufficient to constitute that First Philosophy which Bacon sought for; and, since it is destined henceforth to serve as the permanent basis for all human speculations, it should be carefully reduced to the simplest possible expression.

23. I need not pursue this argument further at present, as I shall have several opportunities of recurring to it in the different parts of this course. I have said enough to explain how and why I limit our inquiry.

24. It follows, then, from the considerations that have been set forth in this chapter: (1) That Human Knowledge as a whole being composed of Theoretical and of Practical knowledge, we are concerned here only with the former; (2) that Theoretical knowledge, or Science properly so-called, being divided into General and Special Sciences, we have only to consider here the first kind, and, interesting as Concrete Physics may be, it is to Abstract Physics that we must confine ourselves.

25. The proper subject of this course having thus been exactly limited, it is now easy to proceed to a really satisfactory rational Classification of the

Fundamental Sciences, which is the encyclopædic question forming the special subject of this chapter.

26. We must, in the first place, recognise that, however natural such a Classification may be, it necessarily always involves something, if not arbitrary, at least artificial. It will, therefore, never be absolutely perfect.

27. The principal object to be kept in view in every attempt at Classification is the arrangement of the sciences in the order of their natural connection, according to their mutual dependence, so that one might be able to present them successively, without ever being in the smallest degree involved in a vicious circle. Now, that is a condition which seems to me impossible to fulfil quite rigorously. Perhaps I may be allowed here to develop this reflection at some length; it is in my opinion an important one, for herein lies the real difficulty of the present inquiry. Besides, its treatment will give me an opportunity of establishing, in connection with the exposition of our knowledge, a general principle which I shall have to apply frequently later on.

28. It is this. Every science can be expounded according to two essentially distinct methods—the Historical and the Dogmatic; every other mode of exposition is only a combination of these methods.

29. By the first method, the knowledge is presented in the same order as that in which the human mind actually obtained it, following as far as possible the actual track pursued.

30. By the second method, the system of ideas is presented as it might be conceived of to-day by a single mind which, being placed at the right point of view and furnished with sufficient knowledge, should apply itself to the reconstruction of the science as a whole.

31. The first mode is evidently that by which the study of every new science must of necessity commence, because it presents the feature of not requiring for the exposition of the knowledge any new independent work. The didactic art reduces itself in that case to the studying in chronological order of the different original works which have contributed to the progress of the science.

32. The Dogmatic Method supposes, on the contrary, that all these individual works have been recast into a general system, so that they may be presented in a more natural logical order; it is, therefore, only applicable to a science which has already arrived at a sufficiently high degree of development. But in proportion as the science progresses, the *historical* order of exposition becomes more and more impracticable, owing to the lengthy series of intermediate works which the mind would be compelled to travel over; whereas the *dogmatic* order becomes more and more possible, and at the same time necessary, because new conceptions permit the earlier discoveries to be presented under a more direct point of view.

33. The education of an ancient geometer, for example, consisted simply in studying, in due order, the very small number of original treatises on the different parts of Geometry which then existed; and this amounted to little more than the writings of Archimedes and Apollonius. On the other hand, a modern geometer has usually finished his education without having read a single original work, except in the case of the most recent discoveries which can only be known by this means.

34. The constant tendency of the

human mind in the exposition of its knowledge is, therefore, to substitute more and more the Dogmatic for the Historical Method, the former alone being suited to the mature state of our intelligence.

35. The general problem of intellectual education consists in enabling an individual of usually but average ability to reach in a few years the same stage of development which has been attained during a long series of ages by the efforts of a large number of superior thinkers, who have throughout their lives concentrated their attention upon the same subject. It is accordingly clear that, although it is infinitely easier and quicker to learn than to originate, it would be quite impossible to attain the desired end if we tried to compel each individual mind to pass successively through the same intermediate stages which the collective genius of mankind has necessarily had to traverse. Hence the indispensable need for the Dogmatic Method, as is especially evident at the present day in the most advanced Sciences, the ordinary teaching of which shows hardly any trace of the actual steps of their evolution.

36. We must, however, add, in order to avoid any exaggeration, that every actual mode of teaching in use is necessarily a certain combination of the Dogmatic and Historical orders; all that the former can claim is a constant and increasing predominance. The Dogmatic order cannot, indeed, be followed quite rigorously, for, as we have seen, it implies that the scientific truths have not only been discovered, but systematically recast. Now, such recasting will not, at any given time, embrace the truths most recently discovered. These, therefore, can only be taught according to the historical arrangement, which will not in such cases be attended with the chief inconveniences that prevent its general adoption.

37. The only fundamental objection which can be urged against the Dogmatic Method is, that it leaves the student in ignorance of the way in which the different Sciences have been built up; a question which, although distinct from the actual acquisition of these Sciences, is in itself of the highest interest for every philosophical mind. This consideration would, in my opinion, have much weight if it was really an argument in favour of the Historical order. But it is evident that learning the truths of a science in their historical order, and learning the actual history of that science, are two quite different studies, as I shall now show.

38. The different subdivisions of each science, which we are led to separate in the Dogmatic order, are in reality developed simultaneously, and under the mutual influence of each other. That is a fact which would naturally tend to make us prefer the Historical order. But when we consider in its entirety the actual development of the human mind, we see further that the different Sciences themselves have, in fact, received improvement simultaneously and from one another. We even see that there is an interdependence between the progress of the Sciences and that of the Arts, owing to their innumerable reciprocal influences, and, finally, that they have all been closely connected with the general development of human society. This vast interlacement is so real that, in order to understand how a scientific theory actually arose, it is often necessary to consider the improvement in some art which has

no rational link with it, or even some particular progress in social organisation without which this discovery could never have taken place. We shall see numerous examples of this as we proceed. It follows from what has been said that we can only know the true history of each science—that is to say, the way in which the discoveries composing it were actually made—by making a direct study of the general history of humanity. That is the reason why all the documents hitherto collected on the history of Mathematics, Astronomy, Medicine, etc., however precious they may be, can only be regarded as materials for the work.

39. The professedly *historical* order of exposition, even if it could be rigorously followed as regards the details of each particular science, would still be purely hypothetical and abstract under the most important aspect, since it would consider the development of the science as an isolated thing. Far from exhibiting the true history of the science, it would lead to a very false conception of it.

40. I am certainly convinced that a knowledge of the history of the Sciences is of the highest importance, and I even think that a science is not completely known if we are ignorant of its history. But this historical study of the Sciences should be looked upon as entirely separate from its proper and dogmatic study, without which, indeed, the history would not be intelligible. I shall, therefore, carefully consider the true history of the fundamental Sciences which are to be the subject of our inquiries; but I shall do so only in the last part of this course—that relating to the study of Social phenomena—in treating of the general development of humanity, of which the history of the Sciences constitutes the most important, although hitherto the most neglected, part. In the study of each science, such incidental historical considerations as may present themselves will have a clearly distinct character, so as not to affect the main characteristics of our principal study.

41. The preceding discussion in the last thirteen paragraphs, which, as we see, must be specially developed later on, tends to define more precisely the true spirit of this course, by presenting it under a new point of view. But its chief bearing on the question immediately before us is that it determines exactly the conditions which we must impose on ourselves, and which we can justly hope to fulfil, in constructing an encyclopædic scale of the different fundamental Sciences.

42. We see, indeed, that, however perfect we might suppose it to be, this Classification can never absolutely conform to the historical succession of the Sciences. Do what we may, we cannot entirely avoid the necessity of presenting as of earlier date a science which may, however, under some special aspects more or less important, need to borrow from the ideas of another science of subsequent rank. Only we must take care to avoid such derangements with respect to the characteristic conceptions of each science, for in that case the classification would be entirely defective.

43. Thus, for example, it appears to me unquestionable that in the general system of the Sciences, Astronomy should be placed before Physics (properly so-called); and yet several branches of physics, especially optics, are indispensable to the complete exposition of astronomy.

44. Minor defects of this kind, which are strictly inevitable, cannot invalidate

a Classification which in other respects suitably fulfils the principal conditions of the case. They are due to the necessarily artificial element in our division of intellectual work.

45. Nevertheless, although for the reasons already given it would have been improper to take the Historical order for the basis of our Classification, I claim as an essential quality of the encyclopædic scale, which I am going to propose, that it does *broadly* accord with the whole history of science. By this I mean that, in spite of the real and continuous simultaneity of development of the different Sciences, those which will be classed as anterior did, as a matter of fact, start earlier, and always continued to be more advanced than those classed as posterior to them. This is what should inevitably occur if we take —as clearly we ought to—the natural logical connection of the Sciences for our principle of classification; the starting-point of mankind having necessarily been the same as that of the individual.

46. The exact difficulty of this question of the Classification of the Sciences is well illustrated by a very simple mathematical consideration, which will also serve to sum up all the previous arguments in this chapter.

47. The problem before us is the Classification of the Fundamental Sciences. We shall soon see that, all things considered, it is not possible to distinguish less than six of these; most scientists would very likely admit a much larger number. That point settled, we know that six objects permit of 720 distinct classifications, among which we have to choose the one classification which best satisfies the principal conditions of the problem. We see that, in spite of the great number of encyclopædic scales successively proposed up to the present, the discussion has as yet been confined to a very small number of the possible arrangements. Nevertheless, I believe we can say without any exaggeration that, on examining each of the 720 classifications, there would not perhaps be a single one in favour of which we could not find some plausible arguments. On observing the different arrangements which have been actually proposed, we remark the most extreme differences among them; Sciences which are placed by some at the head of the encyclopædic system being referred by others to the opposite extremity, and vice versa. The real difficulty of the question before us consists, then, in choosing the one truly rational order out of the very considerable number of possible systems.

48. Approaching this great question now in a direct manner, we must, in the first place, remember that, in order to obtain a natural and positive Classification of the Fundamental Sciences, we must seek the principle of it in the comparison of the various orders of phenomena, the discovery of whose laws is the object of those Sciences. What we want to determine is the real dependence of the different scientific studies. Now, this dependence can only result from that of the corresponding phenomena.

49. By considering all observable phenomena under this aspect, we shall presently see that it is possible to class them in a small number of natural categories, so arranged that the rational study of each category may be founded on a knowledge of the principal laws of the preceding one, while serving as the basis of the following one. This order is determined by the degree of simplicity, or, what comes to the same thing, of

generality of the phenomena. Hence results their successive dependence, and, consequently, the greater or less facility in their study.

50. It is clear, indeed a priori, that the simplest phenomena—those which are least complicated by others—are necessarily also the most general; for whatever is observed in the greatest number of cases is for that reason disengaged to the utmost degree from the circumstances peculiar to each separate case. We must, therefore, begin with the study of the most general or simple phenomena, proceeding from them successively to the most special or complex. This is necessary if we wish to comprehend Natural Philosophy in a really methodical manner; because this order of generality or simplicity, while it necessarily determines the rational connection of the several fundamental Sciences by the successive dependence of their phenomena, at the same time fixes the degree of facility in their study.

51. There is also a secondary consideration which is, I think, important to notice here, and it leads to exactly the same conclusion as the preceding arguments. The most general or simple phenomena, being of necessity the farthest removed from the human order, must, consequently, admit of being studied in a calmer and more rational frame of mind; that, then, is a further reason why the corresponding Sciences have been developed more rapidly.

52. Having thus indicated the fundamental rule which must preside over the Classification of the Sciences, I can now proceed immediately to the construction of the encyclopædic scale, according to which the plan of this course must be determined, and which each reader will easily be able to appreciate with the aid of the preceding considerations.

53. The first glance at the aggregate of Natural Phenomena leads us to divide them at starting—in accordance with the principle we have just established—into two great principal classes, the first comprising all the phenomena of Inorganic bodies; the second, all those of Organised bodies.

54. The latter are evidently more complex and less general than the others; they depend upon the Inorganic, which, on the contrary, are in no way dependent upon the Organic. Hence arises the necessity of not studying physiological phenomena until the phenomena of inorganic bodies have been dealt with. In whatever way we may explain the differences between these two kinds of beings, it is certain that we observe in living bodies all the phenomena, whether mechanical or chemical, which occur in inorganic bodies, with the addition of a wholly special order of phenomena, the vital phenomena properly so-called which belong to *organisation*. There is no need to ask if the two classes of bodies are, or are not, of the same *nature*—that is an insoluble question which is still too much debated in our time, owing to the lingering influence of Theological and Metaphysical habits. Such a question does not enter into the domain of the Positive Philosophy, which formally declares its absolute ignorance as to the *ultimate nature* of any body whatsoever. But it is by no means indispensable to look upon inorganic and living bodies as of essentially different nature, in order to recognise the necessity of separating the two studies.

55. No doubt, there is not yet sufficient agreement upon the general mode of regarding the phenomena of living bodies.

But, whatever view may come to be adopted owing to the future progress of Natural Philosophy, the classification which we are establishing will not be in any way affected by that. Indeed, if we could regard as demonstrated, the idea which the present state of Physiology hardly affords any justification for—that physiological phenomena are always simply mechanical, electrical, and chemical phenomena modified by the structure and composition proper to Organised bodies — our fundamental division would none the less hold good. For it still remains true, even in this case, that general phenomena should be studied before proceeding to the examination of the special modifications which they undergo in certain objects of the universe, owing to a peculiar arrangement of their molecules. Most enlightened minds at the present day base this division upon the dissimilarity of the laws concerned; but it is necessarily a permanent one on account of the subordination of the phenomena, and, consequently, of the Sciences dealing with them, whatever affinity the future may establish between these two classes of bodies.

56. This is not the place to develop in detail a general comparison between inorganic and living bodies, because that will be the special subject of a thorough examination in the physiological section of this work. It is sufficient for the present to have recognised in principle the logical necessity of separating the Sciences relating to these classes of phenomena from each other, and of not proceeding to the study of Organic Physics until we have established the general laws of Inorganic Physics.

57. Each of these two great halves of Natural Philosophy can be subdivided into two branches. We obtain them by a further application of the same general rule.

58. Take, first, Inorganic Physics. Following, as before, the order of the generality and dependence of the phenomena, we see, in the first place, that it must be divided into two distinct sections, according as it deals with phenomena general to the universe or those special to terrestrial bodies. Hence we have Celestial Physics, or Astronomy (whether geometrical or mechanical), and Terrestrial Physics. The necessity for the division is exactly the same as that of the division into Organic and Inorganic.

59. Astronomical phenomena being the most general, simple, and abstract of all, the study of Natural Philosophy must evidently begin with them; for the laws of Astronomy influence those of all other phenomena, but the laws of other phenomena do not influence those of Astronomy. All the phenomena of Terrestrial Physics present the general effect of universal gravitation; they present, in addition, other effects peculiar to themselves and modifying those of gravitation. Hence, if we analyse the simplest terrestrial phenomenon—it need not be a chemical, it may be a purely mechanical one—we always find it to be more complex than the most complicated celestial phenomenon. The most difficult astronomical question, therefore, really presents a less complicated subject for investigation, if all the determining circumstances be taken into account, than the simple movement of a heavy body, even if it be only a solid. Such a consideration shows clearly how indispensable it is to separate distinctly Celestial from Terrestrial Physics, and only to proceed to the

study of the second after that of the first, which forms its rational basis.

60. Terrestrial Physics is, in its turn, subdivided in the same manner into two very distinct portions, according as we regard bodies from the mechanical or chemical standpoint. Hence we have Physics proper and Chemistry. The latter, if it is to be considered in a truly logical manner, evidently presupposes a previous acquaintance with Physics. For all chemical phenomena are necessarily more complicated than physical ones; they depend on the physical phenomena without influencing them in return. Everyone knows, in fact, that all chemical action is, in the first place, subject to the influence of weight, heat, electricity, etc.; and it presents, in addition, something peculiar to itself which modifies the action of the preceding agents. This consideration, while it exhibits Chemistry as necessarily following after Physics, at the same time presents it as a distinct science. For whatever opinion we may adopt regarding chemical affinity, and even if we should only see in it—as is conceivable—mere modifications of general gravitation produced by the form and mutual arrangement of the atoms, it would still remain unquestionable that the necessity of continually taking these special conditions into account would not allow of our treating Chemistry as a simple appendage to Physics. We should, therefore, in any case, be compelled, if only to facilitate our studies, to maintain that division and order of succession which are regarded now as due to the heterogeneity of the phenomena.

61. Such is, then, the rational distribution of the principal branches of the general Science of Inorganic bodies. An analogous division arises in the same manner in the general Science of Organised bodies.

62. All living beings present two essentially distinct orders of phenomena—those which relate to the individual, and those which concern the species, especially when it is sociable. It is principally with regard to Man that this distinction is fundamental. The last order of phenomena is evidently more complex and special than the first; it depends on the first without influencing it in return. Hence we have two great sections in Organic Physics—Physiology properly so-called, and Social Physics, which is based upon it.

63. In all Social phenomena we perceive, in the first place, the influence of the physiological laws of the individual, and, in addition, something which modifies their effect arising from the action of the individuals upon each other—singularly complicated in the case of the human race by the action of each generation on its successor. It is, therefore, evident that, in order to study Social phenomena properly, we must start with a good knowledge of the laws relating to the life of the individual. On the other hand, the necessary subordination between the two studies does not oblige us to regard Social Physics as a mere appendage of Physiology, as some eminent physiologists have been led to believe. Although the phenomena are certainly homogeneous, they are not identical, and the separation of the two Sciences is of the highest importance. It would be impossible to treat the collective study of the species as a pure deduction from the study of the individual, since the social conditions which modify the action of the physiological laws are here the most essential

consideration. Social Physics must, therefore, be founded on a set of direct observations peculiar to itself; due regard being always paid to its necessarily intimate relation with Physiology proper.

64. If we wanted our Classification to be perfectly symmetrical, we could easily make a further subdivision of Organic Physics, as we have already made of Inorganic, by availing ourselves of the usual division of Physiology proper into Vegetable and Animal. Such a division would be based on the principle of classification already employed, since the phenomena of animal life are, for the most part, more complex and special than those of vegetable life. But the endeavour to obtain such exact symmetry would be puerile if it involved the ignoring or exaggerating of the real analogies or actual differences between phenomena. Now, it is certain that the distinction between Vegetable and Animal Physiology, while of great importance in what I have called Concrete Physics, has hardly any significance in Abstract Physics, which alone concerns us here. The knowledge of the general laws of life, which we should look upon as the true object of Physiology, requires the simultaneous consideration of the entire organic series without any distinction between plant and animal—a distinction which is, moreover, daily fading away in proportion as those phenomena are studied more profoundly.

65. We shall continue, therefore, to consider that there is only a single division in Organic Physics, although we have thought it necessary to establish two successive ones in Inorganic Physics.

66. It follows from the foregoing discussion that the Positive Philosophy is naturally divided into five Fundamental Sciences, whose succession is determined by a necessary and invariable subordination, founded merely on a thorough comparison of the corresponding phenomena—quite apart from any hypothetical view on the subject. These Sciences are—Astronomy, Physics, Chemistry, Physiology, and lastly, Social Physics. The first considers the most general, simple, and abstract phenomena—those which are most remote from human interests; they affect all other phenomena, without being in turn influenced by them. The phenomena considered by the last science are, on the contrary, the most special, complicated, and concrete phenomena—those which most directly concern human interests; they depend more or less upon all the preceding phenomena, without—however—exercising any influence upon them. Between these two extremes, the degrees of speciality, of complexity, and individuality of the phenomena go on gradually augmenting in the same proportion as their successive dependence. Such is the most essential general relation between the different fundamental Sciences. We have arrived at it not by drawing arbitrary and empty distinctions, but by a proper use of true philosophic observation. Such must, therefore, be the plan of this course.

67. I have only been able here to set forth in outline the principal considerations on which this Classification rests. To comprehend it thoroughly, it would now be necessary, having viewed it from a general standpoint, to examine it in its special relation to each fundamental science. We shall do that carefully on commencing the special study of each part of this course. The revision of the encyclopædic scale, undertaken in this way at the commencement of each of

the five great Sciences, should make the scale itself more exact and its soundness more evident. The advantages of this plan will be all the clearer because we shall then see the subdivisions of each science falling naturally into order according to the same principle; so that we shall have the whole system of human knowledge analysed, even in its secondary details, in accordance with a rule universally applied—that of the degree of abstraction of the corresponding conceptions. But studies of this kind, besides taking us much too far now, would be certainly out of place in this chapter, where we should maintain our thoughts at the most general standpoint of the Positive Philosophy.

68. Nevertheless, as I shall be constantly employing this fundamental Classification throughout the present treatise, I wish from the outset to make its importance understood. I will, therefore, rapidly review here its most essential general properties.

69. In the first place, a very decisive confirmation of its accuracy is afforded by the circumstance that it is in substantial conformity with the kind of spontaneous arrangement which is, in fact, virtually admitted by scientific specialists.

70. Framers of encyclopædic scales usually take no pains to treat as distinct those Sciences which, in the actual course of intellectual progress and without any premeditated design, have been cultivated separately, and to co-ordinate them in conformity with the real relations exhibited in their daily development. Yet such an accord is evidently the surest index of a good classification; because the divisions which have been spontaneously introduced into the scientific system can only have been due to a long-experienced feeling of the true needs of the human mind, a feeling which had arisen at a time when there was no erroneous theorising to lead people astray.

71. But although the Classification proposed above fulfils this condition entirely—a fact which it would be superfluous to prove—we must not, therefore, conclude that the habits generally established at the present day among scientists, as the result of experience, would make the work of classification, which I have just performed, unnecessary. They have only rendered such an operation possible, for there is a fundamental difference between an arrangement only reached empirically and the same arrangement conceived rationally. And, besides, this classification is not usually conceived—still less employed—with all the needful precision, nor is its importance properly appreciated; a sufficient proof of that is the serious breaches of this encyclopædic law which are committed every day to the great detriment of the human intellect.

72. A second very essential character of our Classification is that it necessarily conforms to the actual order of development of Natural Philosophy. This fact is verified by all that we know of the history of the Sciences, especially during the last two centuries, where we can follow their progress with much greater accuracy.

73. We see, in fact, that the rational study of each fundamental Science demanded the previous study of all those which preceded it in our encyclopædic scale; it could not, therefore, make any real progress and acquire its true character until there had been a considerable development of the earlier Sciences, dealing with phenomena more

general and more abstract, but less complex, and not dependent on those later than themselves. It is, therefore, in this order that the progress, although simultaneous, was bound to take place.

74. This consideration seems to me so important that I do not think it is possible really to understand the history of the human mind without paying regard to it. The general Law of the Three Stages, which governs the whole of this history, and which was explained in the preceding chapter, cannot be properly understood unless it be applied in combination with the encyclopædic formula just established. For it is according to the order enunciated by this formula that the different human theories have successively attained, first the Theological, then the Metaphysical, and, finally, the Positive state. If, in applying the law, we do not bear in mind this necessary progression, we shall often encounter difficulties which will appear insurmountable. It is clear that the Theological or Metaphysical state of certain fundamental theories was bound to coincide for a time, and, as a matter of fact, has at times coincided, with the Positive state of others which precede them in our encyclopædic system. To verify the fundamental law of Filiation would, therefore, be difficult, did we not at the same time take into account the complementary law of Classification.

75. In the third place, this Classification presents the very remarkable property of indicating in a precise manner the relative perfection of the different Sciences. They approach perfection in proportion as their truths are more precisely known and completely co-ordinated.

76. It is easy to see, indeed, that the more general, simple, and abstract any phenomena are, the less do they depend on others, and the more precise do the Sciences concerned with them become, while at the same time their co-ordination admits of greater perfection. Thus, Organic phenomena do not permit of such an exact and systematic study as the phenomena of Unorganised bodies. In the same way, in Inorganic Physics, we see that Celestial phenomena, on account of their much greater generality and their independence of all other phenomena, have given rise to a much more precise and closely connected Science than Terrestrial Physics.

77. This fact, which is such a striking one in the actual study of the Sciences, and has often given rise to chimerical hopes or unjust comparisons, is then completely explained by the encyclopædic order now established. I shall naturally have occasion to give it its full extension in the next chapter, when I shall show that the possibility of applying mathematical analysis to the study of different phenomena, and so obtaining for such study the highest possible degree of precision and co-ordination, is in exact proportion to the rank which these phenomena occupy in my encyclopædic scale.

78. I must here put the reader on his guard against a very serious error, which, although gross, is still extremely common. It consists in confounding the degree of precision which the different Sciences admit of with their degree of certitude, whence results the very dangerous assumption that, since the first is obviously very unequal, the second must be so also. Thus people still often speak, although less than formerly, of the unequal certainty of the different Sciences, which tends to

directly discourage the culture of the most difficult ones. It is clear, nevertheless, that precision and certainty are two qualities of very different nature. A wholly absurd proposition may be very precise, as if we should say, for example, that the sum of the angles of a triangle is equal to three right angles; and a very certain proposition may only admit of very imperfect precision, as for instance, when we affirm that every man will die. If, as the preceding explanation shows, the different Sciences must necessarily exhibit a very unequal degree of precision, that is by no means the case as regards their certitude. Each can offer results as certain as those of any other Science, provided that its conclusions are not pushed beyond the degree of precision which the corresponding phenomena admit of, a condition which may not be always very easy to fulfil. In any Science whatever, everything that is simply conjectural is only more or less probable, and it is not that which constitutes its essential domain; everything which is positive—that is to say, founded on well-established facts—is certain, and there is not any distinction between the Sciences in this respect.

79. Finally, the most interesting property of our encyclopædic formula—on account of the importance and multiplicity of the immediate applications which can be made of it—is to determine directly the true general plan of an entirely rational Scientific Education. That follows immediately from the mere composition of the formula.

80. It is, indeed, evident that, before undertaking the methodical study of any of the fundamental Sciences, it is necessary to prepare oneself by the examination of the Sciences preceding it in our encyclopædic scale. The reason for this is that the earlier Sciences have always a preponderating influence upon the later ones. This consideration is so striking that, notwithstanding its extreme practical importance, I have no need to insist further just now upon a principle which, moreover, will later on inevitably recur in relation to each fundamental Science. I will confine myself to the remark that, if it is eminently applicable to general education, it is particularly so to the special education of scientists.

81. Thus, physicists who have not first studied Astronomy, at least under its general aspect; chemists who, before applying themselves to their special science, have not previously studied Astronomy and then Physics; physiologists who have not prepared themselves for their special labours by a preliminary study of Astronomy, Physics, and Chemistry; all these lack one of the fundamental conditions of their intellectual development. This is still more evident in the case of students who wish to devote themselves to the positive study of Social phenomena, without having in the first place acquired a general knowledge of Astronomy, Physics, Chemistry, and Physiology.

82. As these conditions are very rarely fulfilled at present, and as no regular institution has been organised to carry them out, we must acknowledge that no truly rational education yet exists for scientists. This consideration is, in my opinion, of such great importance that I do not hesitate to attribute in part to this defect in our present educational system the state of extreme imperfection which we still witness in the more difficult Sciences—an inferiority really so excessive that it cannot be entirely

accounted for by the greater complexity of the phenomena.

83. As regards general education, this condition is still more necessary. I regard it as so indispensable that I believe instruction in the Sciences will fail to bring about its most essential general purpose—the intellectual and social ascendency of the scientific spirit—unless those Sciences are studied in their proper order. We must not forget that in almost all minds, even the highest, ideas usually remain associated together according to the order in which they were first acquired; and it is, consequently, in most cases an irremediable evil not to have commenced at the beginning. The number of persons in any century who, after arriving at manhood, are able, like Bacon, Descartes, and Leibnitz, to make a clean sweep of their acquired ideas and reconstruct them systematically from the foundation, is small indeed.

84. The importance of our encyclopædic law as a basis for Scientific Education can only be properly appreciated by considering it also in relation to Method, instead of only regarding it, as we have hitherto done, from the standpoint of Doctrine.

85. Under this new aspect, the carrying out of the general plan of education which we have laid down must have as its necessary result the acquisition of a perfect knowledge of the Positive Method, which could not be obtained in any other manner.

86. For Natural Phenomena have been classed in such a way that those which are really homogeneous always remain comprised within the same Science, while those which belong to different Sciences are really heterogeneous. The consequence is that the general Positive Method will be constantly modified in an uniform manner throughout the extent of each fundamental Science; and it will be continually undergoing different modifications of increasing complexity, in passing from one Science to another. In this way we shall be certain of having considered all the real modifications which it admits of. We should have no such certainty if we adopted an encyclopædic formula which did not fulfil the essential conditions laid down above.

87. This new consideration is of truly fundamental importance. As we saw, in a general way, in the last chapter, it is impossible to understand the Positive Method apart from its application, and we must now add that we can only form a clear and exact idea of it by studying successively in due order its application to all the different principal classes of Natural Phenomena. No one Science, however well chosen, would be sufficient for the attainment of this object. Of course, the Method is essentially the same in all. But it has various forms of procedure, each of which is specially developed in some one Science, and being less developed in the others would in them escape notice. Thus, for instance, the principal means of exploration in some Sciences is Observation properly so-called; in others it is Experiment, and a particular kind of Experiment. Similarly we notice that this or that general precept, forming an integral part of the Scientific Method, has been originally suggested by some particular Science; and, although it may have been subsequently applied in others, it is at its original source that we must study it, if we would know it thoroughly. The Theory of Classification, for instance, is best studied in Biology.

88. If we limited ourselves to the study of a single Science, we should, no doubt, choose the most perfect one in order to obtain the best idea of the Positive Method. But, as the most perfect is at the same time the simplest, we should in this way only obtain a very incomplete knowledge of the Method, since we should not learn what essential modifications it must undergo in order to adapt it to more complex phenomena. Each fundamental Science has, therefore, in this respect some advantages which are peculiar to it. This clearly shows the necessity of paying regard to all of them, lest we should form too narrow conceptions and inadequate mental habits. As this consideration will frequently recur in the course of the work, it is unnecessary to develop it further at this stage.

89. I must, nevertheless, insist here specially, with a view to a sound knowledge of the Method, on the need of not only studying all the fundamental Sciences in a philosophical manner, but of studying them according to the encyclopædic order established in this chapter. How can a mind, unless of the highest natural superiority, produce anything of value if it begins by studying the most complex phenomena, without having previously learnt to know by examining simpler phenomena—what a Law is, what it is to Observe, what a Positive Conception is, and even what a Connected Argument is? Such is, however, still at the present day the ordinary procedure with our young physiologists, who plunge immediately into the study of living bodies, without, as a rule, any other preparation than the study of one or two dead languages, with at most only a very superficial knowledge of Physics and Chemistry. The latter knowledge is almost valueless from the standpoint of Method, since it has not been usually obtained in a rational manner, or by starting from the true point of departure in Natural Philosophy. We can see how important it is to reform such a defective course of study. In the same way, with regard to Social phenomena, which are still more complicated, would it not be taking an important step towards the return of modern society to a truly normal state, if we recognised the logical necessity of not proceeding to the study of these phenomena until the mind of the student has been gradually trained by a philosophical examination of all the preceding phenomena? It would be quite true to say that this constitutes the principal difficulty, for there are few able minds at the present day which are not convinced that we must study Social phenomena according to the Positive Method. But those who are engaged in this study do not, and cannot, know exactly in what this Method consists, because they have not examined it in its earlier applications. This maxim has, therefore, up to the present remained barren as regards the renovation of Social theories, which have not yet emerged from the Theological or Metaphysical state, in spite of the efforts of so-called positive reformers. Later on, this consideration will be treated in full; at present I must confine myself to pointing it out, so as to show the whole scope of the encyclopædic conception which has been propounded in this chapter.

90. Such are, then, the four principal aspects under which I have thought it necessary to exhibit the general importance of the rational and positive Classification of the Fundamental Sciences.

91. In order to complete the general explanation of the plan of this course,

I have now to consider an immense and all-important gap which has been intentionally left in my encyclopædic formula; it is an omission which the reader has, no doubt, already noticed. I refer to the fact that we have not yet found a place for Mathematics in our scientific system.

92. It is just because of its importance that I have not yet mentioned this great and fundamental Science. The next chapter will be entirely devoted to the exact determination of its true general character, and, consequently, of its encyclopædic rank. But, in order not to leave such a serious blank in the great plan which I have tried to sketch out in this chapter, a summary account must be given here of the general results of the examination which we shall undertake in the following chapter.

93. In the present state of development of our positive knowledge we must, I think, look upon Mathematics, not so much as a constituent part of Natural Philosophy properly so-called, but as having been since Descartes and Newton the true fundamental basis of the whole of that philosophy; although it is, strictly speaking, both one and the other. At the present time, indeed, Mathematical Science is of much less importance for the knowledge of which it consists—real and valuable as that knowledge is—than as constituting the most powerful instrument which the human mind can employ in investigating the laws of Natural Phenomena.

94. To form in this respect a perfectly clear and rigorously exact conception of Mathematics, we see that it must be divided into two great sciences whose character is essentially distinct: Abstract Mathematics or the Calculus—using that word in its widest sense—and Concrete Mathematics, which is composed of General Geometry and of Rational Mechanics. The Concrete part is necessarily founded on the Abstract part, and it becomes in its turn the direct basis of all Natural Philosophy; all the phenomena of the universe being regarded, as far as possible, as either Geometrical or Mechanical.

95. The Abstract part is the only portion which is purely instrumental, being simply an immense and admirable extension of natural logic to a certain order of deductions. Geometry and Mechanics must, on the contrary, be regarded as true Natural Sciences, founded like all others on observation; although, on account of the extreme simplicity of their phenomena, they admit of an infinitely more perfect degree of systematisation, which has sometimes led to the experimental character of their first principles being too much lost sight of. But these two principal sciences possess this peculiarity—that in the present state of the human mind they are already, and will be more and more, employed as Method rather than as direct Doctrine.

96. It is besides evident that, in thus placing Mathematical Science at the head of Positive Philosophy, we are only making a further application of the same principle of classification which has furnished us with the encyclopædic series established in this chapter—a principle founded on the successive dependence of the Sciences, which results from the more or less abstract character of the phenomena they deal with. We are now only restoring to this series its true first term, the peculiar importance of which demanded a special and fuller examination. We see, in fact, that Geometrical and Mechanical

phenomena are the most general, simple, abstract, and irreducible of all, and that they do not depend on the others, but, on the contrary, are their basis. We also see that their study is an indispensable preliminary to that of all the other orders of phenomena. It is, therefore, Mathematical Science which must constitute the true starting-point of all rational scientific education, whether general or special. This explains the universal custom which has been for a long while established on this subject in an empirical manner, although it had originally no other origin than the greater relative antiquity of Mathematics. I must confine myself for the present to this very rapid sketch of these different considerations; they will form the special subject of the following chapter.

97. In this chapter, then, we have exactly determined the rational plan which should constantly guide us in the study of Positive Philosophy, not deducing it from vague arbitrary speculations, but regarding the question as the subject of a true philosophical problem. As the final result we have —Mathematics, Astronomy, Physics, Chemistry, Physiology, and Social Physics. That is the encyclopædic formula which, among the numerous possible classifications of the six Fundamental Sciences, is the only one conforming logically to the natural and invariable order of phenomena. I need not dwell on the importance of this result. The reader must make himself quite familiar with it, for he will have to be constantly applying it throughout this course.

98. The final result of this chapter, to put it most simply, has been to explain and justify the great Synoptical Table placed at the beginning of the present work, in constructing which I have striven to arrange the subdivisions of each Fundamental Science in as clear conformity as possible with the same principle of Classification which has given us the general series of the Sciences.

NOTE BY THE TRANSLATOR.

(1) The word "Physiology" in this translation must be considered as invariably equivalent to the term "Biology"; and the latter word was actually employed by Comte in Vol. III. of the *Philosophie Positive* (1838).

(2) In 1839, in Vol. IV. of the *Philosophie Positive*, we find Comte using, for the first time, the word "Sociology" in preference to the expression "Social Physics." It is, therefore, to Comte that we are indebted for the now universally-adopted name of "Sociology."

(3) The reader will notice that in the Synoptical Table only six fundamental sciences are given; the crowning science of Morals or Ethics was not separated from Sociology by Comte until the publication of Vol. II. of the *Politique Positive* in 1852.

HAECKEL'S CRITICS ANSWERED

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The Riddle of the Universe

The Evolution of Man

A Modern Symposium

The Agnostic Annual for 1896

UTAH

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PREFATORY NOTE

WHILST these pages were in the press an interview with Mr. F. Ballard, written by Mr. Raymond Blathwayt, has appeared in *Great Thoughts*. The interviewer introduces his subject with the following passage :—

"None can deny Haeckel's sincerity; few can deny a certain wistful eagerness; all must stand saddened at his pessimism. He himself, if report be true, is shaken to the very core as to his own position. A friend of his, entering his study a few weeks ago, found him in a somewhat mournful condition. 'What is the matter?' said he, and the great philosopher replied, 'I cannot feel certain of my own position; suppose all my theories should turn out to be false.' So that even Haeckel, whom most people regard as a blank materialist, is overshadowed now and again by the spirit world which surrounds us all, and to him also come the doubts and craven fears to which the strongest of humanity is liable now and again."

I at once submitted this passage to Professor Haeckel, and he replied :—

"The anecdote about the wavering of my Monistic position is a pure invention. My views are firm as a rock; but they may, naturally, be only partly correct."

The reader will find from the following pages that this—whoever was the "inventor"—is only one of a long series of untruths and misrepresentations with which the distant Professor has been cowardly assailed.

J. M.

HAECKEL'S CRITICS ANSWERED

CHAPTER I

SOME GENERAL CRITICISMS, AND A LESSON IN MODESTY

SOME forty-four years ago a young German medical man was spending laborious hours in an effort to penetrate the secret of the living organism. From his earliest years he had been powerfully attracted to the study of life. He had written a small work on botany whilst he was yet a boy at the gymnasium. He had then had the advantage of a training for the medical profession under such masters as Kölliker and Johannes Müller. He had published an essay on crabs in 1857, and in 1859 he was pursuing a most important inquiry into the microscopic life that fills the blue waters of the Italian coast. But his many lines of research had not as yet led to any large conclusions. He stood perplexed between the discarded views of the older biologists and the dim vision that was slowly breaking upon the scientific mind of the time. His own revered master had insisted on the fixity of the various species of organisms, but it was an age when every note of the time-spirit whispered "advance" in the ears of the younger men. The despotism of Genesis had been broken by the new criticism, and the Mosaic barrier to research was being trampled under foot. The young scientist, then in his twenty-seventh year, returned to Berlin in 1861, and heard that during his absence an English naturalist had published a startlingly revolutionary view of the whole kingdom of life. He obtained a copy of *The Origin of Species*, and saw at a glance that a great truth had been discovered. In the light of the new theory of evolution, fulfilling the intuitions of Goethe and the speculations of Lamarck, the vast realm of animals and plants began to exhibit the order and rationality he had so long sought.

The very valuable and brilliant work he had done in Italy secured for him a professorship at the University of Jena, and he at once devoted himself to the creation of the new biology. In 1863 (his twenty-ninth year) he gave an able address on the new theory before a congress at Stettin, where all the most distinguished scientists of Germany were assembled. It was his baptism of fire in a life-long campaign against error and prejudice. The vast majority of the scientists present scoffed at Darwin's idea, and said it was not a matter for serious discussion. "The harmless dream of an after-dinner nap," said one distinguished zoologist; and another said they might as well discuss "table-turning." A famous botanist present said there was not a single fact of science in its favour; though Darwin's book alone contains an overwhelming mass of evidence. In France the great Cuvier was crushing the young theory with the weight of his authority. From the pulpit of Notre Dame the brilliant Lacordaire was assuring men that "its father was pride, its mother lust, and

its offspring revolutions." The young naturalist went back to Jena with a stern and grim resolve to pursue truth through fire and water, and, as Huxley was putting it after a like experience, to "smite all humbugs" that lent their authority to error. Five years later he published his *Generelle Morphologie*, which Huxley calls "one of the greatest scientific works ever published," and which considerably advanced the liberation of Germany from the old error. Two years afterwards he published his *Natural History of Creation*, of which Darwin said that, had he read it earlier, the *Descent of Man* would probably never have been written. With phenomenal industry, with brilliant success, and with a moral idealism of the highest order, he continued his research into the nature of life and the nature of man, and long before the close of the century he was in the foremost rank of men of science.

His progress was impeded by the usual conservative hostility. For years the ecclesiastical party strove to drive him from the university, and enforced a boycott of him and his family. One day a prelate approached the Grand-Duke of Weimar, and urged him to put an end to the scandal of the heretical professor. "Do you mean to say," asked the Grand-Duke—for the spirit of Goethe still lingered in the court of Weimar, "that the professor really believes these things he teaches?" "He certainly does," assured the cleric. "Then the man is only doing what you are doing yourself," was the amiable retort. At another time the professor himself approached the head of the university, Dr. Seebeck, an orthodox thinker, and offered to resign his chair, to end the trouble, as he would never swerve one inch from the path of integrity and faithfulness to what he considered to be the truth. Dr. Seebeck bade him remain; and his name has, in return, taken the name of Jena to the ends of the earth. His books have been translated into twelve languages. His name will rise first to the lips of any informed student in the civilised world, from Yokohama to St. Petersburg, from San Francisco to Calcutta, if you speak of zoology or embryology. He holds four gold medals for research, and more than seventy diplomas from so many academies and learned bodies all over the world, who have desired to have his name on their roll of members or associates. When, in 1881, the Asiatic Society of Bengal resolved to nominate six special "centenary honorary members," he was the one chosen for Germany. On the occasion of his sixtieth birthday, ten years ago, the *élite* of the scientific world sent their greeting to the man "who has devoted his life in unselfish devotion to science and to truth, who has opened new paths and inaugurated fresh knowledge wherever he has turned, and who has ever given his best for the moral welfare of humanity."

That is the real Ernst Haeckel.

That is the man whom our ecclesiastical M.A.'s and our D.D.'s have lately been accusing of "scientific humbug" and "insolent dogmatism" and "childish credulity" and "mendacities" and "rhodomontade," of being "an essentially ignorant guide," "an atrophied soul," and "a rude, ill-mannered, ignorant child," of "poisoning the minds" of the people and leading them "back into barbarism," of "prostituting himself," of making "misrepresentations so gross and glaring as to make it extremely difficult to credit him at once with mental ability and sincerity," of "having forfeited all right to speak as a serious scientific man," and of being "so flagrantly prejudiced, so false to fact, and so insolent in tone, as to require much self-control to keep one from flinging the book away in disgust." I am not quoting itinerant Christian Evidence lecturers, but the deliberately published observations of Dr. Horton, Dr. Loofs, and the Rev. Mr. Ballard.

We need not tender our sympathy to Professor Haeckel. He has been listening to language of this kind ever since

he published his famous *General Morphology* in 1866. He may have by this time a kindly theory that it comes naturally to a mind that breathes a mediæval atmosphere, and that still holds the general principles on which the Holy Inquisition was founded. But it is worth while investigating how all this lurid language is reconciled with the culture and scholarship and tolerance which are claimed for the modern clergyman. The writers of these picturesque phrases would indignantly repudiate the notion that they were angry merely because Haeckel's views of the nature of man and the constitution of the universe contradict their own, and tend to diminish the number of their followers. They do, indeed, reject the substance of his speculations, but their *quarrel* is with the manner in which he pursues and expounds them. A few years ago he published a summary of the opinions he had arrived at on a vast number of problems of science, philosophy, history, and religion. As he saw his great colleagues pass on one by one to join "the choir invisible," he decided to draw up this "last will and testament"; to look back over the sombre fields of half-a-century of warfare, and sum up the issues of the conflict. In Germany his *Riddle of the Universe* sold 9,000 copies in two months, and has led to an appalling outpouring of controversial ink. In England it was eagerly and extensively welcomed in the more expensive edition, and in the cheap form it is circulating to the extent of nearly 80,000 copies. I have waded through the turgid flood of criticisms it has called forth, and will deal first with those charges which tend to palliate the outrageous phrases I have quoted before I proceed to the criticisms of its substance. These ponderous names are not flung out, we are told, from a secret consciousness that sober criticism would have little force. They are reluctantly penned out of regard for the ethic and æsthetic of controversy. Professor Haeckel, whom Mr. Mallock has saluted in the *Fortnightly Review* (September, 1901) as "one of the most eminent and most thoughtful men of science in Europe," whom an antagonistic reviewer in *Knowledge* describes as "impelled by no motive but a love of truth," and says that "to know him is to love him," and "there are few who have worked harder and, at the same time, more brilliantly, for their day and generation," whom the *Westminster Review* regards as "a great biologist and thinker," and whom even Dr. Dallinger calls "a man of large scientific attainments, a biologist of the highest repute, and possessed of the keenest acumen" (*The Creator*, p. 18) —this Professor Haeckel has, it seems, greatly violated the good taste and the ordinary morality of literary work in his *Riddle of the Universe*. Mr. Ballard epitomises the charge very neatly in the *British Weekly*. The book, he says, "teems with exhibitions of bitter prejudice, arrant dogmatism, unwarranted assumption, uncalled-for insult, logical failure, and self-contradictions"; and the misguided British public calls for five editions of it, in spite of all the abuse that is heaped on it and all the secret and public manœuvres that are directed against its circulation.

A desperate champion might ask the reader to reflect on the atmosphere of invective in which Haeckel has lived for the last fifty years—from Lacordaire's tracing of the parentage of evolution to Dr. Talmage's sermons on the subject only four years ago—and might recall that even dainty prelates like Bishop Wilberforce could utter bitter insults in that charmed region. He might argue that a Haeckel was not pledged to turn the other cheek to the smiter. He might point out that it is not soothing to have had to spend half a life in overcoming what is now acknowledged to be a foolish resistance, yet see the same theological forces arrayed at a more advanced position to-day. But, in truth, we shall do better to ask, what is the æsthetic and ethical standard of controversy cherished by Dr. Haeckel's critics, and

how far does he really fall below their shining example?

There is Dr. Horton, for instance, whose sensitive nature is outraged by Haeckel's rude comments on some of the Christian beliefs. Now, I have been a priest and I know how largely rhetorical this kind of indignation is, and how effective it is sometimes in preventing a book from being read. As a fact, one who was present when Dr. Horton delivered his philippic tells how, when the preacher read out in tremulous tones the famous mother-in-law passage (and the like) from the *Riddle*, his audience was really shaking with suppressed laughter. However, let us examine Dr. Horton's discourse,[1] and learn the better manners which he desiderates in Haeckel. He opens with a reference to "the depths of degradation and despair into which the teaching of Haeckel will plunge mankind;" though, of course, to speak of Dr. Horton's views as degrading would be considered insulting. Then, though "there has been no more diligent and successful investigator of the facts of nature than Ernst Haeckel during the century that has passed," he is a child at moral and religious reasoning, "a rude, ill-mannered, ignorant child;" he is "an atrophied soul, a being that is blind on the spiritual side." The "spiritual side" being a blend of moral and intellectual faculty (if it is anything more than imagination), this is grave; but Dr. Horton says it "in the interest of souls and truth." Presently he finds Haeckel an "utterly unsatisfactory and essentially ignorant guide," an "unthinking mind" with whose "obvious weakness and ignorance" and "childish credulity" "the rationalist press gulls the ignorance of the public." Dr. Horton admits that modern science "must gradually affect the view of man, even the view of God, which we drew from the matchless revelation of the first chapters of Genesis" [this in Hampstead, in the year of grace 1903!], and must modify "the naive, but essentially correct, conceptions of our ancestors"; but Haeckel asks too much. I will touch in the proper place Dr. Horton's brief argumentation on the origin of life and the origin of the mind,[1] and will only admire here the delicacy with which he points out the spiritual consequences of monism. "Men who have no belief in God and immortality sink to the level of the brutes," and Haeckel is "anxious to sweep us back into this barbarism under the name of progress." "Haeckel is "not conscious of the degradation that has passed upon his spirit" through rejecting the particular solution of the world-riddle which Dr. Horton recommends, but in any one who does so "the soul is shrunk, the mind is warped, the very body must carry its marks of degradation." It is true that the preacher's sense of humour awakes at one point, and he disavows any intention of imputing these "bestial levels" to Haeckel himself, but he seems to forget the reservation, and ends in a most ludicrous strain of commiseration. There is nothing half so insulting and offensive in Haeckel.

Passing by Dr. Loofs (whose little work is one of the most spiteful and painful diatribes that has issued from a modern university), as he does not claim to be an English gentleman, we may turn to the Rev. F. Ballard for an exhibition of those manners which Haeckel has neglected to cultivate. Mr. Ballard is said in the religious press to have proved that "Haeckel doesn't count," and it will be expected from the precision and force of his indictment of Haeckel's manner (which I have quoted above) that this

[1] It is published in the *Christian World Pulpit*, June 10th, 1903.

[1] Dr. Horton's knowledge of the controversy may be tested very well by his statement that Bois-Reymond, Vogt, Büchner, and Baer, "perhaps four of the greatest men of science in the nineteenth century in Germany," came to "the recognition of spirit as the author of consciousness." Not one of the four ever recognised anything of the kind, as we shall see. Bois-Reymond and Baer remained agnostic, whilst Büchner and Vogt were actually the leaders of German materialism up to the moment of death.

scientific clergyman will be quite the Beau Brummel of religious controversy. He has written a chapter on *The Riddle of the Universe* in his *Miracles of Unbelief*, but this has been swallowed up in his great attack in the columns of the *British Weekly*. The later articles of this series refer to the able editor of the *Clarion*, and Mr. Blatchford has shown a sufficient command of appropriate language to dispense with my services. I confine myself to the first three articles (July 23rd, 30th, and Aug. 6th). It proves, on examination, that twelve columns out of the thirteen are mainly preliminary comments on Haeckel's morals. I will deal with the thirteenth column (which will turn out to be very largely a question of *Mr. Ballard's* morals) in its proper place, and will here briefly examine the general criticisms.

Dogmatism and dishonesty are the chief points Mr. Ballard charges, with an infinite variety of phrasing, against the absent Professor. Now, one would really be disposed to see something in the first point, since it is so persistently urged by Haeckel's critics. Unfortunately, when one looks closely into the grounds of the charge it begins to totter; and when one compares Haeckel's words with those of his critics, one wonders what dogmatism really is. There is, for instance, that admirable writer of the *Christian World*, Mr. J. Brierley ("J. B."), who stooped in some unguarded hour to attack Haeckel. The *Riddle* is "one of the most amusing books this generation has seen" because "its dogmatism is so naïve." "Professor Haeckel has found everything out," says Mr. Brierley. "He has exploded the old mystery, and found it a bag stuffed with sawdust. There is nothing to wonder at in suns and systems. They are just matter and force, and there is an end." Now, the *Christian World* is a fine paper, and "J. B." is one of its sanest contributors, yet this passage is astounding. Whence did a hostile reviewer in the *Sheffield Daily Telegraph* get the opposite impression that Haeckel "is modest and unassuming in the claims he makes for his system"? How came the *Westminster Review* to call it "a careful and conscientious endeavour to construct a theory of the universe in harmony with the teachings of modern science"? Read the second page of the preface to the *Riddle*. "The studies of these world-riddles which I offer in the present work," you read, "cannot reasonably claim to give a perfect solution of them; they merely offer to a wide circle of readers a critical inquiry into the problem, and seek to answer the question as to how nearly we have approached that solution at the present day. What stage in the attainment of truth have we actually arrived at in this closing year of the nineteenth century? What progress have we really made during its course towards that *immeasurably distant goal*?" Those words—and you will vainly seek their equal in modesty in any religious riddle-solver in the world—meet the eye at the very opening of the book, and they are substantially repeated at its close (p. 134).[1] "The answer which I give to these great questions," Haeckel continues, "must naturally be merely subjective and only partly correct." Was there ever so singular a "dogmatist"? "The one point that I can claim is that my Monistic Philosophy is sincere from beginning to end." "My own command of the various branches of science is uneven and defective, so that I can attempt no more than to sketch the general plan of such a world-picture, and point out the pervading unity of its parts, however imperfect be the execution." "In taking leave of my readers, I venture the hope that, through my sincere and conscientious work—in spite of its faults, of which I am not unconscious—I have contributed a little towards the solution of the great enigma." If that is dogmatism, and the average theological pronouncement is fragrant

[1] I quote throughout from the cheap edition of the *Riddle*.

with modesty, we shall need to reconsider our moral terminology.[1]

But Mr. Ballard would tell us there are other passages in which "the most arrogant dogmatism" breaks out. Well, Haeckel has told us the book is uneven and sketchy, that its parts were written at different times, in different moods; and, knowing there was no inconsistency of thought, he may have trusted to the intelligence of his readers to adjust any mere inconsistency of expression. But the truth is, that Mr. Ballard's choice examples (given in his third article) of "unmitigated dogmatism" are little short of ridiculous. "Thus we have got rid of the transcendental design of the philosophy of the schools" and "The unprejudiced study of natural phenomena reveals the futility of the theistic idea" are two of the shorter quotations. Clearly, Mr. Ballard must mean that Haeckel should have interposed "in my opinion" in these sentences. Does Mr. Ballard do that? Does any sane and literary writer do it who expects to have intelligent readers? Professor Haeckel is by no means a Social Democrat, but he does credit "the general reader" with intelligence enough to relieve him from saying "this is my opinion" at every third line. He has gone out of his way to warn the reader from the beginning that his conclusions are "merely subjective." In not one of these cases does he represent a conclusion as being unanimously accepted. On the contrary, Mr. Ballard and his friends are never tired of pointing out how Haeckel, *on his own showing*, is contradicted by his own colleagues in Germany. The whole matter is too absurd to prolong. Haeckel's "dogmatisms" are the ordinary ways of expression in adult literature. They shine with modesty in comparison with theological utterances, and they are guarded from misinterpretation on the part of the uninformed by a most rare and conscientious warning in the preface.

Finally let us consider the charge of misinterpretation, trickery ("jugglery," the Rev. Rhondda Williams says), and general dishonesty of method. To deal with this fully would be to anticipate my whole book here; the reader will be amply informed for judgment in the sequel. But we may, in the meantime, profitably run our eye over Mr. Ballard's twelve columns of moral censorship. In the last chapter of *Miracles of Unbelief*, Mr. Ballard says "we find misrepresentations so gross and glaring as to make it extremely difficult to credit the writer at once with mental ability and sincerity" (p. 350). In immediate justification of this, Mr. Ballard quotes Haeckel's statement (p. 46 of the *Riddle*) that even some Christian theologians deny the liberty of the will. This Bachelor of Divinity seems unaware for the moment that the Calvinists notoriously denied freedom on the very ground indicated by Haeckel, and that the greater part of the Catholic theologians (the Thomists and Augustinians) are accused by their colleagues of being, logically, in the same predicament. A more paltry justification for so grave a charge it would be hard to conceive. The only other point in the chapter worth noting is the comment on abiogenesis, and this will be met at a later stage.[1] I turn to the pages of the *British Weekly*, and their blush of righteous indignation.

The only point that concerns us in

[1] An amusing feature of this delinquency of Mr. J. Brierley's—which I sincerely regret to have to notice—is that it follows upon a fine article on "Candour in the Pulpit"—that is to say, on the lack of candour in the pulpit and of honesty in apologetic literature. So that, almost side by side with this unhappy passage, one reads: "A foremost modern theologian, by no means of the radical school, has recorded his significant judgment that one of the main characteristics of apologetic literature is its lack of honesty; and no one who has studied theology can doubt that it has suffered more than any other science from equivocal phraseology" (*Christian World*, August 20th, 1903; p. 10).

[1] But the many admirers of Mr. Ballard who wish to know the worst at once may refer now to p. 40, and see how their apologist garbles his quotation from Haeckel, misrepresents his position, misstates the attitude of science, and so wins a glorious victory—over the Decalogue.

the first article is a curiously spirited attack on my opinion that the *Riddle* is "unanswered because it is unanswerable," and it is instructive to consider this. Take down your copy of the *Riddle*—do not contract the slovenly and expensive habit of trusting a controversial writer; and I will give you pages throughout, which Mr. Ballard never does—and notice that I wrote this in November, 1902. Mr. Rhondda Williams had not then written his pamphlet, Dr. Horton had not preached his sermon, and Dr. Loofs's book was unknown in England. The only "reply" in the field was a hastily added chapter to Mr. Ballard's *Miracles of Unbelief*, which one may be pardoned for not having discovered by 1902. Further, I wrote with pointed reference to Dr. Beale's pathetic promise of a reply in the agony column of the *Times*, Oct. 1st, 1900; a promise which he withdrew by referring later (Dec. 19th) to a tiresome collection of letters from the *Lancet* which he had published in 1898. Moreover, I pointedly wanted an answer to the most important thesis of the book, the evolution of mind, which, I find, even Mr. Ballard had not met. Mr. Ballard's selection of spontaneous generation as the chief point—whereas Haeckel only offers it as "a pure hypothesis," and it is only an incidental (though necessary) consequence of his system—is unworthy of a serious scientific man. So, brushing aside criticisms of Haeckel's views on Christ and the Immaculate Conception, which have nothing to do with the integrity of his system, I deplored "the silence or triviality of his opponents." But note how Mr. Ballard manipulates this innocent observation. Premising that I am "doubtless honest," and that "the apostles of free-thought, of all men, might leave others free to think for themselves," and so on, he tells me it was answered by himself (in an obscure corner of an obscure book) and —by anticipation! That encourages him to call my statement an "untruth."

In the second article my enormity grows. Readers are told that I assert the "monistic mechanism 'has been for ever established' as the all-sufficient origin, means, and end of everything"; whereas I most clearly said only that "the case for the evolution of mind" had been "for ever established." Later we have a reference to "the reactionary assurances of an ex-ecclesiastic to the effect 'that all Christian faith is shipwrecked and all Christian convictions amongst the breakers.'" The unsophisticated reader will learn with surprise (in spite of "to the effect") that this, whether reactionary or not, is not a quotation from me. And finally the growth is complete, and I am made to "sneer at the triviality or the silence of the opponents of the mechanical theory of the universe." Mr. Ballard, F.R.M.S., clearly makes a very improper use of his microscope at times.

So it is with my innocent remark that in the *Riddle* we have a "masterly treatment of the question of the evolution of mind." "Masterly" soon grows into "more masterly," and Mr. Ballard airily asks: "I really want to know *why*, for some of us who make no profession to be experts, Dr. Haeckel's treatment should be more 'masterly' than that of, say, Dr. Wallace"; and in the end: "May we not then ask Mr. McCabe, or Mr. Blatchford, why, or by what authority, they proclaim that Prof. Haeckel's treatment is so much more masterly than that of all others as to foreclose the question?" The perversion of my phrase into a comparison and the implication that I fail in respect for Dr. Wallace or any other distinguished thinker come very oddly from the pen of this literary *censor morum*.

Yet this is a fair sample of Mr. Ballard's procedure—and is in fact a great part of his procedure, or I should not have dwelt on it. The only other important element in Mr. Ballard's preliminary twelve columns is his industrious collection of authorities to

oppose to Dr. Haeckel. I shall speak presently of the proper merit of this, but must touch a few points of it here to finish the consideration of Mr. Ballard's standard of controversy. He constantly affirms that Haeckel is opposed by the majority of scientific authorities. We shall see what this really amounts to, but let us consider it here in the light of the more important question whether they support Christianity. I have carefully examined the list of writers quoted against Haeckel by Mr. Ballard, and this is the result. In the front rank are the three eminent scientists, Lord Kelvin, Sir O. Lodge, and Dr. A. R. Wallace. Their convictions every man will respect who respects himself, but—two of them are Spiritists (having therefore, an alien and empirical source of faith, and holding views on the future state which Christian teaching rejects), and Lord Kelvin gives a very slender support, as we shall see. Then there are Dr. Beale (who confesses in his latest book that he is fighting a vast majority), Dr. Croll (who denies the liberty of the will), Dr. Stirling (whose contribution is the same as Dr. Beale's), Dr. Winchell and Sir J. W. Dawson (geologists of a past generation, who defend the literal interpretation of i. Genesis: Sir J. W. Dawson thinks geology only claims 7000 years for the life of man, and that "the deluge is one of the most important events both in human history and the study of the later geological periods"), Professor Flower (with ten lines of qualifications, but whose only contribution to the subject seems to be an address at a Church Congress, in which he sharply tells the clergy they have done mischief enough in the past, and had better leave evolution to men of science; two short phrases about an "eternal power" and the "Divine government of the world" seem to constitute his slender theology), Dr. A. Macalister, Professor Le Conte and Mr. Fiske (American evolutionists and Pantheists), Mr. Row (the Christian Evidence lecturer), Dr. Cook (the American Christian evidence lecturer), and Lord Grimthorpe (the Vicar-general of York, whose "legal and scientific mind" may be seen at work in his *Letters on Dr. Todd's Discourses on the Prophecies*). The rest of Mr. Ballard's list consists of professional theologians. "Dr." This, and "Professor" That, usually turn out to be graduates in divinity. I am not for a moment slighting the scientific acquirements of men like Dr. Dallinger, Mr. Newman Smyth (one of the few apologists who retain the character of a gentleman amidst polemical work), Dr. Iverach, Mr. Ballard, Mr. Profeit, and Mr. Kennedy; I am not so unintelligent. But it would be absurd to say that the publications of these professors of apologetics and doctors of divinity have the same value, as replies to Haeckel, as those of scientific laymen. The result is that Mr. Ballard's list is totally and gravely misleading to the uninformed. Rubbish like the "Present Day Tracts" and antiquated work like Winchell's and Dawson's and Stirling's and Wainwright's are mixed up with the good work of Newman Smyth and Dallinger and Kennedy. Evolutionists and non-evolutionists, theists and pantheists, Christians and non-Christians, are hastily thrown together. He drags in Prof. W. James to rebuke Haeckel; the average reader will have little suspicion that James rejects the title of theist, speaks scornfully of Mr. Ballard's God, and is not sure of the immortality of the soul. All this is gravely misleading.

Clearly, Mr. Ballard's ideal of controversy is not much superior to that of Dr. Horton. Yet this budding controversialist has the effrontery to tell Haeckel that "if he has no sense of shame, then we have a sufficient object lesson as to the failure of 'monistic religion' to develop even an elementary degree of morality." This is provoked by statements which Haeckel quotes with transparent honesty from writers named in his book. We have seen how an equally coarse outburst was prompted by a statement (as to the free-

dom of the will) which is literally correct. The only other specific criticisms offered by Mr. Ballard relate to the nature of matter and the origin of life. In both cases he gives a mere travesty of Haeckel's position. We shall take them in detail later (though the reader may find them at once by means of the index, if he desires). For the present we take our leave of these graceful guardians of the taste and ethic of controversy.

"What sort of an age do we live in?" asked the *Prager Tageblatt*, when it saw the clerical and scientific Lilliputians of Germany shooting their insults at the distinguished scientist. We are living, still, in an age when religion is made to consist essentially in certain speculations about the nature of the universe, which were framed, in substance, thousands of years ago; an age when any independent speculator on the nature of things must expect to arouse a bitter antagonism if his conclusions differ from those of religious tradition. Religion is, in a most important aspect, "a cosmic doctrine," to quote the words of Mr. Mallock. "Religion and science," he says, "touch and oppose each other primarily as rival methods of explaining the . . . . universe taken as a whole, man forming part of it." Until a short time ago theologians held that their particular cosmic speculations had the distinction of a supernatural origin, and they damned people who called them into question. To-day the gilt is wearing off the legends of Genesis, but the hereditary spirit of intellectual arrogance goes more slowly. To-day there are many theologians who call themselves truth-seekers, and there are a few who write and speak as if they *were* truth-seekers, and not truth-fulminators. But the sad truth is that the majority are morally hampered by a conviction of the sacredness and the exclusive truth of certain speculations, about God and the soul, which they have a corporate charge to defend. Every man who opposes them is constructed into a hater of their religion and a menace to human progress. The diminution of their followers seems only to increase their violence. "Already," says Mr. Rhondda Williams, "it is the fact that the cultured laity on the one hand and the bulk of the democracy on the other are outside the Churches."[1] Yes, people are seeking the truth, out in the light of day, and they distrust a tradition that has broken down section by section as the century advanced. Haeckel, starting from a most comprehensive knowledge of living nature, has reached out to certain conclusions on the cosmic mystery. It will not avail to caricature his conclusions and vilify his person and motives and method. Neither he, nor his translator, nor his publishers, dreamed of thrusting his zoological authority down people's throats, except in so far as his book deals with zoology. His further conclusions must be met on their argumentative merits. His whole system must be judged by rational evidence. Dust-throwing and mud-throwing are not the methods of truth-seekers; they are the devices of timid or foolish partisans.

But before I enter upon a systematic examination of Haeckel's system and the criticisms it has provoked, I wish to expose one further misrepresentation of a general character. Almost all the critics endeavour to make us distrust Haeckel by attributing to him a solitary and isolated position in the scientific world. Even if this were the case, it would only be an incentive to examine his views with the greater care. Copernicus stood alone throughout life. Darwin was opposed by most of the scientists of his time. Wolff enunciated a profound truth which was not accepted until long after his death. Robert Owen preached a whole series of social truths that we all accept to-day. Further, all writers do not regard Haeckel as isolated. Mr. Mallock, in his *Religion as a Credible Doctrine*, not only takes him to be the supreme living representative of scientific philosophy, but says that he and his

[1] *Does Science Destroy Religion?* p. 29.

colleagues "are correct in their methods and arguments—that the attempts of contemporary theologians to find flaws in the case of their opponents, or to convert the discoveries of science into proofs of their own theism, are exercises of an ingenuity wholly and hopelessly misapplied, and exhibit too often an unreasoning or a feverish haste which merely exposes to ridicule the cause which they are anxious to defend."[1] Dr. Lionel Beale speaks throughout his *Vitality* of the majority being on Haeckel's side in that controversy. Dr. Iverach speaks in his *Theism* of "scientists," in a general way, as refusing to go with him. But the misconception it is particularly needful to clear up is as to the relation of Haeckel's Monism to Agnosticism. When Mr. Ballard speaks crudely of the majority of modern scientists being opposed to Haeckel, the uninformed will conclude that they are, therefore, more or less with Mr. Ballard. We have corrected that impression by giving the list of all the scientific laymen of England and the United States, of recent years, that Mr. Ballard has been able to get under one very broad religious umbrella. It bears only a small proportion to the whole, even when we have added Professor Henslow and a few more later on. On the other hand, the average educated man would say that Haeckel is a materialist and atheist, and the great bulk of our men of science reject both names. Haeckel, it is true, equally rejects the name materialist, but we may defer that point to the next chapter. Our average educated man has no illusion as to Huxley, Tyndall, Clifford, Darwin, Bain, Sully, Maudsley, Spencer, Ray Lankester, Karl Pearson, and scientists of that type (or those types) favouring what Mr. Ballard would call religion. These have professed Agnosticism; and the silence on the religious question of the vast majority of our scientific men must—especially in view of the feverish alertness of the Churches to drag them on to platforms when they are known to be in the least favourable—I should say, be construed in the same sense.

Now, Agnosticism is held to be more or less respectable. Mr. Ballard quotes Huxley and Darwin and Tyndall with a light heart and without the least recourse to his red ink. Haeckel is abused because of his "dogmatism." But let us refrain from raising dust, and see what the difference really comes to. I might quote Lord Grimthorpe, whose "legal and scientific mind" Mr. Ballard has warmly recommended to us: "As for professing to believe neither alternative, atheism or theism, . . . that is not only probably but certainly wrong, and, indeed, is so impossible that any man who thinks he has come to that conclusion is mistaken, and is at present an atheist."[1] But I think a writer of that type ought to be left in his grave. Listen, however, to what one of the ablest living thinkers of England says on the matter: "The Neutral or Agnostic Monism now in vogue amongst scientific men . . . is scientifically popular mainly because it is still essentially naturalistic, and disparages the so-called psychical aspect as epistemologically subordinate to the physical. . . . This monism escapes the absurdities of the old materialism more in seeming than in fact . . . it is materialism without matter. . . . In this monism the mechanical theory is still regarded as furnishing a concrete and complete presentment of the objective world. . . . If dualism is unsound, there seems to be no agnostic resting-place between materialism and spiritualism."[2] I do not subscribe to all this, but the high authority of the writer encourages me to say that the custom of opposing our

[1] *The Fortnightly Review*, September, 1901; p. 400.

[1] At the close of *The Origin of the Laws of Nature*.

[2] Professor J. Ward, *Naturalism and Agnosticism*, p. 207, vol. ii. So Professor Case, in the article on Metaphysics in the tenth edition of the *Encyc. Brit.* says Huxley, Tyndall, and Spencer, only escape materialism by being inconsistent.

Agnostic scientists to Haeckel—especially when fairly ancient quotations are dug out of their works in support of it—is totally misleading.

The difference between them is this (setting aside for the manner the question of idealism): Haeckel's system is a comprehensive theory covering the universe, whilst they remain on ground which they feel to be very solid. They affirm the evolution of all things, of matter, of solar systems, of species from lower species, of man, of religion and ethics. But they decline to skate at all on thin ice. Whether the universe had a beginning, whether evolution has been purposively guided, whether or how life arose out of non-life, whether consciousness is of the same texture as physical force, whether death makes an end of it—all these things they prefer to leave to a later generation. Where they do *affirm*, they agree with Haeckel; but they consider his further affirmations premature, to say the least. They agree with him that the religious theory is quite uncalled-for by the facts of science; but they think it too early to frame counter-theories. This is the real significance of those famous conversions of German scientists of which every critic of Haeckel has made so much. Du Bois-Reymond, Virchow, Baer, and Wundt spread their affirmations over the universe in their younger days. At a later period they restricted themselves, like Huxley or Darwin, to positions which seemed impregnable. They retreated to Agnosticism on the more advanced questions. It is absurd to find Haeckel's critics representing them as having gone over to theism or Christianity.[1] Like Huxley and Tyndall (in his agnostic mood) they only decline to follow Haeckel in a constructive theory of the origin of life and the relation of consciousness to brain, and the strenuous denial of God and immortality; but they shrink just as severely from the constructive theories and the dogmas of Haeckel's critics.

In that sense Haeckel stands apart, though far from alone. Is he justified in leaping the abysses from which his colleagues shrink? Would it be wiser to keep to the solid ground? To put no rounded system before the world? We can judge best when we have covered the whole ground over which his system extends. Meantime, remember three things which are lost sight of in the dust of this controversy. Firstly, Dr. Haeckel does not claim anything like equal value for his views on all points. He knows perfectly well how the evidence differs, and how at times he must bridge a chasm with "a pure hypothesis," as he calls his theory of abiogenesis; though he does not even put out a hypothesis without sober ground. His system is an elaborate structure of demonstrated truths, convincing theories, and rational hypotheses of all grades of strength. The critic who confuses the latter with the former, and thinks he has destroyed "the fundamental axiom," when he has only shown that some outlying hypothesis *is* only a hypothesis, does not evince much discernment or a scrupulous desire to let truth prevail. Secondly, dualism, or theism, may not logically rush in if one

[1] Haeckel is read a ferocious lesson in manners by all his critics for putting a certain construction on their change. Let it stand. I am chiefly concerned with the truth or untruth of his ideas. I see, therefore, a far more grievous sin in the almost general misrepresentation of the nature of these "conversions." Dr. Horton, we saw, slipped in Vogt and Büchner, the most advanced materialists of Germany, as converts to spiritualism. Mr. Ballard inserts Romanes, of whose conversion Haeckel was totally unaware when he wrote the book, and whose change of views differs *toto cælo* from that of Virchow or Wundt. All essentially misstate the real "metamorphosis." It was merely from dogmatic monism to what Dr. Ward calls "agnostic monism." It lends no support to theism or spiritualism, Prof. Haeckel assures me that "even to-day these men are styled *atheists* by German ecclesiastical writers." Read Mr. Kennedy's attack on Du Bois-Reymond's heterodoxy, after his "Ignorabimus-Rede," in his *Natural Theology and Modern Thought*, pp. 42–65. Darwin used stronger language about Virchow than is to be found in the *Riddle*.

of Haeckel's particular hypotheses breaks down. Between Haeckel and Martineau or Fiske lies the broad region of neutral or agnostic monism. And thirdly, this is the ordinary procedure of science. It throws out the light bridges of its hypotheses far in advance of its solid march. They *may* be withdrawn later. More probably they will gather strength as the years roll on, and be at length absorbed in the growth of the impregnable structure of scientific truth.

Chapter II

THE UNITY OF THE WORLD, AND THE LAW OF SUBSTANCE

What, then, is this monism which has aroused so much bitterness and antagonism? Once more, before we can proceed to a sober and patient study of the position of Dr. Haeckel, we find it necessary to lay the dust which his critics have raised. There is the definition given by the Rev. Ambrose Pope, who seems to have led the opposition to Haeckel in the Clarion controversy. Mr. Pope disposes of the system—which it has taken Dr. Haeckel a laborious life-time to construct—with a marvellous and quite papal facility. It was made, he thinks, during three "half-day excursions" out of Haeckel's own province. From these he returned with certain "assumptions" which contain, with almost ludicrous clearness, the conclusions he wanted to reach. We will have a word on these "assumptions" (which are really the *conclusions* of years of observation and reflection) when the time comes. But incidentally Mr. Pope defines monism, or, as he calls it for some occult reason, "physiological monism." "Briefly," he says, "the universe is not dual in its ultimate nature, viz., spirit (or soul) and matter; but single (monistic), viz., matter (or substance)." Mr. Pope goes on to say airily that "this is another of those innocent-looking hypotheses" from which Haeckel derives his atheism, &c. How any man can fail to see that this is not an assumption, but the most laboured conclusion of Haeckel's system—not the base but the apex of his pyramid—passes comprehension. Meantime, it is formulated in utter defiance of Haeckel's words, and one might think Haeckel would be consulted on the matter. He says (p. 8) that monism does "not deny the existence of spirit, and dissolve the world into a heap of dead atoms" and that "matter cannot exist and be operative without spirit, or spirit without matter." Dr. Horton and many others have the same confusion. The Rev. Rhondda Williams says: "He recognises that there is something which is not material (spatial) which we may call mind, or soul, or spirit. But if this spiritual something is treated as the mere product of matter, or the mere function of the material organism, its reality is denied, *i.e.*, it has no real spiritual nature." But Haeckel has nowhere said that spirit (or force) is a product of matter. There are scientists who resolve matter into force, but no one ever attempted the reverse, except in

the sense of reducing force to motion, which Haeckel certainly does not.

Monism is so clearly defined at the very commencement of Haeckel's book (p. 8) that these gentlemen must have convinced themselves he gave an improper definition in order to escape the odious label "materialist." Before we proceed, let us be perfectly clear why this odium does attach to the word "materialism." It is well worth while, for here is one of the strangest and most common sophisms of the hour. Materialism is the name for two totally different things, which are constantly confused. There is, in the first place, materialism as a theory of the universe—the theory that matter is the source and the substance of all things. That is (if you associate "force" or "energy" or "motion" with your "matter," as every materialist does) a perfectly arguable theory. It has not the remotest connection with the amount of wine a man drinks or the integrity of his life. But we also give the name of materialism to a certain disposition of the sentiments, which few of us admire, and which would kill the root of progress if it became general. It is the disposition to despise ideals and higher thought, to confine one's desires to selfish and sensual pleasure and material advancement. There is no connection between this materialism of the heart and that of the head. For whole centuries of Christian history whole nations believed abundantly in spirits without it having the least influence on their morals; and, on the other hand, materialists like Ludwig Büchner, or Vogt, or Moleschott, were idealists (in the moral sense) of the highest order.[1] Look around you and see whether the belief or non-belief (for the Agnostic is in the same predicament here) in spirit is a dividing-line in conduct. There is no ground in fact for the confusion, and it has wrought infinite mischief; while it has rendered, and still renders, incalculable service to conservative religion.

In his *Natural History of Creation* Professor Haeckel admitted that his monism was not far removed from scientific materialism. But there is still so gross a confusion on the subject that it is very natural for him to refuse the name. Indeed, he could not logically accept it, and no one who is well informed in recent physics will accept it, unless he is allowed to interpret it in his own way; a right which seems to be denied to men like Dr. Haeckel. Glance at any scientific work, and you will find that it speaks as much, if not more, about force than about matter. Hence if critics insist on calling materialism a belief in "dead atoms" and "hard atoms," and "solid atoms," and nothing else, there are no materialists to-day, if ever there were? We shall see more presently about modern notions of matter and force, but may take it that Haeckel, in proper scientific spirit, attaches as much importance to force as to matter, and does *not* make any absurd attempt to derive force from matter.[1] Further, he identifies "soul" or "spirit" with force. Mr. Williams says this is a polite way of denying its existence, and Mr. Pope would say it is an assumption. It is neither one nor the other, but a most serious and characteristic conclusion of Haeckel's researches. I am now stating his position, not the grounds for it (which will come in due time). He concludes that the thinking and willing force in man—what we call his mind or spirit—is identical with the force that reveals itself in light and heat. In other words, he is forced to think that spirit and energy are one and the same thing, and so he uses the names indiscriminately. But he is further convinced, on grounds we shall see presently, that matter and spirit (or

[1] See sketches of their lives in *Last Words on Materialism*.

[1] Yet even the writer of the article on Metaphysics in the 10th edition of the *Encyclopædia Britannica*, who devotes two columns to the *Riddle*, joins in this general misrepresentation.

force) are not two distinct entities or natures, but two forms or two aspects of one single reality, which he calls the fundamental substance. This one entity with the two attributes, this matter-force substance, is the sole reality that exists—to use a Greek word, the *monon*—the one nature that presents itself to our contemplation in the infinitely varied panorama of the universe.

This position is logically, as I said, the culmination of Haeckel's system. For the convenience of this brief description I take it as the starting point of that network of explanations, theories, and hypotheses which constitutes the monistic philosophy. There is a most important school of philosophers who will challenge even the existence of this matter-force substance, as we shall see presently, but for the vast majority of men of science, as well as of ordinary folk, this matter-force element is the one obvious reality. In this Haeckel's critics are at one with him. It is when Haeckel goes on to say it is the *sole—mon-on*—reality that the conflict begins. The view which Haeckel opposes is that there is another element in existence, totally distinct from this matter-force reality: that the mind of man cannot be an evolution from the matter-force substance, and that this substance itself could not have evolved into the orderly universe about us except under the guidance of a still higher intelligent principle, God. Now, it would be quite legitimate to say that we are as yet so imperfectly acquainted with this matter-force reality that it is premature to say what it can or cannot do. That is the Agnostic position, rejecting alike the dualist theory of Mr. Ballard and the monistic explanations of Dr. Haeckel.[1] But monism is more ambitious. Science has now amassed enormous quantities of facts concerning every part and aspect of the universe. The monist believes we can already, with this material, sketch in broad outline, at least, the upward growth of the great world-substance until it is transfigured in the beauty of the living organism, and becomes self-conscious in the mind of man. Everybody admits to-day, says Mr. Mallock, that the inorganic world is "an absolute monism." The monist proceeds to bring the realms of life and consciousness into this matter-force unity, and to show that we are not warranted in claiming that its growth needs a designer or a controller. He will go on until he has embraced the whole life of humanity, science, art, religion, and ethics, in his single formula.

Do not misunderstand me to the extent of supposing, as so many strangely do, that the monist is bound to have a theory ready for every phenomenon under heaven. We find even the ablest of Haeckel's critics claiming that monism breaks down here, or fails to explain there, and then with a chant of praise fluttering the banner of dualism in the breach. Such a course is absurd. If the monistic theory fails anywhere, the next attitude that logic enforces is agnosticism, or reserve of judgment. If Haeckel's theory of the origin of life, or of heredity, or of consciousness, or of morality, or of Christ, will not stand the strain of rational examination, this does not impair the general system of monism. The heart of the system is (1) the affirmation that a great matter-force substance (or nature) is unrolling its potentialities in the universe about us (which no one denies), and (2) that we have no rational evidence that there exists any other substance (or super-nature). To say that Haeckel is bound to explain everything or die, is a grotesque assumption. He has plainly disavowed so foolish an ambition. It may be that before the last red rays of our dying sun fall upon the eyes of the last of our race, some millions of years hence, the mon-

[1] But I must repeat—so persistent is the misrepresentation—that this agnostic position is as antagonistic to Christianity as monism is. Its quarrel with what it calls the premature theories of the monist is a purely scientific or philosophical matter, and is totally unconnected with religion.

istic philosophy will be complete. That is the "infinitely remote goal" he spoke of. But, as I said, science has already accumulated so vast a library of knowledge that we may venture even now to draw the outline of an extensive view of the universe in the monistic sense. That is what Dr. Haeckel does in the *Riddle of the Universe*. He has spent half a century in seeking truth. He has fought side by side with the finest scientific thinkers of the last century in overcoming an historic resistance on the part of the Churches. No one who is not convinced that humanity has already, at the very beginning of its higher life, reached the final truth, will be diverted by the sneers and gibes of heated partisans from a patient study of his conclusions. No one who believes that truth is a sacred possession, and the first condition of lasting progress—no one who feels that dignity and sincerity are the first qualities required in its pursuit—will allow himself to be turned from the true and vital issues by a petty and frivolous criticism of irrelevant details.

The plan I have adopted is to state first the almost undisputed unity of the inorganic world, then proceed to consider its evolution, and pursue the process of development through the successive stages of life, consciousness, and reason. But I have already said that an important group of philosophers challenge our right even to the inorganic world as a base of operations. Age after age philosophy has rung the changes on the familiar bells—materialism, idealism, spiritualism, realism. To-day the system in favour in the schools is idealism. According to the idealists the naïve belief of the average man that he lives in a material universe, which lay here in space before humanity began to furrow its soil, and will lie there still when the last man has dropped into his eternal tomb, is a delusion. The arch-sophist, Berkeley, comes along, and explains that the orange he thinks he is vulgarly injecting into a material cavity he calls a stomach, is only a bundle of sense-impressions which he quite gratuitously supposes to be caused by a material object, and his stomach is a fiction. So with the whole of material life. It is a kinematoscopic display in the mind—not, as far as we know, taken from life. Berkeley opined that God was the operator of the instrument. Idealists generally have dispensed with the operator now. The show unwinds itself by some occult law of the mind. In either case "this too, too solid flesh" *does* melt, and thaw into something thinner than "an everlasting dew." Matter is a mental construction, force is the same, the world they make up cannot be otherwise. There is, of course, the agnostic position, that we do not know whether this kinematoscopic panorama is a photograph, or a diagram, of a real world, or no. But all idealists, and they are the vast majority in philosophy to-day, sternly insist that the matter and force which the scientist manipulates are mental counters; that he is dealing with *his idea* of matter and force, whether or no an eternal reality corresponds to these. Hence it is that so many cultivated reviewers set aside Haeckel's system with polite disdain. His realism—his habit of talking of matter and force as familiar objective realities—is too naïve.

Now this philosophy so obviously cuts out the root of Haeckel's system that some of his clerical critics have put on superior airs and borrowed phrases from it. If the very existence of matter and force is doubtful, clearly monism is in a parlous state. They forget one thing. If idealism excludes, or throws doubt on, the objective reality of matter, it in the same proportion destroys the Christian position. What is the meaning of the Incarnation, or the death of Christ, or the whole historic foundation of Christianity, if the material world and its history are subjective? Dr. Iverach sees this very well, and warns his impetuous colleagues. "In truth," he says, "we must arrive at a conception which leaves room for real individuality; that will

recognise the uniqueness of every person, and yet place every person in relation to every other person and thing that is, has been, or will be. It must allow reality to history, and permit a real progress and real events in it. It must recognise human activity as a factor in the world's history, and recognise somehow that good and evil, happiness and misery, righteousness and sin, are not appearance, but stern realities, which philosophy and theology must deal with."[1] There are, of course, important divines amongst the idealists, such as Dr. Caird, but they are neither consistent nor likely ever to be literally adopted. The Catholic Church is intensely realistic. Its philosophers, Dr. Ward, Dr. Mivart, Father Maher, Father Clark, etc., have never yielded a step to the reigning fashion of idealism. In a word, the defenders of religion whom Haeckel opposes are as "naïve realists" as he is. It is only the more short-sighted who meddle with the edged tools of the modern metaphysician.

But the philosophers themselves, the aristocracy of the intellectual world! Are we to go on with our construction in total disregard of their protest? I believe Haeckel is quite right in doing so. As Mr. Mallock says, these idealist dreams are not "the mere raving which at first sight they seem to be." On the other hand, the common fashion idealists have of saying that the man who refuses to take them seriously must be altogether ignorant of their philosophy—a species of arrogance peculiar to idealists and Roman Catholics—is absurd. Few cultivated men are ignorant of their arguments. But the average man of science, the average historian, and the average man of affairs, sweep away their theory as, in the words of Mr. Mallock, "a fantastic, though ingenious and learned, dream.[2] "If philosophers," he says again, "instead of confining themselves to the solemn altitudes of existence . . . would condescend to take their examples from the common events of life, they would avoid many of the mistakes which expose them to the just ridicule of the vulgar." The historian is hardly likely to admit that the stupendous drama he is engaged in reconstructing is not the real play of living passion. The astronomer is not prepared to see in the vast expanse of the heavens only the unreal mirage of his ideas. The physicist contemptuously repudiates the idealist's interpretation of his matter and force. The question is raised, said Sir A. Rücker, in his presidential address to the British Association in 1901, "whether our basic conceptions are to be regarded as accurate descriptions of the constitution of the universe around us, or merely convenient fictions," and he gave an emphatic adhesion to the former. His speech ended with a claim that ether and the atom are not mere mental fictions, not mere "working hypotheses," but "objective realities." His successor in the presidency, Professor Dewar, no less strongly repudiated "the ancient mystifications by which a certain school shatter the objective reality of matter and energy." Indeed, signs are not wanting of a coming change amongst the metaphysicians themselves. The immense difficulty of explaining how we can perceive an external world is familiar enough to every thinking man. But philosophy must try again. The material world is more convincing than all their difficulties. The article on "Metaphysics," by Professor Case, in the latest edition of our greatest Encyclopædia is one long warning that the reign, or the nightmare, of idealism is over, and that we shall shortly return through "the anarchy of modern metaphysics" (as he says), to a normal belief in the reality of a material world, the reality of war and disease and poverty and ignorance, and the rationality and validity of social enthusiasm and scientific investigation.

With Professor Haeckel, then, we pass

[1] *Theism in the Light of Present Science and Philosophy*, p. 305.

[2] *Religion as a Credible Doctrine*, p. 202. Mr. Mallock gives an admirable summary of the system, as presented by its latest and ablest expositor, Professor James Ward.

by our perplexed metaphysicians, and smile at their supercilious comments. We turn to the spreading panorama of inorganic nature as the first embodiment of the monistic substance.[1] There should be no criticism for us to meet here, but the eagerness to deny and to discredit and to score a point—as if we were conducting a mimic Parliament in some dull provincial town, instead of being sober searchers for truth—has been so feverish that we shall find it breaking out into all kinds of frivolous criticisms.

When you look up at night into the heavens you see some three or four thousand stars scattered through space. Each is an incandescent sphere, rarely less than three million miles in circumference, and usually separated from its fellows by billions of miles of space. It would take some 175,000 years to count the distance in miles to the nearest of them. Some of them can be proved to be at least 1,500,000,000,000,000 miles away. With the use of a good telescope the number of these world-masses runs up to more than a hundred millions. Yet even then we seem to be only at the fringe of the question of the magnitude of our universe. When a telescope containing a highly sensitive photographic plate is directed to what seem to be dark and empty parts of space, and is kept in that position for eight or ten hours, the plate is found to bear the faint imprint of a fresh myriad of worlds. They are so far distant that, though they are 150 times more luminous than lime-light, and though the waves of light they send us have been falling on the plate—a plate that would take a picture in the merest fraction of a second in day-time—at the rate of 700,000,000,000,000 per second, many of them fail to make the least impression after six or eight hours' exposure. We have no ground for supposing our most powerful instruments bring us to anything like a limit to the universe.

Is the universe infinite? Dr. Haeckel speaks of it as infinite and eternal, and this is just one of those typical cases where the monist outruns the agnostic. The criticisms which have been passed on the phrase "infinite" (we shall speak of eternity later), as applied to the material universe, are not very discerning. There are critics who imagine that Haeckel must advance no statement for which he cannot furnish empirical proof; whereas he has told us from the first page that, as a sensible thinker, he employs his faculty of speculation (taking care that it starts from facts) as well as his power of observation. Then there are critics who insist on thinking—it is very convenient for their purpose—that he lays the same stress on every line of his system, and so cry "dogmatism" wherever the evidence is slender. We must approach the subject more reasonably. The question is, does the evidence of astronomy point in the direction of limits or of illimitableness? Philosophy has nothing to say against the infinity of the cosmos. "We have no evidence," says Dr. Ward, "of definite space and time limits; quite the contrary. . . . we certainly cannot prove that the universe as a whole is measurable and therefore finite. And when we pass to more purely *a priori* considerations, the case against a universe with fixed and finite limits is equally strong."[1] The idea of a limit is in fact unthinkable, and the evidence of astronomy is far from suggesting it. "Is the universe infinite? Who can say?" asks Dr. Dallinger. He refers to the fairly definite scheme of

[1] A certain school would have us admit that, because our conviction of the reality of the external world is incapable of demonstrative support, we should grant the same privilege to the belief in God. There is no analogy whatever. We cannot get away from our belief in the real world. The idealists themselves assume it in their arguments—as when they take the physicist's analysis of sound or light, to throw doubt on our hearing or sight. There is not a particle of this irresistibility about the idea of God. We can trace its roots and reject it without the slightest inconsistency.

[1] *Naturalism and Agnosticism*, vol. i. p. 195. Dr. Ward does not, of course, say the cosmos *is* infinite.

our milky way, but says "it may be but a complex particle in a universe of universes, stretching on for ever and ever over the bourneless immensity of the unknown."[1] Briefly, what evidence we have is totally against the idea of a limit, and that idea is so unimaginable that it would never have been suggested but for theological considerations. Dr. Haeckel prefers to rely on the scientific indications. I reserve for a separate chapter the discussion of Prof. Wallace's curious views on the subject.

The next step that science takes is to establish the unity of this immeasurable universe. There is no question to-day about the identity of the matter which composes these innumerable and widely distant worlds. The spectroscope is a more delicate analyst than the apparatus of the chemist. It has detected poison and convicted criminals where chemistry has been mute. And the spectroscope will tell us the chemical constituents of Arcturus, 1,500,000,000,000,000 miles away, as confidently as it will analyse the matter in the laboratory. It needs for its operation only a ray of light from the matter in question. We have thus learned that the material of the stars is the same as that of our earth. We may find different elements here and there; we may find matter in states we cannot detect or produce on earth. But the ancient idea that the heavens were made of a superior substance is totally discredited. From end to end of the known universe matter is one. It is also established that a more subtle form of matter, called ether, fills the interstellar spaces and penetrates into the very heart of the most solid substances. Even the apparently rigid particles of a block of iron are really swimming in miniature oceans of ether.

But this is not unity, it is a wonderful variety, some of the critics exclaim; you give us ether on the one hand and some seventy-four different kinds of ponderable matter on the other. The latter part of the objection is not now seriously urged. For years the indications in chemistry pointed towards a real unity of the chemical elements, and to-day no one has any doubt whatever that they are all multiples of some simpler form of atom. The unity of oxygen, hydrogen, iron, gold, and so on, is completely accepted. Astronomers have observed in some of the stars matter which seems to be actually in a transition stage; and physics, which has made gigantic strides of late, seems to have detected the same phenomenon in its laboratories, as Sir O. Lodge points out in his brilliant Romanes Lecture for 1903. The elements have been built up by evolution from some simpler and homogeneous substance. That is the belief of all physicists and chemists, and it is based on a mass of facts. Mr. Ballard thinks it useful, or wise, to raise the dust even here. He says (third article—not the one in which he charges Haeckel with dogmatism) that Haeckel frankly confesses—as he does—his lack of expert knowledge of physics, and adds that these "ultimate questions of molecular physics of necessity determine our conceptions of the constitution of matter, and so are fundamental to the whole of his monistic theory." This is mere dust-throwing. The *unity of matter* is a necessary part of the monistic theory, but this is given in the commonest and the finest manuals of physics as an established and accepted truth; *how* the various elements arose from one form of matter is a subject of merely speculative interest to Dr. Haeckel, and is not yet settled. But Mr. Ballard plunges deeper, and says Haeckel's confession of weakness in physics "does not prevent his recommending 'the brilliant pyknotic theory' of J. C. Vogt to the acceptance of every biologist." Then he begs the

[1] *The Creator*, p. 14. Strange to say, Dr. Dallinger immediately continues: "If that be so, we can make no useful inference from our *finite* universe": and shortly after actually infers that the world was created on the ground that it is "finite"! "What is finite begins to be, must have been caused to be" (p. 14). If Haeckel had proceeded in this slovenly fashion, what an outcry there would have been.

reader to study the stale criticisms of Mr. Stallo "before accepting the Vogt-Haeckel theory as final," and later says Haeckel "decides that the conception which best suits his purpose is the one to be generally received." He then reads a lesson on the impropriety of misleading people, and, finally, after a bewilderingly tortuous run, appeals to the expert physicists Stewart and Tait and Lord Kelvin to prove—quite irrelevantly—that there is a Supreme Being. The whole passage is too ludicrous to analyse in detail, but I must point out two things. Firstly, Mr. Ballard has no more doubt than I have of the unity of matter, which is the only serious point in question; Haeckel can fit into his system any theory of the evolution of matter that physicists decide to adopt. Secondly, Mr. Ballard quite misrepresents Haeckel's attitude towards the "pyknotic theory." He does not say "it is the one to be generally received," but says (p. 78) he "thinks it will prove more acceptable to every biologist who believes in the unity of nature" than the other theory. The foolishness of the whole episode is seen when one reflects that this somewhat old (1891) theory of Vogt's is infinitely nearer to the theories which are being discussed to-day than the "kinetic" theory which he dislikes.

The unity of all ponderable matter is, then, an accepted doctrine, but we meet fresh difficulties when we turn to ask if there is a unity of ponderable and imponderable matter (or ether). Here, indeed, we meet a critic of a friendly disposition whom it is courteous to hear. A writer in the *Reformer* says, "it will be news to most of us that the ether is the original and fundamental matter, since it is in its properties, so far as known, pretty nearly the antithesis of all we understand by material"; and he describes ether as "a material substance which has none of the properties of matter, and has most of those usually associated with spirit." Whether ether has the properties of spirit or no depends on what we mean by spirit. Theologians mean nothing like ether, but spiritists (who seem to be generally materialists unconsciously) frequently do. In any case both Sir O. Lodge and Sir A. Rücker meet the objection for us. Sir O. Lodge, in his Romanes Lecture (1903), says some physicists admit two kinds of inertia, and he himself boldly advocates the unity of electricity and ponderable matter. "An electric charge," he says (p. 4), "possesses the most fundamental and characteristic properties of matter, viz., mass or inertia." Sir A. Rücker, in his presidential speech (1901), sweeps the objection away as unphilosophical. "We cannot," he says, "explain things by the things themselves. If it be true that the properties of matter are the product of an underlying machinery, that machinery cannot itself have the properties which it produces, and must, to that extent at all events, differ from matter in bulk as it is directly presented to the senses."[1] The affinity of ether and ponderable matter is not questioned in science, whatever the actual *degree* of affinity may prove to be. And the proof is advancing rapidly. I have said that the astro-physicist finds a transitional matter in the heavenly bodies, and now the terrestrial physicist announces[2] that in his experiments with the new element, radium, he witnesses the actual break-down of the ponderable atom into a form of matter he associates with electricity. In fact, every modern theory

[1] These principles also dispose of the critic in *Light* who finds Haeckel "very uneasy" at having to fit ether into his scheme, and thinks his "annexing" it is "desperate work at this hour of the day." Seeing that the whole trend of physics has been ever since in the direction which Haeckel follows, I should say the *criticism* is "desperate work." *Light* thinks ether is "ending the old materialism" and making for spiritist monism. As I said, it depends what you mean by spirit. Religious philosophy has always meant "unextended substance." Ether is just as quantitative as the most ponderable of the elements.

[2] See Sir O. Lodge's Romanes Lecture, 1903, and the discussion at the recent British Association meeting.

of the atom implies its origin from ether, or their common origin.

Haeckel is, therefore, fully justified in taking from physics and chemistry his thesis of the unity of matter. No man of science disputes it, and it is a purely scientific question. With regard to the unity of force, there is even less difficulty. It is now notorious that the forces of the universe are interchangeable, and are regarded in physics as so many varieties (chiefly differentiated by wave-movements of different lengths) of one fundamental energy. I am not, of course, including here the disputed "vital force" and the human soul, which later chapters will discuss. But the unity of the forces with which the physical sciences deal is beyond dispute. We have thus so far simplified the visible universe as to detect beneath its kaleidoscopic variety the operation of one form of force and one form of matter from end to end of the universe. The next and final step as far as the unity of the material universe is concerned is to bring together this matter and force themselves.

Dr. Haeckel has done this by saying that matter and force (or spirit) are "the two fundamental attributes, or principal properties, of the all-embracing divine essence of the world, the universal substance." He further admits that "the innermost character" of this substance is still totally unexplored; and in the end seems to question its existence altogether (p. 134). Here, of course, the critics are active. In the first place let us examine the alleged arbitrariness of this conjunction of matter and force. It is a perfectly sound scientific and philosophic procedure. We not only know no form of matter without force, but we cannot imagine it. It could not act on our organs of perception. On the other hand, we know no force apart from matter (or ether). Force seems to be always embodied or substantiated in matter. Each is an incomplete reality; or, rather, they are two sides, or two different manifestations, of one reality. That is in full accord with scientific teaching. But what does Haeckel mean by making this reality, or substance, of which they are the manifestations, the central mystery of life at one moment, and doubting its very existence the next? A patient examination of what Haeckel says, and a little less eagerness to score rhetorical points, would have enabled Mr. Rhondda Williams and other critics to see what he meant. He warned them that the *Riddle* is a sort of "sketch-book," and they might have expected a lack of complete harmony of expression. Haeckel says (p. 134): "We must even grant that this essence of substance [more correctly, the essence of this substance] becomes more mysterious and enigmatic the deeper we penetrate into the knowledge of its attributes, matter and energy, and the more thoroughly we study its countless phenomenal forms and their evolution. We do not know the 'thing in itself' that lies behind these knowable phenomena. But why trouble about this enigmatic 'thing in itself' when we have no means of investigating it, when we do not even clearly know whether it exists or no?" The Greeks long ago started the notion that the properties or attributes of a thing were really distinct from its substance. The mediæval philosophers made them as distinct as the skin is from a potato, and so it became a general custom to speak of the essence or substance of a thing as being hidden within or underneath a shell of properties. The senses stopped short at the shell, but the intellect somehow penetrated to the kernel. Kant's critical philosophy destroyed this supposed privilege of the intellect, but substituted for the substance-and-properties idea the equally false and arbitrary notion of phenomena (qualities or attributes that reach the senses) and noumena (or "things-in-themselves," which would be food for the intellect, if it could reach them). In both cases there is the veil of phenomena, or properties (colour, sound, shape, etc.), and the veiled and inaccessible substance, or essence, or noumenon. Now, many

of us deny to-day that there is any solid ground for the distinction at all, and that is what Haeckel means. You say, he argues, that matter and force are only phenomena, and that there is an underlying "thing-in-itself." If there is, he says, it is as mysterious as ever; but I see no good reason at all for thinking that matter and force *are* a screen or veil hiding something else. They *are* the one eternal substance or reality. It is a pure fallacy to say that in ordinary experience we are dealing with a shell of properties or phenomena, and not with the realities themselves. Therefore—logic sternly enjoining us never to multiply entities without necessity—I take it that matter and force are the world-substance breaking upon our perception in two different ways.[1]

To illustrate the point further, and to meet a further class of critics, let us hear what science says about these properties or phenomena of things. Let us take the familiar ones, sound and colour. Are you unaware, we are severely asked, that science has shown these to be totally subjective? Yes, I am quite unaware; though I know perfectly well what science has done. I am writing over a green table-cloth. Science tells me that this really means that the material covering my table is of such a molecular texture that it absorbs a number of the waves of sun-light which fall upon it, and only reflects the blue and yellow waves. These it sends to my retina at the rate of some hundred billion per second: they cause a peculiar movement in my optic nerve, and finally in my brain, and—I see green. So, as I write, the clock strikes twelve. That is to say, the metal molecules of the bell are thrown into a violent oscillation; they cause waves in the surrounding atmosphere; and the intricate mechanism of the ear turns these into a modification of my auscultory nerve and brain. And all this elaborate description of objective movements and objective agencies is supposed to have made colour and sound "subjective!" In point of fact, it has done away with the old shell of properties (though it is a question how far people ever did say their sensations of colour and sound were objective) and brought us into direct touch with realities. And as all the unnumbered objects about us constitute, fundamentally, *one* matter and *one* force, we are face to face with the one fundamental reality. We do not "know all about it." That is the grossest perversion of Haeckel's words. To borrow the fine metaphor of Sir A. Rücker, we see it in a light that is still dim, but we *see it*. It is for the future to complete the outline and fill in the detail, as the light grows.[1]

Thus we have given in terms of science the world substance, the matter-force reality, which is the constructive starting point of Monism. The rest of our work consists in eliminating the additional substances or forces which theists, spiritualists, or supernaturalists would compel us to add to it. It only remains here to say a word of what Haeckel calls the fundamental "law of substance." And first as to Haeckel's idea of a "law." A fair-minded reviewer in the *Inquirer* (March 9, 1901) says: "The distinguished author seems to have failed to see that to imagine a *law* as an *active power* is every whit as 'anthropomorphic' as to imagine a God of manlike form as feeling." A writer in *Knowledge* (January 30, 1901)—from whom the *Inquirer* probably borrowed—

[1] And that is not only the literal, but the only rational, meaning of "phenomenon." Prof. Haeckel readily endorses my explanation of his position.

[1] From these principles the reader can answer for himself the often-heard criticism: You build up the universe by matter and force, but what do you really know about matter and force themselves? The answer is: Go to a good library, and ask for a few recent manuals of astronomy, geology, chemistry, physics, and physiology. If they do not deal with matter and force, they deal with fictions. The fallacy of the criticism is, of course, that science deals with this impostorly shell of "phenomena," and does not reach the "essence" or the "underlying reality."

puts it as strongly: "To scientific minds who regard laws of nature as merely conceptual formulæ summing up certain sequences of experience, it may seem that to replace a deliberate architect and ruler of the world by 'the eternal iron laws of nature' is to be guilty of an anthropomorphism precisely analogous to those on which the illustrious author pours contempt," and he says, "evolution travels through the book like a creator in disguise." It would be rather curious if one of the ablest living scientists did not know what science means by "a law." I say science, because there is here no discrepancy of views. That "law" only means "a summing-up of experience," a uniform mode of action of this or that force, is a platitude of natural science. Said Professor Dewar in his Presidential Speech: "When the scientist speaks of 'a law of nature' he simply indicates a sequence of events, which, so far as his experience goes, is invariable, and which therefore enables him to predict." But the "law," or mode of operation, of an agency is so closely connected in our minds with the agency itself that we frequently substitute the one for the other. It is strange to hear that this deceives any one.[1] When a scientist speaks of the *law* of gravitation, or the *law* of evolution, producing or compelling certain results, he invariably means the *force* of gravitation or the agencies of evolution.

We come, finally, to what Mr. Ballard strangely calls Haeckel's "irrational law of substance." The law of substance is one of the most undoubted truths of modern science. It is merely the union in one sentence of two of the proudest results of modern physics, the indestructibility of matter and the conservation of energy—which are, said the *Manchester Guardian* critic, "precisely the oldest of all man's discoveries in the cosmological field." No particle of matter is ever annihilated or created; that is the first axiom. Recent experiments have actually seen the breakdown of what has been called the "atom," and have seen particles chipped off it; but only another form of matter is produced. The observations have been so broad that physicists have felt justified in concluding that indestructibility or permanence is a property of matter. The same has been experimentally demonstrated of force.[1] Both are constant in quantity, though ever-changing in form and distribution. Since we have seen reason for associating matter and force so closely, it is necessary to combine the two axioms likewise. The great fundamental reality is constant or permanent amidst all its qualitative changes. That is the first and firmest law or feature of the monistic substance.

We have now seen that Professor Haeckel is in full accord with the latest scientific teaching in his doctrine of the unity of the visible world. We have seen (1) that matter and force are realities; (2) that there is at bottom one supreme form of each; (3) that there is no reason for holding them to be distinct realities, and so we unite them as aspects of one substance or reality; and (4) that this substance is, as far as extended observation goes, constant and indestructible in its quantity. We may now proceed to consider the evolution of this matter-force reality into the infinite complexity of the visible universe.

[1] Does any one quarrel with us for saying that "the law" compels us to pay taxes, and so forth?

[1] As to the difficulty alleged to rise from radio-action, Sir O. Lodge says there was "never any ground" for concern about the theory.

CHAPTER III

THE EVOLUTION OF THE INORGANIC WORLD

WHERE shall we begin in a description of the growth of the universe? Can we go back to a stage beyond which the imagination cannot penetrate with its ceaseless questioning? It is impossible for us to hope ever to do this. Wherever we start in our construction, we shall start with positive building material, and the imagination, if not reason, will ask endless questions about its previous history. All that we can do is to set out from a definite and recognised point, the nebula from which our particular solar system has been formed. From this, once we have traced the broad lines of the evolution of our sun and planets, we may, in the light of the discoveries and speculations of modern science, look back into the appalling abysses of past time and out over the boundless panorama of the universe.

With what is known as the nebular hypothesis we need not linger. Haeckel has sketched the outline of the theory, and there is no relevant criticism of it. "There is no doubt," says Dr. Iverach, "that some form of the nebular theory is true."[1] There are clerical writers who seem to think it profitable in some obscure way to point out defects in the theory, or to prove that the evidence for it is not overwhelming. What they gain by such efforts is not clear. The question has long since passed beyond the sphere of theology. Catholic astronomers like Miss Agnes Clerke accept it as eagerly as atheists. No man of science entertains the smallest doubt to-day that it correctly describes in outline the formation of our solar system. Once upon a time—it may have been fifty million years ago, as Dr. Iverach says, or it may have been one hundred or more, as others think—the part of space we occupy was filled with a cloud (not necessarily a "fire-mist") of infinitely attenuated matter. By the action of its inherent and natural forces this nebular matter entered upon a process of condensation and disruption. Portions of it—whether or no they were cast off in the form of rings, which broke into irregular masses—condensed into the several planets of our system, and were set in revolution round the central mass. This central mass, the sun, is still condensing and pouring out the heat which its compression causes. The smaller masses, such as the earth, cooled in time and formed a solid crust at their surface. This outline is accepted by all educated people to-day. Quibbles about the details of the process are best left to expert astronomers to deal with.

Our solar system is as a single snowflake in a shower, but we have already seen that it in every verifiable way resembles its fellow flakes. It is of the same stuff as they, and is ruled by the same laws or forces. We have undeniable ground to extend our nebular theory to other worlds than ours, and take it as the key to the formation of all the stars that fill the immeasurable heavens. Indeed, we find worlds in every stage of development, as required by the theory, when we sweep the sky at night. We find nebulæ stretching sometimes over billions of miles (as the nebula in Orion), and patches cut out of them, as it were, to form stars. We find clusters of thousands of stars (as the Pleiades) with the remnants still clinging to them of the gigantic nebula they were developed from. We find nebulæ and stars illustrating almost

[1] *Theism in the Light of Present Science and Philosophy*, p. 35.

every step of the process. We find dark stars, extinct suns, which point to the complete accomplishment of such a process. Astronomers are of late years disposed to think the number of these extinct suns is enormous. Moreover, at times a new star flames out in the sky, announcing the recommencement somewhere of the familiar drama of world-formation.

In a word, the evidence of astronomy forbids us to look upon the evolution of the material universe as a continuous process in a straight line of which we might picture a definite beginning and for which we might anticipate a definite end. The life-force of the great substance only dies down in one corner of space to be relit in another. The dark stars which indubitably have run their million-year long course are only waiting to be reanimated by collision or some other cosmic accident. The nebulæ are embryonic worlds before our own eyes. The blue-white stars are in the prime of life. The red stars (with certain peculiarities) are slowly dying, but may rise again any day from their tombs. Science, as Dr. Mivart said in *Truth*, "points to no beginning." Nor does it help us to approach the subject from another point of view. We have not only the evolution of cosmic masses to explain, but the evolution of the chemical elements themselves, or of ponderable matter, from the finer medium from which all physicists believe it has been developed. If we had any scientific evidence which justified us in going back to a stage when ether (or whatever the "prothyl" may turn out to be) alone existed; and could then show how atoms of ponderable matter arose by condensation of it, or by the formation of vortices in it; and could see these atoms being grouped into the complex atoms of oxygen, gold, sulphur, &c.; and could further trace their aggregation into meteorites, and the meteorites into nebulæ, and the nebulæ into solar systems—even then we should in reality be no nearer the beginning. The "prothyl" (or "first matter," a name which does very well to designate the much-sought elementary substance) might very well be only the last term of a previous universe-drama. The cyclic process may have gone on for ever as far as science can tell. But in point of fact the universe does not as yet give indications of any such continuous process. The universe is developed piecemeal, star by star. The hundred millions that we see shining to-day are by no means "the universe."

We have here a drama of life and death on an almost inconceivable scale, but the point I want to bring out is that even the most daring speculations of science bring us no nearer to a beginning than we are to-day. Dr. Haeckel has been roundly abused for speaking of the universe as eternal. I think it is quite clear that, if we confine ourselves to *scientific* considerations, he is using a very proper kind of language. Here is a matter-force reality which is constant and indestructible in its ultimate quantity; and though we can go back millions of years on solid evidence, and billions of years on fair speculation, we find no more suggestion of a limit in time than we did in regard to space. Certainly, the greatest number of billions of years we could imagine would not be nearer to eternity than a day is. I merely say that if any one suggests a limit in time for the cosmic process he will not find the shadow of a justification in science. Critics seem at times to employ a curious logic in dealing with this question. "Finiteness" and "infinity" are words with a strong odour of metaphysics about them. Let us take it that it is a question simply whether the universe had a beginning. Now, some critics naïvely assume that it is our place to prove that the universe, or matter, or force, or motion, never had a beginning. That is a novel kind of logic. Here is the universe given, and if any one makes the very pregnant and formidable assertion that there was a time when it did not

exist, and that it came into existence out of nothing, he must have a very positive and firm ground for his assertion. As far as scientific experience of matter and force (or motion) goes, they are not entities that slip in and out of existence, but are constant. Yet we have Mr. Rhondda Williams talking of "the mystery of the primitive push" as having always been the great difficulty of mechanism. He tries at first to make a scientific difficulty of it: "Galileo, the founder of physical science, laid it down as the first principle of dynamics, that every movement of matter could only be explained by another movement of matter, and that has been a recognised principle of science ever since."[1] Well, that looks like a very strong confirmation of Haeckel's thesis that matter and motion must be eternal. But Mr. Williams goes on: "The difficulty was to explain how matter began to move, what caused the first movement, what gave the primitive push?" But science, we have seen, knows nothing whatever about any "primitive push." It is a purely gratuitous assumption. Dr. Horton might refer us to "the matchless revelation of Genesis," and we might suggest that the Babylonian astronomers of 6,000 years ago are not very safe guides. Mr. Williams is content to assume the fact of this "primitive push" without saying why he thinks there was one. More than that, he is greatly excited because Haeckel declines to attempt to explain it until some good reason has been shown for thinking there ever was such a thing. He tell his admiring audience that Haeckel says "the origin of movement is no difficulty because it never did originate, he explains by simply denying! What evidence does he adduce? Absolutely none." Dr. Haeckel, one would think, can hardly be expected to spend time in finding scientific proofs for the first chapter of Genesis. His position is negative. Eternity is a negative concept. We do not prove negations in logic, or in real life. Mr. Williams further says he has no objection to Haeckel holding this "as a belief," but he "does object to his contention that this type of monism is based upon empirical investigation." This is an unfortunate confusion. The essence of Haeckel's position is negative. But he goes beyond the agnostic chiefly on the ground of (1) the astronomical evidence, and (2) the constancy of matter; and those constitute empirical evidence. But to take them as more than suggestions, and to ask empirical proof that the world is eternal is rather funny. Finally, Mr. Williams says Haeckel is equally unsatisfactory about the origin of consciousness. This just illustrates Mr. Williams's essential confusion. We *know* that consciousness had a beginning, so there is no analogy; and in point of fact Haeckel, as we shall see, devotes whole chapters to the origin of consciousness.

Now this is a fair illustration of the dreadful confusion which rules in the minds of the people who put on very superior airs about Haeckel's "dogmatic" affirmation that the universe is infinite and eternal. They almost always assume, often in sweet unconsciousness, this most important thesis that there was a time when matter or motion was not. It is one of the largest assertions that was ever made on the poorest of sophisms. The scientific evidence, such as it is, favours Haeckel's negative attitude.[1] Philosophy is equally mute.

[1] *Does Science Destroy Religion?* (p. 13).

[1] It is true that Mr. Mallock thinks one might plausibly infer from what is called the *entropy* of the universe that it had a beginning. This is the only case where Mr. Mallock allows that scientific evidence even seems to help theism. But we shall soon see that the theory of entropy is totally unable to bear the strain of such an inference. Sir J. W. Dawson, one of the scientists Mr. Ballard raises from the dead to answer the *Riddle*, says science does not regard the universe as eternal "because, when we interrogate it as to the particular things known to constitute the heavens and the earth, it appears that we can trace all of them to beginnings at more or less definite points of past time." Even at the time this was written it was false in fact and unsound in logic.

The Greeks held that matter was eternal. "It is not more difficult," says Mr. Mallock, "to suppose an eternal, self-existing and self-energising substance than it is to suppose an eternal and self-energising God." But Christian scholars have, in the interest of dogma, tried to prove that the universe must have had a beginning. We have seen how Dr. Dallinger skipped from "bourneless immensity" to "finiteness," and concluded that "what is finite begins to be." The last link of his curious chain is hardly better than the others. Dr. Iverach suggests the argument, but abandons it (Ch. I., *Christianity and Evolution*). Dr. W. N. Clarke says: "The things that we behold, mutable though magnificent, bear the marks, not of original, but of dependent existence. Somehow existence has been caused."[1] Such an argument could only be elaborated with the aid of a mediæval metaphysic which we do not take to-day as a measure of things. Dr. Clarke, indeed, retreats to the position that even if it were eternal we should need a "character-giving Spirit" along with it; a point we shall discuss later.

To sum up: neither philosophy nor science points to a beginning of the scheme of things. In view of the constancy of matter and the inconceivability of a creation out of nothing, very strong evidence would have been required to make us accept this beginning. As it is, the only source of the assertion is the first line of Genesis and a concern for theistic evidence. Professor Haeckel has preferred to be guided by the suggestions or indications afforded by scientific evidence. "Science points to no beginning," as Mivart wrote. "We have no evidence of definite space and time limits; quite the contrary. . . . And when we pass to more purely *a priori* considerations, the case against a universe with fixed and finite limits is equally strong."[2] Every effort to assign a beginning fails. We should never have heard of it but for "the matchless revelation of Genesis."

Let us now turn to consider whether science has anything to say with regard to the end of the universe. As far as our solar system is concerned, the teaching of science is firm. Our sun can only sustain his terrible vitality by shrinking a certain number of feet every century. He is doomed, as far as astronomy can see, to die, like the dark stars that already lie in the vast cemetery of space. The air and water will disappear from the surface of our planet, and for a time the heat of the sun will beat upon the white tomb of all the hopes and all the achievements of humanity. The moon is the skeleton at our feast. Its yawning sepulchre points out the fate that awaits us.

> Thou too, oh earth—thine empires, lands, and seas—
> Least, with thy stars, of all the galaxies,
> Globed from the drift like these, like these thou too
> Shalt go. Thou art going, hour by hour, like these.[1]

Perhaps Jupiter and Saturn will even then teem with life, and their astronomers study nightly the scarred and silent face of the planet we enliven to-day.[2] But from planet to planet the hand of death will travel. Then one by one, astronomers believe, the planets will fall into the shrinking bosom of the sun and eke out its failing vitality. At last the blood-red sun will die out, and continue to speed through space at twelve miles a second, a dark, solid, silent, and gigantic sepulchre. Physicists talk of ten million years. It is an hour in eternity.

[1] *An Outline of Christian Theology*, p. 109.
[2] Prof. J. Ward, quoted previously.

[1] Mr. Mallock's *Lucretius*.
[2] When Prof. Lionel Beale says (*Vitality*, p. 4) that "the more recent discoveries as to the constitution of our sun and the planets as well as the fixed stars, render it most improbable that life exists in these or other orbs," one can only gasp with astonishment. There is no truth whatever in it; and the mere idea of people living in the stars—at a temperature of several thousand degrees—makes one uncomfortable.

For this is only a relative end. The whole hundred-million-year drama of our history will be, in our present cosmical perspective, only the subsidence of a tiny ripple on the bosom of an illimitable ocean. Millions of similar dramas had been played out before ours began; and when silence shall have fallen successively on the planets of our system, the great nebulæ that lie against the background of space will be but waking into existence. Moreover, the dark stars, and the new stars that appear at times in the heavens, point to an indefinite prolongation of the process. The colliding of two of these extinct suns—two globes of perhaps 800,000 miles diameter (like the dark companion of Algol)—would generate heat enough to reduce them to a nebulous mass, pouring out for millions, if not billions, of miles; and the force of gravitation would ensure a further condensation and world-formation. Actual collision is, indeed, not believed to be necessary; in cases an approach within a few million miles is believed to have led to a stellar conflagration. Moreover, there are stars so stupendous (take Arcturus, for instance), and moving at such inconceivable speed through the universe, that we can only look upon them as destructive anarchists. The universe, taken as a whole, has all the appearance and promise of "perpetual motion."

Recent writers have, however, appealed to the theory of entropy as a scientific indication of an end of the process. Briefly, all energy can be (and is daily) converted into heat, but heat is not all reconverted into electricity, &c. This seems to forecast a time when all the working energy of the universe will be dissipated, or lost in a generally diffused heat. Mr. Mallock has pointed out (though Lord Grimthorpe and others had done so years ago) that if this were true the universe cannot have been eternal. We should have reached the final stage long ago. Haeckel has described and rejected the theory. It only remains for me to show how the very latest pronouncements of science quite confirm his position. Physicists generally are by no means disposed to allow that, because in our laboratories a certain quantity of the heat-force cannot be reconverted, we may jump to a cosmic conclusion on the matter. Mr. Mallock admits that many physicists reject it altogether, "but since others equally eminent maintain that there is no escape from it—so far at least as our present knowledge extends—it is necessary to consider how it may bear on the point at issue." The parenthetic clause contains the essential weakness of the theory. It assumes an acquaintance with cosmic processes which science is very far from possessing. Sir O. Lodge deals with the point incidentally in his recent Romanes Lecture. "So long," he says, "as there is only a force of one sign at work it would seem that ultimately the regenerative process must come to an end. The repellent force exerted by light upon small particles, however, must not be forgotten; and there are other possibilities." These possibilities have been emphasised by the most recent discoveries in physics, in connection with radio-action, so that Haeckel was more than justified in declining to accept the hasty and unwarranted conclusions of the entropists.

Sir O. Lodge suggests an analogous theory with regard to matter—a kind of entropy of matter—but he suggests only to reject it. He and many distinguished physicists see in the phenomena of radium, which have so greatly agitated the world of physicists of late, an actual breakdown of the atom. Electrons (units of electricity) are detached from matter at an electrode, and it is believed that these electrons are really "bits chipped off" the atoms. It is a "reasonable hypothesis" that an atom of ponderable matter is made up of these electrons. An atom of hydrogen is something like the hundred-millionth of a centimetre in diameter; yet an electron has only about one-thousandth the mass of an atom of hydrogen. It is calculated that 700 electrons would go to make the hydrogen

atom, 11,200 to make the atom of oxygen, and so on with the other elements. Not that these electrons are to be pictured as locked in each other's embraces to form a solid atom. If the atom were magnified to the size of the Sheldonian Theatre, its constituent electrons would be "like full-stops flying about the room." They occupy the atom by their forceful activity, not by bulk. These electrons are thought to be the ultimate units of which the atoms of ponderable elements are built—though no doubt Sir Oliver would allow that there remains the question of the formation of these electrons themselves from a continuous medium. But the most curious fact is that in the experiments on radium the atoms seem to disintegrate and give rise to other forms of matter, which break up in their turn. This seems to point to a dissipation of matter into electrons corresponding to the dissipation of force into heat. But Sir O. Lodge reminds us at once of the impropriety of founding such large cosmic theories on our laboratory experiments. "There may be regeneration as well as degeneration," he urges, and he points to the analogy of the collision of stars.[1] Theoretical physics is making rapid pace to-day—too rapid, some physicists say. But the whole of its recent discoveries and speculations go to confirm those physical theorems which Professor Haeckel took from the physics of the time when he wrote (1890–5), and built into the structure of his system—viz., the unity of matter and force, the indestructibility of matter and conservation of energy, and the evolution of the ponderable out of imponderable matter and its natural aggregation, by gravitation, into nebulæ and solar systems. Monism can easily accommodate itself to any rectifications of the details of these theorems.

[1] On the whole question see the Romanes Lecture for 1903—which recalls the brilliant expository work of Professor Tyndall—and the proceedings of the Physical and Mathematical Section at the meeting of the British Association, September, 1903.

We are thus made acquainted with the second great law of the universal matter-force reality—evolution. Avoiding metaphysical and abstract formulæ, and keeping as closely as possible to the facts of science, we learn from the study of inanimate nature that the life of this great reality stretches as far behind and before us in time as its substance stretches over the abysses of space. We find it in a condition of orderly and continuous development. Chronologically, we cannot reach back to any stage of the process where we discover a continuous and homogeneous form of matter and force diffused through space. But physical analysis brings us almost within sight of such a "prothyl" (first-matter) and of the connecting link between ponderable and imponderable matter. If we can to-day witness the disintegration of the atom, we are completely justified in forming theories of its integration; and the theories find strong empirical confirmation in the astro-physical observations. We can trace the upward growth of our "prothyl" into the familiar chemical elements with their immense variety of properties—and it may be noted, in face of the recrudescence of old metaphysical theories as to these new properties, that the new elements (formed in radio-action, for instance) sometimes only acquire their distinctive qualities with very sensible gradations. The titanic forces of the universe—already differentiated into heat, electricity, gravitation, &c.—mould the new-formed matter into meteorites, nebulæ, stars, and solar systems. Man looks about him on a vast and restless ocean of being, on the surface of which the life of his whole race is no more than a momentary bubble.

There are two points to be considered before we follow Dr. Haeckel into the more contentious field of biological evolution in which he possesses an almost unique authority. We have to meet the charge that Haeckel tries to bully and depress us with the magnitude of this "cosmological perspective," and we

must see how far his opponents accept this teaching of modern science. Mr. Ballard declares that this "latest pseudo-gospel from Jena is as miserably belittling and depressing as it is intellectually invalid and practically unworkable." A critic in the *Daily Chronicle* expresses the same sentiment (as to depression), and it has been repeated by many of the reviewers. There is an excellent English proverb about the proof of a pudding which might have saved these writers if they had heeded it. Haeckel himself is by no means depressed by his "cosmological perspective," if he is saddened at times by the slow progress of truth. No Rationalist is ever heard to complain of or to betray the faintest depression at his position. Sometimes, indeed, with that marvellous alacrity of his, the theologian flies to the other extreme, and says the Rationalist must infallibly come to the practical conclusion to eat and drink and be merry. It is curious that we, who are credited at times with making too much use of reason, should be held to make so little use of it in the ordering of our lives. Quite certainly one effect of this perception of our infinite littleness in the universe at large, with its yawning cosmic sepulchres on every side, is to make us eager to enjoy our present life. Quite certainly we say to ourselves, in the words of Omar,

> "Ah! make the most of what we yet may spend
> Before we too into the dust descend.
> Dust into dust, and under dust to lie,
> Sans wine, sans song, sans singer, and sans end."

We have not the remotest idea of being depressed or bullied by the immensity of the universe or its sepulchral aspect. That would be folly, not rationalism. Moreover, it would be equal folly to plunge into those sensual depths which are so strangely said to be the alternative to depression. Life is too precious a thing to be squandered on every impulse. Its potentialities must be reasoned out. The promise and the prospect of developing its higher gifts must be pondered. Science, art, literature, social and political activity, refined intercourse, and sweet homes—those are the most precious gifts life offers to us. We are rationalistic enough to prefer the higher to the lower, to prefer gladness to depression.

The objection is, in fact, a purely captious one. Haeckel's belittlement of man is relative. It aims at discrediting the traditional and arrogant doctrine of man's uniqueness, which has done so much to obstruct the advance of truth in the nineteenth century. Even if it were depressing to learn that we are *not* compacted of a special material, and that the universe is *not* a toy-theatre for us to play our parts on before the angels, we should welcome the truth and speak it. The code of morals that consults our likes and dislikes does not find favour amongst Rationalists. But depressing the truth certainly is not; and it is only belittling in a narrow, comparative sense. One of Haeckel's critics proceeds to show that, "if we look at evolution from above downwards, man is still the chief thing in the universe." With a passing reminder that we do not know the whole of evolution—we do not know what the process may have produced in other planets—we need only say that here is, of course, another aspect of the question. But to suppose that it has been overlooked, and that the belittlement is other than comparative, is quite gratuitous.

The last point we have to deal with here is: What is the attitude of the opponents of Monism on the teaching we have seen thus far? As far as the inorganic universe is concerned, they accept the teaching of science, and are usually content to add to it a theistic supplement. They generally deny, as we saw, the infinity and eternity of the universe; and we have discussed the grounds of their denial. The more impetuous and less informed of them have some vague notion of rendering service to religion by criticising (for the edification of their followers) every

advance of scientific theory. Even Dr. Dallinger protests that the nebular hypothesis is not "an undisputed and established fact of modern science." Others, like Mr. Ballard, recommend the study of sceptical writers like Stallo. All these petty criticisms might profitably be left out of religious controversy. They tend to no conclusion now. There was a time when theistic evidence meant the detection of gaps in the scientific view of the world, and a rush to fill up the gap with supernatural action. It is beginning to dawn on the more enlightened of our theists that this is weak in logic, and dangerous in practice. Who could number the gaps they have occupied during the last two centuries—and deserted? They are beginning to see at length—what they were begged to consider from the beginning—that a gap in scientific construction may only mean our temporary (or even permanent) ignorance, and does not necessarily imply a real breach or defect in the action of natural agencies. We shall see more of this later. Meantime Mr. Mallock says: "If we compare the evidences in favour of the monistic doctrine generally with the objections urged by religious dualists against it, the great difference between the two is this: that whilst the objections of the latter are isolated, disconnected, casual, the existing evidences of the former cohere and dovetail into one another like numbered stones designed for some vast edifice: and whilst the missing evidences of the monist are one by one being found, the objections of the dualists are in daily process of being discredited."[1] Hence, he says, "educated apologists of all schools accept evolution to-day," and he quotes Professor Ward as saying that, if there has been any interference in the cosmic process, it "took place before the process began, not during it." And Professor Le Conte, whom Mr. Ballard recommends us to read, and who accepts evolution from the atom to the human mind, says: "Evolution is no longer a school of thought. The words *evolutionism* and *evolutionist* ought not any longer to be used, any more than *gravitationism* or *gravitationist*; for the law of evolution is as certain as the law of gravitation."[1]

So theistic writers are beginning to repudiate the theology of gaps. "How slow of spirit we have been to learn that the Divine Spirit does not work through gaps," says Mr. Newman Smyth.[2] Already we see a tendency to prove on theological principles that the world *must* have been evolved, from the primary matter (and there is a disposition to let this be eternal) up to the human mind; that evolution is the one divine process, and that the old idea of successive interferences in the work is too undignified altogether. This language will be heard from every village pulpit in fifty years' time. We need not be spiteful about it; but, on the other hand, these advanced theologians, who know it, might understand the irony and humour of a great scientist who has lived through the struggles of the last fifty years. At present the spectacle we witness is not unlike that of the competitors in a walking-match. In front are a few laymen like Professor Le Conte and Mr. Fiske (who have nearly dropped their theism for greater lightness on the way). Mr. Rhondda Williams and Mr. Newman Smyth are not far behind. Canon Aubrey Moore and Dr. W. N. Clarke would be well in the running if they were still here. Mr. Ballard, who thinks "Christian thinkers have every reason for accepting evolution as the general method of world-growth" (but makes a tremendous pother when it comes to the evolution of life), and Dr. Iverach, who is not anxious to quarrel with evolutionary terms "except in so far as they become the symbols of a mechanical evolution" (but *does* raise much dust as he goes along), are at a third stage. Mr. Ambrose Pope, who thinks

[1] *Religion as a Credible Doctrine*, p. 78.

[1] *Evolution and Religious Thought*, p. 66.

[2] *Through Science to Faith*, p. 20.

"the theory of evolution is a scientific hypothesis, true only in the sense that it explains all the facts to hand at present, true in exactly the same sense in which the theory of creation, as found in Genesis, was at the time it was written," comes a bad fourth—in line, however, with the average "cultured" preacher and the leader-writers and reviewers of the *Tablet*, *Guardian*, and *Church Times*. Then we have a straggling line of Christian Evidence Lecturers, tract-writers, preachers, and leader-writers in the *Methodist Luminary*, &c.; ending in bunches of suburban curates and rural vicars, who are still handicapped with heavy old copies of the Bible.

All this puts a peculiar difficulty in the way of the Rationalist. If he attacks the attitude of the advanced minority, Christianity at large repudiates his criticism; if he tilts at the conventional beliefs, the little band of the intellectuals use excited language. There is hardly a single question on which we have anything like a solid front to meet. This will be clearer as we proceed. As regards the inorganic universe, we may say that no Christian scholar of any serious influence questions its unity, its actual constancy (or its first law—the law of substance), or its formation by gradual development (its second law—the law of evolution) from a primitive matter. They rest their dualism, as far as visible nature is concerned, on (1) the need for a creator of matter and force, and (2) the need for a directive intelligence. With the first point—or with its groundwork—we have already dealt, and will deal again in the chapter on God. The second point must be very clearly grasped. It is the last conceivable quasi-scientific argument for the existence of God. It will confront us throughout the next three chapters, and it will before long be the only argument of "physical theology." In its general formula it runs: Although science can assign the efficient or physical causes of the complex phenomena about us, it cannot say *why* they produced just these phenomena and not different ones; and the more clearly science shows that an elaborate phenomenon—say, thought, or life—is only the outcome of a long and intricate evolutionary process, the more pressing is the need to admit that the evolutionary agencies were guided and controlled by intelligence from the first. The argument is not a new one, of course, but the best-informed theistic apologists are warning their colleagues to fall back on it at once, and to abandon the defence of temporary gaps and petty criticisms of science. "We are not," says Dr. Iverach (though he will forget it later), "of those who are constantly looking about for imperfections in a mechanical or other theory in order to find a chink through which the theistic argument may enter. If that were our position, the argument for theism would soon be a fugitive and a vagabond on the face of the earth; each advance of science, each discovery of law, would simply drive the theistic argument to find a new refuge."[1] So Mr. Newman Smyth says: "The assurance of faith cannot be maintained from a fortified critical position outside the province of the evolutionary science." And Mr. R. Williams declares: "I do not worship a God who only fills gaps, nor hold a religion whose validity depends on missing links." Teleology is the word. The scientist will show you everywhere certain forces co-operating to produce certain complex results. Point out that these "blind" erratic forces must have been guided in their co-operation, especially if the result is beautiful or orderly or beneficial or admirably adapted to produce a certain further result.

The advantage of "the new teleology"

[1] *Christianity and Evolution*, p. 26. Observe the excellent description of what the theistic argument *has been* for some time and the naïve proposal of this as a mere contingency. We shall find, too, that the old Adam is still strong in Dr. Iverach, and he is still keen on gaps in practice.

—which is the "old teleology" re-enamelled—is obvious. Science may now strain its mechanical causes as it pleases to explain the origin of life and consciousness. The more stupendous the results it claims for physical agencies, the clearer will it be that there were design, guidance, and control. Moreover, the argument comes into play from the very first step that evolutionary science takes. The best illustrations of its application will be found in Dr. Iverach and Mr. Profeit.[1] They follow step by step the teaching of physics and chemistry, and pause at the end of each paragraph to admire the wisdom of the creator with Paleyesque devotion. Behold the primitive matter mould itself into electrons and atoms. Whence did it get the power? How came a blind force to put together the electrons in such an orderly series of atoms with such wonderful chemical adaptations to each other? Behold the ponderable matter grow into nebulæ and solar systems. Who distributed the elements so nicely amongst the various nebulæ? Who distributed the elements *in* the nebula, and broke off the whirling rings at the proper moment, and set the planets going at the requisite speed, that a system of perfect order resulted, and was found to be just suited for the sustenance of life?

Now let us be perfectly clear. This argument is to be the great reply to Haeckel, and it will recur all through. It thinks it differs from the old Paleyism in this: it can grant science the power, either now or in the future, to give a complete explanation on physical lines of the up-building of an atom or a world. As it says, science may explain *how* these things were done. It adds that every thoughtful man must ask also *why*—why the process took place at all, and why it took this particular line, with such a lucky termination for us, rather than any one of a thousand others. They say: Let Haeckel explain the whole world-growth on mechanical principles, from the formation of the first atoms of hydrogen to the solidification of the last planet. That only tells *how* natural forces built up the world: we want to know *why*. So we can allow the naturalist or mechanical view to be complete in itself, yet leaving full room for us.

In order to avoid the repetitions and the confusion which this design-argument leads to, I propose to take the hint offered and keep quite separate the questions *how* the world was made and *why* it was so made. In this and the following three chapters we shall see how the world was made; in the seventh chapter we shall discuss the teleological argument in its principle. We shall see that the theistic evolutionists are by no means prepared in practice to allow that science can explain *how* all things were made, or to assign adequate efficient causes for the more complex phenomena. The first line of defence had better hold as long as it can, in case the second should be not quite impregnable. As to inorganic nature, however, there is no serious hesitation. The inherent or native qualities of the matter-force reality (I am not shirking, but deferring, the question why it has these qualities at all) are generally admitted to be the adequate efficient explanation of the formation of atoms and stars. The first serious challenge rings out when we come to the frontiers of living nature.

[1] *The Creation of Matter.* Mr. Ballard tells us this may count as a reply to the *Riddle*. It has been published since the *Riddle*, but does not seem to mention Haeckel's book.

Chapter IV

THE ORIGIN OF LIFE

No sooner do we pass from the consideration of inorganic nature to a discussion of the origin of life than we encounter in a severe form the perplexity I have previously indicated. Do theists or dualists deny that Haeckel may legitimately extend the monistic interpretation to the problem of life? At once we have to deal with a straggling line of contradictory thinkers, instead of the fairly solid front which we desire to face. A large number of the authorities recommended to us as correctives of Haeckel's philosophy entirely agree with him in his theory of the spontaneous generation of life, and are content to add, as before, the teleological consideration. A large number severely criticise his position—and therefore that of their own advanced colleagues—even from the point of view of physical or efficient causation; and there is every grade of vacillation between the two. It will be interesting to see first how far the doctrine of the first appearance of life by abiogenesis is accepted by theistic writers.

It is well known that Dr. Mivart defended the doctrine with great ability for the twenty years preceding his death. To-day Father Zahm and other Catholic scientists are no less willing to admit it. That Professor Le Conte and Mr. Fiske accept it goes without saying. Dr. W. N. Clarke is disposed to grant it: "Life, when its time came, may have come in by direct creation; so may human life or the life of other species; or the whole process of unfolding may have been continuous, impelled by only one kind of divine movement from first to last. Whether God has performed specific acts of creation from time to time is a question for evidence, which lies outside the field of theology."[1] Mr. Newman Smyth admits that it is now irresistible: "While the fact is now universally admitted that non-living matter cannot now be organised into a living form except through the prior agency of life, on the other hand the momentum of all our scientific knowledge of the continuities of nature leads modern biology to the assumption that the organic substance at some time has been raised and quickened from the deadness of the inorganic world."[2] Mr. Profeit also is willing to admit the evolution of protoplasm, though only "as the result of working intelligence."[3] Dr. Iverach, who is also anxious to stress the teleological aspect, nevertheless admits that life was "implicit in the whole"; though we shall find him raising superfluous difficulties later.

Thus in his allegation of the fact that life was evolved out of non-life Professor Haeckel finds himself in quite respectable company. The sonorous philosopher of one of our dramatic and sporting papers (the *Referee*) delivered himself as follows some months ago (March 1st, 1903): "At the very threshold of this great theme we encounter the eternal question as to how life began at all, and here the scientist cannot help us." It would be

[1] *Outlines of Christian Theology*, p. 132.

[2] *Through Science to Faith*, p. 17.

[3] *The Creation of Matter*, p. 96; his proviso is, of course, shared by all these evolutionists. We are for the present concerned only with efficient causation. When Mr. Profeit goes on to tell us that when protoplasm appeared "the stars clapped their hands for joy," we can hear the rustle of his surplice. The evolution must have taken millennia, if not millions of years. There was no psychological moment for applause.

interesting, and not a little enlightening, for "Merlin" to investigate this—under the circumstances—remarkable phenomenon of a group of ardent religious apologists subscribing to the doctrine of abiogenesis. But "Merlin" might quote a number of scientific men (of ecclesiastical standing) who make the same affirmation in yet stronger language, and who denounce Haeckel with some vigour for representing abiogenesis as a scientific theorem. There is Dr. Horton, the admirer of Vogt and Büchner, who assures us that "no leading man of science treats it [Haeckel's theory of the origin of life] seriously." But the leading opponent is Mr. Ballard, and we will treat his criticism at respectful length. It will lead us, sooner or later, into the heart of the difficulty.

It will be remembered that in his attack in the *British Weekly*, in which he emulates the spirited Dr. Loofs in literary manner, he devotes the bulk of his articles (about twelve columns out of thirteen) to preliminary observations, and then turns, "for sheer relief," to criticise Haeckel from the scientific point of view. I will strike off superfluous errors as I go along, and deal with the essence of his objection afterwards. "To begin with," he says, "its fundamental thesis is utterly unscientific, viz., the assumption of the actuality of spontaneous generation." To begin with, I may repeat, this sentence contains three grave and essential misrepresentations. Spontaneous generation is very far from being the "fundamental thesis" (or the "fundamental axiom" and "crucial proof" he elsewhere calls it) of the *Riddle*, or of Haeckel's system; it is not an "assumption," but a serious conclusion; and Haeckel does not claim that spontaneous generation takes place today. It is preposterous to suppose that Haeckel's fundamental thesis should be one that many Christian scholars accept, and the reader will already understand that, though it is necessarily involved in Monism, it is no more "fundamental" than ten other propositions. But Mr. Ballard proceeds to make good his statement. He says Haeckel "frankly acknowledges that spontaneous generation is 'an indispensable thesis in any natural theory of evolution. I entirely agree with the assertion that to reject abiogenesis is to admit a miracle.'" "An," one may observe, is different from "the," and "indispensable" from "fundamental"; but that is a comparative trifle. No page is given, but if you do look up the passage (page 91) you find that Haeckel is saying that *Professor Naegeli* represents it as "an indispensable thesis," and that "the assertion" should be "his assertion." It would not do, I suppose, to let readers of the *British Weekly* know that Haeckel does not stand alone, so the quotation is manipulated. Moreover, the phrase, "to reject abiogenesis is to admit a miracle," is quoted by Haeckel from Naegeli, but the quotation marks are omitted by Mr. Ballard. The reader may judge if the fact of Haeckel's agreeing with Naegeli justifies this. I know that Mr. Ballard quotes the passage fairly in his *Miracles of Unbelief*. My second point, that it is not an "assumption," will be clear when I come to resume the evidence for it. The third point is that if Mr. Ballard uses "actuality" in the ordinary sense of the word, as the ordinary reader will suppose, he gravely misstates Haeckel's position. That he does imply that Haeckel claims spontaneous generation to be "actually" occurring is clear from his appeal to those scientists (Tyndall, Pasteur, &c.) who disprove no more than this. As a fact Haeckel says (p. 91): "I restrict the idea of spontaneous generation—also called abiogenesis or archigony—to the *first* development of living protoplasm out of inorganic carbonates." Further, Haeckel refers the reader to his earlier work for details, and Mr. Ballard himself quotes therefrom that Haeckel only offers the doctrine as "a pure hypothesis" without experimental support.

Haeckel's position is, then, properly stated, that we have no evidence that

living things now arise by spontaneous generation; that the monistic view of the universe, which other scientific evidence commends, requires the birth of living things from non-living in the beginning; that he finds no peculiar qualities in the vital force which forbid the extension of the law of evolution to it; and that he therefore sketches a purely hypothetical suggestion of the mode of transition on broad lines. A really careful and impartial inquirer would see that the essential part of this position, from the logical point of view, is the third part of it—the conviction that there is no peculiar feature of the vital force which forbids us to assume its evolution. Evolution is a known law of the cosmos—or "the general method of world-growth," as Mr. Ballard says. We apply it until we are pulled up by some phenomenon of a specific nature that seems impossible to have been evolved. But Mr. Ballard utterly disregards this chief strength of Haeckel's position (supported by the whole of this chapter of the *Riddle*), proceeds to flourish weapons which do not reach that position at all, and concludes that Haeckel is "utterly without scientific warrant," or, as he has previously said, he "sets at defiance the latest and most exact findings of science, and cuts the Gordian knot by sheer assertion of that which is essential to his hypothesis, but is itself undemonstrated, and, we may venture to add, on good authority, undemonstrable." His procedure is so typical of the usual confused discussion of the subject that we may follow him to the end.

After saying that Haeckel offers no proof—which we will discuss presently—he goes on to overwhelm him with the "conclusions of experts." "Between the inorganic and the organic, there is, according to all the facts now known and the consensus of modern science concerning them, a stage in which, to quote Mr. Wallace, 'some new cause or power must necessarily have come into action.'" We are defending a gap after all, you see; though Mr. Ballard says it is not essential to do so. Further, it is not only "utterly without scientific warrant," but "emphatically" contradicted by "the conclusions of such experts as Tyndall, Pasteur, Drysdale, Dallinger, Roscoe, Kelvin, Beale, &c."; and "for modern science, speaking generally and carefully, spontaneous generation is as dead as Huxley's Bathybius." One's mind goes back involuntarily to those clerical spontaneous generationists and the horrible levity with which they have deserted the gap. The truth is, as those who know anything of the controversy will have seen long ago, Mr. Ballard is throwing dust. He knows perfectly well that the only point on which scientists are agreed—and Haeckel is quite with them—is that abiogenesis does not take place to-day; that is a thesis which Haeckel has explicitly disavowed. The experiments of Pasteur never purported to prove anything else, and never could. His favourite Professor Beale admits his own solitude: "Physicists and chemists look forward with confidence" to further experiments, "and "think to acquire a knowledge of the manner in which the first particle of living matter originated."[1] He cannot quote a single biologist to say that his science is against Haeckel's "hypothesis" of abiogenesis in the past. I will presently quote more than one in favour of it, in the sense of endorsing Haeckel's most important point—that there is no essential difference between vital force and non-vital force. He, a bachelor of science, has blurred the distinction between actual abiogenesis and archigony, which is essential, and which has been pointed out for twenty years by men of science. And this is the culmination of his attack on Dr. Haeckel, and, I suppose, the chief justification for the gross epithets he has showered on one of the most venerable figures in the scientific world.

Mr. Mallock says: "It was formerly

[1] *Vitality*, p. 7.

supposed that they [life and man] were produced by isolated creative acts; but we now know that they are the results of an orderly process of evolution. The theist of to-day admits this as fully as anybody." Unfortunately, we see that there are theists, who are held to be men of scientific culture and liberality, who do not admit it, and we must discuss the subject patiently. This is largely the result of people like Mr. Ballard, in their eagerness to draw up a long list of "sound" literature, recommending all kinds of antiquated works. For instance, one of the authors he urges us to read on this question, "Principal Chapman," assures his readers that Büchner and Haeckel assert "life *now* can be reproduced out of inorganic conditions," and attacks the "asserted possibility of artificially producing organic compounds" —which are produced artificially by the score to-day; whilst his general culture may be measured by his giving the motto of the Büchner school as: "Ohne Phosphor ohne Gedank." This does not tend to the advancement of truth. Let us have a clear idea what the real position of Haeckel's theory is in science.

I have stated it in four theses, and will deal with these separately. In the first place, scientists of all schools are agreed that we do not know a single case of abiogenesis taking place to-day. Curiously enough, religious philosophers in the Middle Ages believed that any number of highly organised forms of life (such as bees) were produced daily by spontaneous generation. It was science that first opposed them. However, a few decades ago a group of materialistic scientists made a stand for abiogenesis as an actual occurrence, and there was a fierce controversy. It was a purely scientific quarrel, Tyndall opposing them as firmly as the semi-vitalist Pasteur. It was abundantly proved that no living thing we are acquainted with to-day is developed without living parentage. This is that "teaching of science" (to which Haeckel fully subscribes) which Mr. Ballard and others so confusedly represent as opposed to Haeckel. Science draws no inference, and logic can draw no inference, with regard to the primeval origin of life from this negative evidence. This has been pointed out time after time, as it was by Sir W. Turner in his Presidential Address in 1900.

Haeckel's second point (in my analysis of his position) is that we have ample reason to regard evolution as a law of substance, or a law of nature. We have seen how completely scientific this thesis is. "Evolution," said Canon A. L. Moore, sixteen years ago, "may fairly claim to be an established doctrine."[1] And we have quoted the Rev. Newman Smyth's opinion that "the momentum of all our scientific knowledge of the continuities of nature leads modern biology to the assumption that the organic substance at some time has been raised and quickened from the deadness of the inorganic world." As a matter of scientific procedure, then, we are bound to assume that life arose by evolution *until* it has been proved that the vital force is something specifically distinct from physical force, and could not have been derived from it. That is both the scientific and the logical way of looking at the question. The scientist does not depart from his ordinary methods without grave reason; nor does nature. Nature evolves, wherever evolution is not impossible. The really important point is, then, this question whether there is something so peculiar about vital force that we cannot suppose it to have been evolved; and we find accordingly that Haeckel devotes several pages to the point. I will not repeat, but only supplement these from other scientists; though, as we will discuss the question of the nature of life more fully later (in the chapter on Lord Kelvin's intervention), I will not say more than is necessary for our purpose here.

[1] *Science and the Faith*, p. 162: one of the works Mr. Ballard recommends to us.

Let me begin by quoting this admirable warning to those who affirm that nature could not have evolved life without a divine interference: "In spite of all present-day scientific generalisations, and these based on the widest inductions possible to us, we have no warrant whatever for the assumption that the possibilities of the universe end where our human apprehension of nature has reached its *ne plus ultra*." Does Mr. Ballard recognise the words? They are taken from his own preface to his *Miracles of Unbelief*. A theistic philosopher, Professor J. Ward, also says: "Of the origin of life, if it ever did originate, we have absolutely no knowledge. But, on the one hand, there is no definite limit to the possible complexity of mechanical processes, nor any definite limit on the other, to the possible simplicity of life."[1] These are timely warnings to the theist not to build on gaps in biology. Yet Dr. Horton tells his trustful congregation that science has "not discovered what is that *vast bridge* which spans the regions which, to the eye, appear so near." And a reviewer in the *Church of England Pulpit* says the gap between the living and the non-living is "now wider than ever." If you seek the authority for these assertions, you are generally met with a reference to Professor Lionel Beale. Now, Prof. Beale is an able scientist and original worker, and we will examine his claims about protoplasm in a later chapter. Meantime, we may recall that it was he who so pathetically protested in the agony column of the *Times* that Haeckel's asseverations in this chapter were not in accord with the teaching of science, and later referred the anxious world to his little work on *Vitality*. Now, when we peruse *Vitality* we are given to understand almost from first page to last that Professor Beale is nearly *contra mundum*. "It must be admitted," he says (p. v), "that few scientific men are quite satisfied that vital phenomena may not yet be otherwise explained"; and we have already quoted his admission (p. 7) that "physicists and chemists" look forward to a mechanical explanation of the origin of life.

And in point of fact one can quote a string of the ablest authorities against the claim that vital force has so specific a character that it could not have been evolved. Says the theistic (or pantheistic) evolutionist, Professor Le Conte, one of Mr. Ballard's chief authorities: "Vital forces are also transmutable into and derivable from physical and chemical forces . . . Vital force may now be regarded as so much force withdrawn from the general fund of chemical and physical forces . . . If vital force falls into the same category as other natural forces, there is no reason why living forms should not fall into the same category in this regard as other natural forms."[1] Says Professor J. Ward, another of Mr. Ballard's authorities: "The old theory of a special vital force, according to which physiological processes were at the most analogous to—not identical with—physical processes, has for the most part been abandoned as superfluous. Step by step within the last fifty years the identity of the two processes has been so far established that an eminent physiologist does not hesitate to say 'that for the future the word vital, as distinctive of physiological processes, might be abandoned altogether.'"[2] The "eminent physiologist" is Sir J. Burdon Sanderson, another able authority. In the article on zoology in the *Encyclopædia Britannica*, Professor Ray Lankester says: "It is the aim or busi-

[1] *Naturalism and Agnosticism*, ii, 262. Professor Ward, therefore, assumes life was evolved. The words, "if it ever did originate," must be understood in the idealist sense; and the emphatic denial of knowledge is grounded rather confusedly on the Pasteur experiments.

[1] *Evolution and Religious Thought*, p. 36.

[2] *Naturalism and Agnosticism*, ii, p. 9. Ward and Le Conte, while admitting the mechanical theory as the explanation of "efficient" causation, claim the action of a guiding intelligence. That is a point we have reserved, and it does not affect the present question.

ness of those occupied with biology to assign living things, in all their variety of form and activity, to the one set of forces recognised by the physicist and the chemist." On the physical side Sir A. Rücker, in his presidential speech of 1901, spoke of the recent rise of Neo-Vitalism as merely the result of "some outstanding difficulties" in biology, and he protested that "the action of physical and chemical forces in living bodies can never be understood, if at every difficulty and at every check in our investigations we desist from further attempts in the belief that the laws of physics and chemistry have been interfered with by an incomprehensible vital force." His successor in the presidential chair also protested that science was "not debarred from speculating on the mode in which life may have originated," and he quoted this splendid expression from Lord Kelvin's (then Sir W. Thomson) presidential speech in 1871: "Science is bound, by the everlasting law of honour, to face fearlessly every problem which can fairly be presented to it. If a probable solution, consistent with the ordinary course of nature, can be found, we must not invoke an act of Creative Power." And, finally, when Lord Kelvin recently declared that he understood biologists were coming again to entertain the notion of a specific vital force, he was, as we shall see (or the reader may see now in Chap. XI.), emphatically contradicted by the representative biologists of this country.

The authority of Dr. Haeckel himself on this point is paramount. He has made a life-long study of it. But I have shown that his conclusion is in accord with the general scientific attitude to-day, and that he is not giving us the "science of yesterday," as the dilettanti of the *Pall Mall Gazette* express it. I will only add here a few further considerations that tend to make clearer the question of the primitive origin of life, and will reserve the discussion of Neo-Vitalism until we come to deal with Lord Kelvin and his critics.

It is a matter of some importance to remember that we do not know the nature of the earliest organisms. Living things had to proceed very far in their development before it was possible for their remains to be fossilised and preserved. Palæontology can give us no aid whatever. It is generally assumed that the monera and such simple forms—mere tiny globules of protoplasm—were the earliest in point of time. That they must have been the earliest of existing forms is obvious, but, as Professor Ward suggests, it is conceivable that there were many simpler forms of life before the moneron. We had to wait for the microscope to discover the protists. We may make other discoveries yet; or there may have been earlier forms too unstable to persist. These are "may be's," but remember Lord Kelvin's advice that we must exhaust the possibilities of nature before we invoke "an abnormal act of Creative Power." Canon Aubrey Moore said long ago in connection with the evolution of species: "In this process of evolution there are things which puzzle us, though it would be quite true to say there is nothing half so puzzling as there was, if we had only thought more about it, in the old theory of special creation." That is peculiarly applicable to the question of the origin of life. The notion of a "creative act"—the notion that, at the mere expression of a wish on the part of some infinite being, particles of "dead" matter scrape themselves together without any physical impulse, and, though they are incompetent to see the design they are to execute or the end of their individual movements, build themselves up into the intricate structure of living protoplasm—is a perfect world of mysteries, instead of being an "explanation." We can only have recourse to it when every conceivable effort has been made to explain the phenomenon by the physical impulsion of the atoms by natural forces and by a very slow and gradual development; and science, we saw, is by no means inclined to admit

that its possibilities have been exhausted yet.

But if we cannot get any nearer to the origin on the biological side, it may be possible to do something on the chemical side; and from this side, in point of fact, the "gulf," as preachers call it (compare Huxley's article on Biology in the *Encyclopædia Britannica*), between the organic and the inorganic is being bridged. If you take down one of the apologetic works of the last generation (even some of those Mr. Ballard recommends to-day), you will find that the writers lay great stress on the inability of the chemist to produce artificially certain compound substances which were then only made by the living organism. To-day a large number of these are produced by the chemist in his laboratory. This branch of chemistry is advancing every year, and last year was able to announce the artificial synthesis of so complex an organic substance as albumen. The "gulf" is narrowing; it is very far from being "wider than ever." Dr. Iverach, one of those hesitating teachers who are continually criticising scientific results with some vague notion of serving religion, says these chemists only "accomplish at great cost and labour and with many appliances what life is doing easily every moment." Very true; but, pray, how long was nature in fitting up *her* laboratory and making *her* appliances? Possibly millions of years in making the protoplasm of the first moneron; certainly many millions of years in evolving those higher organisms which the scientist is set to emulate. One does not see what liberal-minded and scientific men gain by strewing the path with little obstacles of this kind. There are other writers who say chemistry may produce organic substances without number, but it cannot produce an organism. Well, on the theistic-evolution hypothesis, which the abler apologists adopt to-day, it took God hundreds of thousands, if not millions, of years to make an amœba, with all the resources of nature completely known to him. And man, with his dim knowledge of natural forces, is to make one in a few weeks, or years! Science is advancing. Let us be patient.

We are now in a position, then, to estimate the criticisms that have been directed against this section of Dr. Haeckel's system. There are two aspects of his position. On the one hand there is the negative side, that we are not justified in rushing into the present gap (such as it is) of scientific knowledge with a "vital force" or a "creative power," which are specifically distinct from the natural forces we have hitherto studied; and there is, further, the positive attempt to sketch a theory of the way in which protoplasm was evolved. The first part is essential to monism; the second is not, and may vary with the progress of science. Both parts are scientifically justified. How widely Haeckel's first position is shared by men of science, and how it is forced on us by the axioms of men so different as Lord Kelvin and Canon A. L. Moore, we have already seen. It is the only logical attitude. When science assures us that it has acquired a perfect knowledge of vital force on the one hand and physical force on the other, and that the two are so widely separated that it cannot conceive the one to have been evolved from the other; *then* there will be time enough to talk of gaps and gulfs and creative power. In the meantime logic forbids us to multiply agencies without need. There is a plausible kind of critic—usually a preacher—who says: Well, Haeckel may enjoy his opinion as long as he likes, and the agnostic may wait eternally for the last word of science, but I find this creator-idea very satisfying, and you may keep your logic for the school. That is the practical man—the man who would think you a fool if you reasoned like that in business. It must be remembered that we are not playing a parlour game with conventional rules. It is a question of truth or untruth, reality or unreality. It is a huge assertion, this of creative action. It at once

brings a new element into our cosmos. We see that the material universe exists. We must not recklessly affirm the existence of anything beyond it; or if we do, we have no guarantee of the truth of our statements. Now, until science has shown that physical force and vital force are *not* transmutable, and that no extension of the former, even into the most elaborate complication, could produce the latter, you cannot extract from the appearance of life a particle of evidence for an interfering cause other than nature.

But Haeckel does not cease to speak as a scientific man when he goes on to offer a positive suggestion as to the origin of life. Science advances commonly by projecting hypotheses in advance of its solid and established positions, and if ever we are to understand the mode of the origin of life it will be by such a procedure. No living scientist is better acquainted with the conditions of the problem than Haeckel, and it would be preposterous to suppose that he has not framed a theory consistent with the known facts. His theory is directly grounded on the established facts of the chemistry of protoplasm. The only possible justification for the criticism offered by scientists like Dr. Horton would be if Haeckel had put it before us as a sort of photographic description of the primeval dawn of life. As Mr. Ballard reminds us, Haeckel only offers it as "a pure hypothesis," consistent with the facts as we know them, and capable of any modification new discoveries may entail.

Thus, when we have shaken off this group of not very enlightened critics, we see that we have advanced a step in the evolution of the monistic universe. We had already followed the great matter-force reality in its development as far as the formation of planets with firm crusts, with heated oceans and an enveloping atmosphere, and provided by a shrinking central luminary with a powerful flood of heat, light, and electricity. Some time in the pre-Cambrian epoch living things appeared in the primeval oceans. This was not a sudden and dramatic entrance on the stage of time, at which the morning stars might clap their incandescent hands; it was the final issue of a long course of evolution. It was the matter-force reality slowly groping upwards through more and more elaborate combinations of the formed chemical elements until a stage was reached when a substance sufficiently plastic to exchange elements with the environing fluid and sufficiently stable to maintain its integrity was formed. To-day this substance (living protoplasm) is marked off by several remarkable properties from inorganic matter. Professor Beale talks much of its "structureless" character. In view of the known extreme complexity of its *molecular* structure, it would be a miracle if it did not exhibit functions widely removed from those of simpler compounds. But the finding of an actual divergence to-day is no obstacle to our entertaining a theory of evolution. No serious scientist questions to-day the evolution of the human body from that of a lower animal species. Yet the connecting links have disappeared. It is a scientific truth that intermediate forms do tend to disappear. We see here, then, only another phase in the unfolding of the cosmic substance, or nature. Neither scientific evidence nor logic compels us yet to admit a fresh reality, a new form of being. We are still monists. Whether nature has needed the guidance of intelligence in this evolution we need not consider yet. First let us establish the fact that nature evolves, from the first union of electrons into an atom to the development of man, by means of its inherent forces, and then we will consider "whence" it got these forces and whether they must have been guided.

Now, given the first tiny globule of living protoplasm, there is no further gap for the theologian to defend until we come to the human mind. For the fifty million years which extend from the

Laurentian epoch to the early Pleistocene we witness the natural evolution of the cosmic substance without any plausible interference. Naturalists "have accepted Darwin's idea," Sir W. Turner tells us in his presidential speech; and he speaks with respect of Haeckel's great share in constructing our ancestral tree. Huxley said a long time ago that he "refused to run the risk of insulting any sane man by supposing that he seriously holds such a notion as special creation." Canon Aubrey Moore wrote sixteen years ago that "every competent man of science believes in the origin of species by progressive variations."[1] "All living nature is of one descent and constitutes one relationship," says Mr. Newman Smyth. "Evolution as a law of derivation of forms from previous forms . . . is not only certain, it is axiomatic," says Professor Le Conte. "The immutability and separate creation of species . . . are doctrines now no longer defensible," says Professor Ward. And Professor Flower (to whose qualifications Mr. Ballard devotes ten lines—much more than Professor Flower ever devoted to theology) told the Reading Church Congress twenty years ago (1883) that the doctrine of the evolution of species was even then "almost, if not quite, universal among skilled and thoughtful naturalists of all countries," and advised the clergy not to burn their fingers again with it.[2] We might fill a book with such quotations.

Happily, there is no longer the need to do so. Darwin lies in Westminster Abbey, and episcopal lips utter his name without a tremor. No one now questions the fact that the species have been formed by evolution; but there are still ecclesiastics who take this occasion to show that they are of a critical rather than a credulous temper. They quarrel with the agencies which science assigns to the task of the formation of species, or with the mode in which science conceives those agencies to have acted. They express an opinion that natural selection and sexual selection could not do this or the other; that the question of the transmission of acquired characters is very unsettled, and so forth. Now, it is in itself a healthy sign of the times that our theologians take an interest in these scientific questions, and as scientific men. But the cause of truth and progress, and the placidity of scientific workers, would be best consulted by keeping these criticisms out of Christian evidence treatises, with which, logically, they have nothing to do. Thus Dr. Iverach discusses the question at great length in his *Theism in the Light of Present Science and Philosophy*. He thinks that natural selection may act on variations, but cannot initiate them, and cannot show why some organisms remain unicellular and others become multicellular. Biologists do not, he urges, prove the indefinite expansiveness of species, and do not explain the special causes which check expansion. In strict logic this has nothing to do with "Theism." If biologists have not adequately explained the process of evolution, we must wait until they have further knowledge. His point is, of course, that the triumph of evolution only means "to transfer the cause from a mere external influence working from without to an immanent rational principle." He is pleading again for that "incomprehensible vital force," as Sir A. Rücker calls it, which we have already discussed and will discuss later.

If it is sufficient to admit natural (physical and chemical) forces in the first formation of protoplasm, we meet nothing to turn us aside from these with any plausibility until we come to consciousness, which I will treat in the next chapter. With that reservation Haeckel's mechanical explanation of the derivation of species is accepted. Professor Ray Lankester says, in the article on zoology in the *Encyclopædia Britannica*: "It was reserved for Charles Darwin in the year 1859 to place the

[1] *Science and the Faith*, p. 165.
[2] *Recent Advances in Natural Science.*

whole theory of organic evolution on a new footing, and by his discovery of *a mechanical cause* actually existing and demonstrable, by which organic evolution must be brought about, to entirely change the attitude in regard to it of even the most rigid exponents of scientific method." The recent letters of Professor Ray Lankester to the *Times*, which I will quote later (Chap. XII.), show that he has not departed from this position. Dr. Croll also admits of the derivation of species: "At present [1890] most evolutionists regard the process as purely mechanical and physical, the results of matter, motion, and force alone."[1] And Mr. Fiske says: "The natural selection of physical variations will go far towards explaining the characters of all the plants and all the beasts in the world."[2]

But do not let us lose our way amidst conflicting authorities. Two objections are formulated, more or less vaguely, against this phase of Haeckel's position; or the two objections may be combined into the general statement that the mechanical explanation leaves some aspects of the derivation of species unaccounted for; and so we must admit, besides the evolving matter-force reality, a telic or purposive principle in the organism and a general controlling intelligence, or at least the latter (Fiske, Ward, Le Conte, &c.). The second opinion does not really conflict with our present purpose, because it assumes that this directing intelligence never *takes the place* of physical agencies. It always acts *through* mechanical causes, so that science is quite right in expecting to build up a perfect mechanical scheme of the development of the world-substance. With its further contention that this mechanical scheme points to an initial designer, we will deal later. It is only the first opinion—that which postulates a purposive principle *in* the organism—which conflicts with the monistic view at this stage. And this second opinion is, frankly, a philosophy or a theology of gaps. It lodges in the breaches, or supposed breaches, in our knowledge of the evolutionary processes, and naïvely takes these to be breaches in the cosmic scheme itself. Remember Mr. Ballard's wise injunction that "we have no warrant whatever for the assumption that the possibilities of the universe end where our human apprehension of nature has reached its *ne plus ultra*"—for the time being, let me venture to add. Which attitude is the more logical and scientific, and the best accredited by experience—this defence of gaps, or the resolution to admit no aquosities or vitalities, or other immaterial entities until science has given a definite and fully-informed decision?

Professor Haeckel adopts the latter attitude, and proceeds to reconstruct the wonderful paths that nature has followed in her journey from those ancient Laurentian waters to the achievements of man. We have three convergent and consonant lines of evidence: the documents of palæontology, or the science of fossils, the documents of zoology (to speak of animals only), and the documents of embryology. From them, as from three synoptic gospels, we retrace the upward growth of living nature. The simplest organisms we can definitely picture to ourselves are simple granules of protoplasm, or structureless morsels of an albuminous matter. In time some of these are formed which live on their fellow-protists, and the distinction of the animal from the plant is adumbrated. Later, some of them develop a nucleus and form definite cells; the cells cling together in colonies and form multicellular organisms; these cells are disposed in a layer or skin with a central cavity, and develop fine hair-like processes by which they can travel through the water. As the ages advance some of these beings fold their cell-layer inwards and form the primitive gut. From these, probably, the flat worms are developed, with a primitive nervous system and reproductive apparatus.

[1] *The Philosophical Basis of Evolution*, p. 2.
[2] *Through Nature to God*, p. 81.

Higher worms arise with primitive vascular and excretory systems, and at length with a rude kind of breathing apparatus. At the next stage the rudiment of a spinal cord appears, and continues to develop until the lowest vertebrates (such as the lampreys) are seen, with their primitive crania, suctorial mouths, and advancing ears. Then comes a great development of fishes with strong dermal armour and increasingly acute organs of sense. Amphibious animals link the fishes with the reptiles, which soon prowl over the earth in huge and terrible forms. Mammals, or warm, red-blooded animals, next appear in the Jurassic strata, and slowly advance through the forms of marsupials and placentals until the lowest lemures, in the lower Eocene strata (computed to be 3,000,000 years old), bring us within dim and distant vision of the human form. The man-like apes appear in the Miocene period (about 850,000 years ago). Some 600,000 years later the *pithecanthropus*, or erect man-ape, is found to herald the approach of our own race.

Chapter V

THE ASCENT OF MAN

When the third International Zoological Congress met at Leyden in 1895 a Dutch military physician produced two or three bones that he had discovered in Java the previous year, which created a lively sensation amongst the assembled anthropologists. They were merely the skull-cap, a femur, and two teeth of some animal form that had been buried in the upper Pliocene strata nearly 300,000 years ago. The modern zoologist can reconstruct a skeleton almost from a single bone, and the complete outline of the being to which these scanty remains had belonged was quickly restored. Science found itself confronted with the long sought missing link between man and his pithecoid ancestors. The powerful form, standing five feet and a half high when erect, yet still much bent with the curve of its prone ancestors: the great cranial capacity (about 1,000 cubic centimetres), much greater than that of the largest ape, yet lower than that of man, and associated with prominent eye-brow ridges and heavy jaws; in a word, all its features pointed very emphatically to a stage halfway between man and the earlier species from which he and the apes had descended. A loud and long discussion followed Dr. Dubois' address. The celebrated Dr. Virchow stubbornly opposed the conclusion of Haeckel and his colleagues, and was driven from point to point by his opponents.[1] In the end twelve experts of the Congress gave a decision on the remains. Three of them held that they belonged to a member of a low race of man; three held that they

[1] See the account of Virchow's pitiful and transparently prejudiced resistance to evolution in Büchner's *Last Words on Materialism*, p. 97. At a scientific congress in the preceding year, one of Virchow's colleagues observed that his behaviour was "quite enough to justify us in paying serious attention no longer to the great pathologist on this question." In effect, Virchow's opinions on the matter have died with him.

had belonged to a huge man-like ape; and six were convinced that they belonged to an intermediate form, which was rightly called the *pithecanthropus erectus* (erect ape-man). The opinion of the majority has now become the general opinion in anthropology.

This was a dramatic intervention in the standing controversy with regard to the origin of man. Ever since Darwin had, as Professor Dewar says, "illumined the long unsettled horizon of human thought" with his theory of selection and descent, anthropologists had foreseen the extension of the doctrine of evolution to man. Haeckel and Darwin had soon effected that extension in theory. Now the discovery of the *pithecanthropus* came as a remarkable crown to the enormous structure of evidence in its favour. But a distinction had already been drawn between the evolution of body and the evolution of mind. Thinkers like Dr. Wallace and Dr. Mivart offered no resistance, or, indeed, strongly defended, the doctrine that man had inherited his bodily form from a lower animal species, but affected to see a gulf in mental faculty which forbade us to derive man's mind from that of any animal. Since those days the evidence for the evolution of the mind has accumulated until it is at least equivalent to that for the evolution of the body. In the *Riddle of the Universe* Professor Haeckel gives a magnificent summary of the evidence for both theses, for the development of man, mind and body, from an animal ancestor, through which he is closely related to the apes. The subject is one that belongs to the science of which Haeckel is one of the acknowledged masters. It was thought that all serious criticism of the work—all criticism that had the moral and constructive aim of ensuring the triumph of truth—would centre upon these first ten chapters dealing with evolution. The critics have acted otherwise, and we shall see that there is little serious resistance to our extension of the principle of natural evolution to man, and bringing him within the unity of the cosmos.

Let us see first, however, what is the attitude of cultivated thought generally on the subject. We have seen how the defenders of gaps have surrendered the inorganic world to the monist, how a mere handful remain to defend the dualistic theory of the origin of life, and how they have fled before the advance of the Darwinians. We shall now find that they are fast deserting this last breach in the evolutionary scheme. A quarter of a century ago Tyndall shook the world with his famous: "We claim, and we will wrest from theology, the whole domain of cosmological theory." "His successors," said Professor Dewar, in the same city, last year, "have no longer any need to repeat those significant words . . . The claim has been practically, though often unconsciously, conceded." Canon Aubrey Moore, whose work Mr. Ballard recommends us to read, urged his colleagues to admit the claim nearly twenty years ago. Wallace's idea, he said, "has a strangely unorthodox look. If, as a Christian believes, the higher intellect who used these laws for the creation of man, was the same God who worked in and by these same laws in creating the lower forms of life, Mr. Wallace's distinction of cause disappears." Again: "We have probably as much to learn about the soul from comparative psychology, a science which as yet scarcely exists, as we have learned about the body from comparative biology."[1] He concludes that the question has nothing to do with religion. Dr. W. N. Clarke is no less clear. "The time has come," he says, "when theology should remand the investigation of the time and manner of the origin of man to the science of anthropology with its kindred sciences, just as it now remands the time and manner of the origin of the earth to astronomy and geology . . . anthropology and its kindred sciences will give an evolutionary answer." Again: "But though there is no reason against

[1] *Science and the Faith*, pp. 203 and 211.

admitting it if it is supported by facts, special creation, whether of the spirit of man or of other new elements of the advancing order, may come to appear improbable. The larger the sweep of one great progressive method, the more probable does it become that the method is universal. The idea of unity in God's work and method is an idea that tends, when once it has been admitted, to extend over the whole field."[1] Dr. Iverach and Mr. Newman Smyth desert the gap, and refer us to science for the solution; though, as before, we shall find Dr. Iverach raising subsequent and irrelevant difficulties. Professor Le Conte and Mr. Fiske, whom we are told to read, are emphatic evolutionists. Says Le Conte: "I believe the spirit of man *was* developed out of the *anima* or conscious principle of animals, and that this again was developed out of the lower forms of life-force, and this in its turn out of the chemical and physical forces of nature."[2] Mr. Fiske sketches a theory of natural evolution in his *Through Nature to God* (p. 94). Dr. Dallinger allows it is "not by any means other than conceivable that science may be able to demonstrate the actual physical line of man's origin" (quoted by Mr. Ballard). Even Mr. Rhondda Williams believes "evolution is complete from the jelly-fish up to Shakespeare" (p. 26), and says (p. 40): "When evolution reached man she seemed not to be content with making bodies, and devoted herself to the development of intelligence and the noblest feelings."

Haeckel is, therefore, once more in excellent and edifying company. He tells in his latest work (*Aus Insulinde*) how he found himself a few years ago face to face with the religious director of an infirmary in travelling by rail across Switzerland. Observations on the beauty of the mountains led to a discussion of their natural growth, and the nun—little suspecting his identity—informed him that she had obtained her sensible and modern views from Haeckel's *Natural History of Creation!* We shall see in the end that the religious opposition to Haeckel's teaching—his *real* teaching—is crumbling year by year. On our present question of the evolution of the human mind, one may gather from this very general agreement of the cultured defenders of Christianity that scientific and expert opinion can be little short of unanimous. Dr. Wallace, with whose views we shall deal separately, does indeed stand out with a strange obstinacy in the world of science—stands out as Virchow so long did in Germany, as Cuvier did in France—but the doctrine of the evolution of mind is now generally accepted by psychologists. Professor J. Ward says "the unanimity with which this conclusion is now accepted by biologists of every school seems to justify Darwin's confidence a quarter of a century ago."[1] Another distinguished psychologist, Professor Münsterberg, is equally scornful of those who still linger in this breach.[2] Sir W. Turner closed his Presidential address to the British Association in 1900 with a confident assumption of the general acceptance of the doctrine[3]—so far, indeed, as to evoke from a conservative writer in the *Athenæum* a lament that he "carried the evolutionary idea to its logical conclusion with a most uncompromising materialism." In fact, a cultivated and hostile reviewer in the *Manchester Guardian* dismisses the first and

[1] *An Outline of Christian Theology*, p. 225.

[2] *Evolution and Religious Thought*, p. 313. And elsewhere he says that until recently "the grounds of our belief in immortality were based largely on a supposed separateness of man from the brutes—his complete uniqueness in the whole scheme of nature. This is now no longer possible" (*The Conception of God*, p. 75).

[1] *Naturalism and Agnosticism*, ii, p. 7. Dr. Ward is speaking of the complete doctrine of development.

[2] *Psychology and Life*, p. 91.

[3] I shall quote his words presently to show that he held not only evolution, but evolution in the same sense as Haeckel. I shall also quote similar language from the speech of the President of the Anthropological section at the Congress of 1901.

chief part of Haeckel's book with an assurance that "nowadays you cannot startle even the man in the street by telling him the soul has been continuously evolved from the souls of unicellular protists." For my part, I am not prepared to assign Dr. Wallace, or even Dr. Horton, to a lower level of culture than that of the man in the street. But it would be difficult to draw up to-day even a slender list of capable biologists or anthropologists who deny the ascent of man from the rest of the animal world.

This very general agreement of scientific men, accepted, as it is, by the ablest theistic writers of the day, has a formidable support in the facts and the justified assumptions of science. Once it has been proved that the whole development of nature, from the formation of atoms up to the formation of species, has proceeded in a continuous manner; and when it is known, as we do know to-day, that this law of natural evolution applies also to the most elaborate of our thoughts and institutions, to our art, our language, and our civilisation; it becomes clear that there is so strong a presumption for the natural evolution of man that only the most explicit proof of man's uniqueness could prevent us from applying the law to explain his origin. When we find further that man is akin to the lower species in a score of ways which point to derivation, and are quite unintelligible on any other theory, the onus of proof lies heavier than ever on those who resist. We should be scientifically and logically justified in *assuming* the evolution of man, unless and until some grave hindrance is pointed out in the nature of man's structure or spiritual powers. But, as I said, the positive evidence is enormous. As far as structure is concerned we have no reply to meet. The proofs which Haeckel has marshalled so ably in Chapters II.–V. of the *Riddle* have passed unchallenged; nor is there any serious "answer by anticipation" which we should be expected to consider. The analogy of man's structure and his physiological functions with those of other mammals, the significant course of his embryological development, and the atrophied organs and muscles that are still transmitted from mother to child, have convinced a stubborn world at length. That gap has been deserted. It is still thought by some that a gulf remains between the mind of man and that of the other animals, and that here at least they still find their treasured intervention of an external power in the orderly development of the universe. They think that man's mental powers, and what he has achieved with those powers, mark him off too sharply from the psychology of the lower animals for us to admit evolution. Let us see first what distinctions are alleged in support of this assertion, and then we may study the force of the psychological evidence for evolution.

Now, when we turn to the critics of the *Riddle*—either explicit critics or critics "by anticipation"—we find we have to deal with a very meagre group of not very clear or well-informed thinkers. Such phrases as those which Mr. Blatchford quotes from a sermon delivered by Dr. Talmage as late as 1898, that the evolution of man is "contrary to the facts of science," and that "natural evolution is not upward but always downward"—only show the kind of stuff that can be safely delivered in tabernacles. Dr. Horton, another preacher, complains that Haeckel "has not been able to explain the origin of consciousness," or "how the rational life we call spirit has been produced by the physical"; which is a complete ignoring—probably ignorance—of the mass of evidence Haeckel has presented, as we shall see. Mr. Ballard hides behind the respectable figure of Dr. A. R. Wallace, though at other times he seems indesirous to press the objection. We are, in fact, left to face a medley of small points made by the Rev. Rhondda Williams (who admits the evolution of

the mind), Dr. Iverach, and the Rev. Ambrose Pope.

Mr. Pope, you will remember, holds that Haeckel collected the basic material for his system during three "half-day excursions." He himself admits the sufficiency of evolution until we come to the human mind, and then says: "This is psychology, and, like all psychologists, Haeckel starts with certain metaphysical hypotheses. His hypothesis is that mental phenomena are the effects of physical phenomena." This, he says, "looks like an innocent assumption"—to whom, we are not told—but it contains the fatal conclusion, and is "opposed by nearly every psychologist of repute in the world." These men are "expert psychologists," whereas Haeckel is only making a "half-day excursion" from his own province into "another subject entirely." One really begins to suspect that it was during "a half-day excursion" that Mr. Pope studied Haeckel. A grosser travesty of his system it would be difficult to conceive. Serious students will not expect an analysis of it, but I will briefly point out its absurdities. This subject is as much within the province of comparative zoology, of which Haeckel is one of the greatest living masters, as it is in the field of psychology. It is a border question. There was, therefore, no excursion. Indeed, it is not too much to say that this tracing of the upward growth of mind has been one of Haeckel's most absorbing studies; and now his conclusion, based on a long life of study and research, is to be flippantly represented as an "assumption" ignorantly and hastily stolen from a province "entirely" different from his own—a province, moreover, where we are assured it did not exist. Further, of the seven "psychologists of repute" whom Mr. Pope quotes—Windt (Wundt), Hoffding, Ward, Sully, Stout, Dewy, and James—six at least admit the evolution of mind by purely natural processes. I have already quoted the ablest of them, Professor Ward, as a witness to the unanimity of this conclusion.[1]

With the difficulties alleged by Dr. Iverach we will not linger. He seems not to insist on the impossibility of evolution, but urges that man is actually separated from the animals by several marked prerogatives. One of these is language; but as Dr. Iverach admits this is "manifestly a social product"—that is to say, evolved—one wonders why it is adduced at all. Another difference is in his relation to his environment, which he can modify and turn to service; that also is clearly an acquired or evolved faculty. Finally, Dr. Iverach urges man's distinction in the way of science, religion, morality, civilisation, and so on. Experts are agreed, and many theologians are with them, that these are all evolutionary products. They did not exist 300,000 years ago. Nor does Dr. Iverach seriously urge them as objections to the theory of evolution. On the other hand, Mr. Rhondda Williams, who "believes"—though it is "not proved"—that man was evolved, soul and body, makes a prolonged onslaught on Haeckel's position. Before we follow him into his storm-cloud of rhetoric, let us make clear what he hopes to gain by it. He admits the fact of evolution. He claims, of course, that the evolutionary process was divinely or pantheistically guided; a point we discuss later. The only practical question is: Does he, or does he not, admit that the agencies at work in the uplifting of the human species are the same agencies which we have hitherto dealt with? If he does, it is of no real consequence to us that he finds Haeckel's theory of consciousness or of memory at fault. The main point is the exclusion of the new kind of force which was supposed to enter the world with the human mind. It is important to remember—he seems to forget it himself sometimes—that Mr. Williams does not postulate the entrance of a new

[1] In so far as Mr. Pope means that they differ from Haeckel as to the actual relation of brain and mind we shall meet the point presently.

force into the cosmos, but, like Le Conte and Fiske, sees only a further unfolding of the universal spirit. At the bottom his quarrel with Haeckel is not about the evolution of the human soul, or the agencies which evolved it, but as to the relation of *all* soul to brain.

He promises us, then, that he is going to convict the distinguished scientist of "jugglery," and to find him in "a perfect muddle," and so on. The first "conjuring trick" is produced by a little conjuring on the preacher's own part. He cuts in two Haeckel's reference (p. 94) to "the transcendental design of the teleological philosophy of the schools," inserts a full-stop after "design," and then asks us to admire the stupidity or desperateness of a man who first excludes purpose from the universe—"in order to shut out God"—and then finds it in the organic world and calls it "mechanical teleology." If, moreover, Mr. Williams cannot see that the word "design" or "purpose" is used only in a figurative sense in the second application, he would do well to re-study the passage. A similar confusion is found in his criticism of Haeckel's treatment of consciousness and memory. He labours to prove that Haeckel must take the word memory figuratively in its lower stages—which is precisely what Haeckel obviously means. But the justification of applying the word "memory" to the function of a cell and to the human faculty lies in the whole mass of proof Haeckel has accumulated to show that they *are* the same function, and that the one passes gradually, as the nervous system develops, into the other. That is one of the most superficial truths of comparative psychology.[1] Then Mr. Williams turns to "psychoplasm" for more "conjuring." Haeckel is represented as "calling in psychoplasm to account for what protoplasm could not do"—which is false; psychoplasm being the same thing as protoplasm, but in a different relation, just as Dr. Lionel Beale speaks of "bioplasm"—and then as saying that "what springs from it is declared to be only a name for what protoplasm does." Mr. Williams foists on Haeckel a fictitious distinction, and then invites his admiring audience to make merry over the confusion it involves. Any student with a desire to understand, rather than to score rhetorical points, will see at a glance that Haeckel's terminology is perfectly consistent with itself and the facts. Protoplasm is the material substratum of all life; but when it takes on the form of nerve-tissue and becomes the base of nerve-life (which we all agree to call psychic life) it is described as psychoplasm. Just as Mr. Williams's procedure would be called clever from the intellectual point of view, but by a different name from the moral standpoint.

As a last instance of this poor "jugglery" I will quote one more passage. Haeckel, he says, "speaks of certain parts of the brain as 'the real organs of mental life; they are those highest instruments of psychic activity that produce thought and consciousness!' Look at the contradiction in that statement. Certain parts of the brain are said to be at once the *instruments* and the *producers* of consciousness! Talk about a doctor using instruments if you like, but do not talk of the instruments producing the doctor; and especially do not speak as if both statements could be true at the same time." This is a bewildering sort of

[1] We may compare Mr. Ballard's eagerness to point out that, whereas Haeckel grants *us* no souls or wills, he ascribes these even to the cells and atoms. It is the same curious and wilful misconstruction. Haeckel maintains that the force associated with the atom or the cell is the same fundamentally as that which reveals itself in our consciousness. That is the logical conclusion of all his proofs of continuous, natural development. He is, therefore, logically correct in speaking of the "soul" of the atom if we insist on speaking of the "soul" of man. The sensation and will he attributes to atoms are obviously figurative, and merely reminders of his doctrine of the unity of all force or spirit—a unity which Le Conte and Fiske and even Mr. Williams (when he is consistent) also admit.

criticism. Organs, instruments, and producers are clearly used by Haeckel in much the same sense. None but a pedant, or a desperate critic, would abuse us for saying that the stomach was the instrument and producer of digestion; certainly no one would misunderstand us. Thought is not a substantial entity like a doctor. The simile is totally misleading.

Happily, Mr. Williams finds we have arrived at last at the crucial point, and he says that it is: "Does the mind use the brain as an instrument, or does the brain really produce the mind? Haeckel's position is the latter. But do not suppose for a moment that he has any scientific proof of it." Anyone who is acquainted with modern psychology is aware that neither of the positions Mr. Williams puts is held by anybody of consequence nowadays. Spiritualist philosophers do not speak of the mind using the brain; and Haeckel, when you pay serious attention to *all* he says, does not hold that the brain produces the mind. Matter, he has said from the beginning, *never* produces force or spirit. They are two aspects of one reality, as Mr. Williams himself holds (p. 8). The sole question with Haeckel is whether this force we call the human mind is one with the force revealed in the animal mind and also in inorganic nature. That is naturally the first concern of a monist. Force, it is a truism in science, varies with its material substratum. When hydrogen and oxygen are united the resultant force has vastly different properties from what it had before. When water unites with fresh chemical substances, force takes on again a wholly new set of properties; and the more elaborate the material compound, the more elaborate the force. Protoplasm is a most highly elaborate chemical compound with a most intricate molecular structure. It is quite natural to expect the force-side of it to be very distinctive and peculiar; so we agree to connect *life* with the lower forces. But when protoplasm becomes psychoplasm, the complication greatly increases; the force varies in the same proportion. The psychoplasm or protoplasm of the higher animal brain advances still further in complexity, and, moreover, organic structure of the most intricate kind is added. Hence in the human brain, on physical principles, we must expect a manifestation of force vastly different from all that we find elsewhere. We find mind. Haeckel, on the strength of this very clear and scientific reasoning, and of all the facts as to the intimate dependence of mind on nerve-tissue which he gathers into several chapters, and all the facts as to the gradual unfolding of this force we call mind in exact correspondence to the growth in complexity of the nervous system, concludes that he sees no reason for thinking that the mind-force is specifically different from any other kind of force. I will return to this very important point presently. Meantime we see what there is in Mr. Williams's statement of Haeckel's position and his assertion that it is an idle assumption.[1]

[1] I dare not risk fatiguing the reader with a further analysis of Mr. Williams's criticisms under this head. I have treated them at some length, because this is the chief section of his criticism of Haeckel, and because, though this is the chief section of Haeckel's book, no other critic devotes more than a paragraph to it. But I will briefly point out some further instances of Mr. Williams' peculiar method. He says that, "as far as science goes," we are "quite free" to conceive the relation of mind to brain as that of "the musician and his instrument." That is gravely misleading. Science permits no such substantial independence of each other as there is between musician and organ. The only proper metaphor science would allow is the relation of music to the instrument; which is by no means so accommodating to the dualist. With the petty quibble about "truth" I will not delay. But on the next page (23) you will note how Mr. Williams quotes Haeckel's saying that "man sinks to the level of *a* placental mammal" (which no one questions, in substance), and in the next paragraph turns this into the grotesque doctrine "that human nature sinks to the level of *the lowest* placental mammal" (a very lowly beast)! Then he grumbles that Haeckel is "inconsistent in his estimates of man"; though he must know that Haeckel only belittles man relatively to the old theology. Then (p. 24), after a pedantic effort to make Haeckel say the mind of Shakespeare may have rivals in the animal world, he credits him with

Mr. Williams and his colleagues may be advised to take to heart the words of one of the ablest American psychologists, Professor Münsterberg, who is by no means a materialist. "The philosopher," he says, "who bases the hope of immortality on a theory of brain functions and enjoys the facts which cannot be physiologically explained, stands, it seems to me, on the same ground with the astronomer who seeks with his telescope for a place in the universe where no space exists, and where there would be undisturbed room for God and eternal bodiless souls."[1] All this criticism is neither more nor less than an attempt to defend gaps. If Mr. Williams replies that it is rather an attempt to point out gaps in Haeckel's system, the reply is obvious. The essence of Haeckel's system is monistic or negative. Any positive theories he may advance as to the relation of brain to memory or cell to consciousness are scientific theories, grounded on the best available evidence, but not final and unchangeable. If they prove inadequate, or if fresh facts discountenance them, they will be modified. But the essential part of his position remains. "The whole momentum of our knowledge of biological continuities," as Mr. Newman Smyth says, the whole momentum of our knowledge of cosmic processes, indeed, impels us to suppose the human mind was evolved. Where are the obstacles to such an assumption? Where are the specifically different—not merely *very* different, but different in kind—contents of the human mind which forbid us to suppose it? They are disappearing one by one as the sciences of comparative psychology and comparative philology and comparative sociology and comparative ethics and religion unfold their several stories. Everything has been evolved. To talk blandly of the "vast difference" between mind and matter is "an appeal to the imagination" and "an insult to the understanding," says Mr. Mallock. He goes on to censure the dishonest practice of contrasting the mind of the highest man with that of the lower animals. That is not truth-seeking. The truth-seeker will take the highest animal intelligence (as discovered by the observations of Darwin, Romanes, Lloyd-Morgan, Lubbock, and so many others) and the lowest human intelligence (as seen in the Veddahs or Hottentots, or as indicated by prehistoric human skulls) and ask himself whether he finds here a gulf which evolution could not be supposed to have bridged in something like 500,000 years. But if animals have the germ, ask some, why can you not raise one to a higher level? Setting aside the actual results of training, let us ask: Did it, on the theistic-evolution theory of man's origin, take God 300,000 years or more to raise the highest animal species to the miserable level man occupied 50,000 or 100,000 years ago? And do you ask man to do more than this in a year or two?

But, though it is well to remember that the essence of Haeckel's position is the reasoned exclusion of any new force, we are bound to give serious attention to the positive evidence he has accumulated. The verbal quibbles of Mr. Williams have not touched the structure of evidence given in Chaps. VII.–X. of the *Riddle*, and no other critic is in the field. To resume it briefly, we have a fourfold gradation of psychic force, or a fourfold exhibition of the growth of mind. In the first place, we may arrange all known organisms, from the moneron

the opinion that the difference between the mind of Plato and the animal is "slighter in every respect than that between the anthropoid ape and a bird"; whereas Haeckel had said "between the higher and the lower animal souls," which may mean the gorilla and the amœba. Then he finds a difference between the animal and the human embryo in the fact that the embryo will become a man and "the highest animal never will"; which is begging the whole question whether the highest animal has not actually done so. Such is the farrago of rhetoric opposed to us as the only and adequate reply to the most important section of the *Riddle*.

[1] *Psychology and Life*, p. 91.

to man, in a scale of mental faculty, or vital faculty leading up to mental, and we find a sensibly graduated development of mind, corresponding rigidly to the growth of structure in complexity. In the second place, we study the growth of the individual human mind from the impregnated ovum, and we find the same gradual formation of nerve and brain and the same proportionate unfolding of consciousness. In the third place, we learn from palæontology that living things have been developed from each other in the order in which the zoologist arranges his subjects, and which is confidently anticipated by the embryologist. In the fourth place, if we arrange the brains of all known men in a similar hierarchic scale, we find the same rigid correspondence of function and structure, or of mind-action and brain. Then there are supplementary and complementary lines of research. There is the life of the sub-conscious self, which Professor James says is a great world we are only just beginning to explore. Already the explorations show conscious action to be only a small area of mental action; the larger area is mostly mechanical, and the conscious area passes gradually into it and out of it. As Mr. Mallock says: "The human mind, like an iceberg which floats with most of its bulk submerged, from its first day to its last, has more of itself below the level of consciousness than ever appears above it." There are the facts of double and abnormal consciousness, the various kinds of mental paralysis resulting from lesion of the brain, the phenomena of somnambulism and narcotic action and artificial unconsciousness. There are the voluminous determinations of psycho-physics as to the exact correspondence between purely physical and chemical changes in the brain and changes in thought or emotion. There are the zealous investigations of the modern students of child-life and child-brain, showing the same exact relation of development. And there are the most recent and largely successful efforts to localise mental functions in different parts of the brain.

Now, let us be perfectly clear what this enormous mass of convergent evidence really means. When we study the stomach or the lungs in comparative zoology, and perceive the close correspondence, from the lowest to the highest forms, of structure and function, we do not dream of concluding only that the two have a very close connection: we say at once that they are in the relation of organ and its function: we say that the digestive force or the respiratory-force is the same throughout, and we can at the lowest end of the scale connect it with ordinary natural forces. Yet when we have this stupendous mass of evidence converging along a dozen lines to the conclusion that the mind-force is continuous throughout the animal kingdom, and is rigidly and absolutely bound up, as far as every particle of scientific evidence goes, with the nerve-structure, and is, at the lower end, continuous with the ordinary force of the universe, we are told we must draw no conclusion whatever. We are asked to believe that this mass of scientific evidence is quite consistent with a belief that some extraneous force, distinct in kind from the ordinary force of the cosmos, is "using" the nerve-tissue to manifest itself; and that the highly complex force which must result from the intricate molecular texture of the human brain is nowhere discoverable. On scientific principles "these facts," as Mr. Mallock says, "totally destroy the foundation of the theist's arguments." They teach us that, as he says again, "each mother who has watched with pride, as something peculiar and original, the growth of her child's mind, from the days of the cradle to the days of the first lesson-book, has really been watching, compressed into a few brief years, the stupendous process which began in the darkest abyss of time and connects our thoughts, like our bodies, with the primary living substance—whether this

be wholly identical with what we call matter or no."[1] If it were not for the presence amongst us of certain religious traditions about the nature of man's "soul," or mind-force, no scientist would ever hesitate for a moment to draw a conclusion which would be justified by every canon of logic and science—the conclusion that in this vast hierarchy of facts we see the world-force ascending upwards until it grows self-conscious in the human brain. Haeckel's attitude is the strictly and purely scientific attitude.

But, it is further urged, this is only a description of the manner of growth, not of the causes. "Thus," says Professor Case, "in presence of the problem which is the *crux* of materialism, the origin of consciousness, he first propounds a gratuitous hypothesis that everything has mind, and then gives up the origin of conscious mind after all." I have explained in what sense Haeckel attributes mind to "everything"—though a skilled metaphysician might be expected to see that. To the second point I reply that the whole of this evidence is an explanation of the origin of mind. The whole evidence points to the conclusion that conscious mind is an outgrowth of unconscious, and that this is the generally diffused cosmic force. But you cannot derive the conscious from the unconscious, say several critics. The objection is childish. If we are to explain anything, as Sir A. Rücker said, we cannot explain it in terms of itself: the conscious *must* be derived from the unconscious. And as a fact, Mr. Mallock points out, you do get consciousness out of the unconscious every day—in the growth of the infant; or, as Lloyd Morgan puts it, in the development of the chicken from the egg. In any case, the critics plead, you are only saying *how* and not *why* mind was evolved. Now, in so far as this is a plea for teleology, we remand it, as before. If it is anything more than this, it is a plea for gaps and breaches in the mechanical scheme of the universe, building fallaciously (as usual) on the present imperfection of science. Take the development of the embryo. We certainly can do little more as yet than describe its stages. But no one now doubts it is a mechanical process. The assumption that some non-mechanical force was grouping and marshalling the molecules of protoplasm, according to a design of which it was itself totally unconscious, only plunges us in deeper mysteries than ever. Moreover, the facts of heredity, the transmission of bodily marks and features and peculiarities, point wholly to a mechanical or bodily action. The development of the mind on a cosmic scale is still more clearly mechanical. There is not a single fact that compels us to go outside of the range of familiar cosmic forces to seek an explanation.

I will add one or two illustrations from recent science to show how its progress tends more and more to confirm Haeckel's position. Sir W. Turner closed his presidential address to the British Association three years ago with these words (which were duly censured as "materialism"): "At last man came into existence. His nerve-energy, in addition to regulating the processes in his economy which he possesses in common with animals, was endowed with higher powers. When translated into psychical activity, it has enabled him throughout the ages to progress from the condition of a rude savage to an advanced stage of civilisation." Thus is the very language of Haeckel used on our supreme scientific solemnity. The following year Professor D. J. Cunningham (M.D., D.Sc., LL.D., D.C.L., F.R.S.) was the president of the Anthropological Section of the Congress, and his presidential address was devoted to "the part which the human brain has played in the evolution of man." The whole speech was a vindication of the purely mechanical explanation of the rise of man. Instead of

[1] *Religion as a Credible Doctrine*, p. 77. The last phrase is superfluous. No one "wholly identifies" the primary living substance with "matter." Matter and force are two aspects of it, as brain and mind are.

seeking the influence of external powers, Professor Cunningham looks for more prosaic changes that may have led to the segregation of man. The reader who is only accustomed to rhetorical and spiritualistic treatment of the theme will learn with a shock that the mere formation of a habit of setting the hands free for other purposes than locomotion probably had a profound effect on the brain and intelligence. "So important is the part played by the human hand as an agent of the mind, and so perfectly is it adjusted with reference to this office, that there are many who think that the first great start which man obtained on the path which has led to his higher development was given by the setting of the upper limb free from the duty of acting as an organ of support and locomotion." It hardly needed divine intervention or guidance to suggest this change. The hand-centre in the brain is located in such a region that its development must react on the cortex. Further it is "the acquisition of speech which has been a dominant factor in determining the high development of the human brain." The centre for facial expression is contiguous to that of the hand, and, as communication began to grow between the primitive men, much facial expression would be used, giving a still further stimulus to the brain. In fine, not only is language shown by the philologist to be an evolutionary product, but the physiologist finds that the distinctive structures in the human brain (though they may occasionally be fairly traced in the brain of the anthropoid ape) which are connected with speech are the outcome of "a slow evolutionary growth." Thus is science coming to determine the physiological line of evolution which gave the first distinction of brain-power, on which natural selection has fastened so effectively.[1]

Thus are the mechanical methods of science bridging the supposed gulf. There is no longer serious ground for claiming a unique position for man, and it is not surprising to find the leading theologians sounding the retreat once more. We are, in fact, beginning to realise that the dualist theory of man never did afford any "explanation" of anything. The connection of soul and body was always incomprehensible;[1] nor is there the slightest intellectual satisfaction in covering up the whole mystery of the mind with a label bearing the word "spirit." Psychology has deserted its old ways and become a science. The theologians will do well not to wait until they are again ignominiously splashed by the advancing tide of scientific research. Their efforts to "show cause" why we should not apply the mechanical process of evolution (whether divinely guided or not) to the growth of man have hopelessly failed.

But before we leave the question it is necessary to consider for a moment the question of the liberty of the will. Here Haeckel's opponents are content to appeal to what Emerson calls "the cowardly doctrine of consequences." We shall consider the moral outlook of a monistic world in a later chapter, but

[1] Let me quote Professor Cunningham's conclusion: "Assuming that the acquisition of speech has afforded the chief stimulus to the general development of the brain, thereby giving it a rank high above any other factor which has operated in the evolution of man, it would be wrong to lose sight of the fact that the first step in this upward movement must have been taken by the brain itself. Some cerebral variation—probably trifling and insignificant at the start, and yet pregnant with the most far-reaching possibilities—has in the stem-form of man contributed that condition which has rendered speech possible. This variation, strengthened and fostered by natural selection, has in the end led to the great double result of a large brain with wide and extensive association-areas and articulate speech, the two results being brought about by the mutual reaction of the one process on the other."

[1] Compare Professor Herbert's desperate predicament in his *Modern Realism Examined*, which we are urged to read: "We may regard the material world as real, but if we do we must deny the existence of all but Creative Intelligence. . . . If the material world is as it *seems*, it contains no minds" (p. 148). Mr. Mallock points all this out to Father Maher very forcibly in his *Religion as a Credible Doctrine*.

may observe in passing that all this kind of reasoning is futile and insincere. It will not make the least practical difference to life whether psychologists do or do not agree to leave unimpaired the old formula of "the liberty of the will." A man can control his actions to a great extent, and will to that extent be responsible for them. On that we have the witness of consciousness. How this apparent power of choice arises in a mechanism like the mind we can hardly expect to understand until the new psychology has made some progress. But the old idea of a "self-determining power of the will" is now "an unthinkable conception," as Dr. Croll (who is on the list of the sound scientists) emphatically says. Mr. Mallock also thinks that "every attempt to escape from the determinism of science by analysis or by observation is fruitless." No sooner do we begin to look closely into our free-will than we find the supposed area of its action shrinking rapidly: we find ourselves in a perfect network of determining influences. Our will is the slave to our desire; we cannot will what we do not desire, nor what we desire the least or the less. Our desire can always be traced to our circumstances, our education, our character and temperament. And our character and temperament — here modern science has had a great deal to say—are determined by heredity and environment. The attempt to break through this network with a cry of alarm about consequences is futile. There will be no practical consequences of an evil character; and the consequences for good of the scientific attack on the old doctrine, from the days of Robert Owen down, have been incalculable. The community is a self-conscious determinism. Now that it knows how much heredity and environment have to do with character and desire, and with the healthy balancing of desires, it will take action. The whole of education and social reform have benefited enormously by the overthrow of the old scholastic notion of the will. Such "freedom" as we now find we have—if we may still use the word—is not different in kind from that which a cat or a dog evinces every day.

We conclude, then, that Haeckel's opponents have shown no plausible reason why evolution should not extend to the origin of man. The great achievements which distinguish man to-day from the animal world—art, science, philosophy, religion, civilisation, language—are known to have been formed, from very rudimentary beginnings, by a long process of evolution. At their root, in the men whose skulls and bones and rude implements are unearthed to-day, we find only a somewhat more elaborate brain, with deeper furrows and more convolutions, a somewhat higher grade of intelligence and emotion, than in the higher animals about us. There is no gulf, no gap: but there is a period of some 300,000 years for natural selection to work in. Comparative anatomy is beginning to trace the steps—quite natural, if not at first casual, steps—by which man ascended in this direction. A chance variation in the use of the limbs could, it seems, greatly stimulate the most important part of the brain. Any increase of brain-power would prove of enormous advantage, and would be "selected" and emphasised at once. In any case the momentum of continuity and the mass of evidence for actual continuity are enormous. It is no less scientific than philosophical to see in the growth of the human mind a further extension of the life-force of the cosmos, a further embodiment of the great matter-force reality which unfolds itself in the universe about us and in the wonderful self-conscious mechanism of the mind.

Chapter VI

THE IMMORTALITY OF THE SOUL

Until a few centuries ago a belief in the immortality of the soul harmonised so well with the prevailing conception of the world at large that men were content with but slender rational proof of it. Even then, it is true, the tragedy of death seemed to the eye so final—the curtain seemed to be rung down so inexorably on the conscious soul—that sceptics were not wanting. The Sadducees amongst the Hebrews, the Epicureans amongst the Greeks, and the *materiarii* of early Christian times, rejected the belief entirely. Some of the ablest of the mediæval schoolmen (such as Duns Scotus) went so far as to deny that any rational proof could be devised in support of the belief. But for most men the belief was credible enough, and not unwelcome. Immortality was a familiar idea to them. Not only God and the angels had that prerogative, but the very stars they looked on night by night were believed to be of immortal texture. In a world where the immortal outnumbered the mortal, man could well convince himself that the tradition of his own immortality was true.

But the world has grown into a universe to-day, and from end to end of it comes only the whisper of death. The stars, that had been regarded as fragments of immortal fire, are known to be hastening to a sure extinction. The moon stands close to us always as a calm prophet of death. Such as it is, the corpse of a world, will our earth one day be. Such will our sun finally become; and after him, or with him, the hundred millions of his fellows in the firmament. Countless dead worlds already lie on the paths of heaven; and the millions that are yet unborn will have the same fate. Man now sees in the universe at large no shadow of support for that promise of unending life he has entertained so long.

> "What! shall the dateless worlds in dust be blown
> Back to the unremembered and unknown,
> And this frail Thou—the flame of yesterday—
> Burn on forlorn, immortal, and unknown?"

Death is the law of all things. It is true that the great reality that shapes itself in a million forms never dies. That is *its* first law. But of every single embodiment of its restless energy, of every individual being that pours out of its womb, the path is measured and the fate is written.

> "Life lives on.
> It is the lives, the lives, the lives, that die."

So the position of the belief in personal immortality has changed. The pretty thoughts that supported it, or accompanied it, in the mind of a Plato or an Augustine, crumble beneath the burden some would lay on them to-day. The cosmic odds are against it. It is now the assumption of a stupendous privilege on the part of one inhabitant of the universe, who flatters himself he is exempted from the general law of death. We look up now to no immortal stars for reassurance as we turn sadly from the truthful face of the dead. The angels have retreated far from the ways of humanity. God has shrunk into an intangible cosmic principle. If belief in immortality is to be anything more than a despairing trust, it must appeal to the presence in man of some unique power and promise. But we have seen that modern science completely discredits the "supposed separateness of man from the brutes," to use the words

of Le Conte. The thinking force in him is the same force that reveals itself in the industry and ingenuity of the ant or the affection of the dog. Why shall it survive the corruption of the brain in this case, yet in their case die away as surely as the light dies when the sun sets? It would seem that it is not so much a question of examining Haeckel's disproofs, as of asking where we are to look for the ground of this stupendous claim.

We shall fully consider both points in the light of the criticisms passed on Haeckel's chapter on immortality and the works on the subject which are opposed to him. The actual criticisms will detain us very little, for an obvious reason. Haeckel has already destroyed the ground for any claim of a unique character of the human mind. We have seen with how little success his opponents have tried to impede or retard his progress from point to point of the evolutionary scheme. The very latest researches of science confirm his theses. The ablest Christian apologists yield their arms and desert the long-defended breaches. We have been borne along by the flood of scientific evidence, philosophically considered, as far as the closing thesis of our last chapter. Man is the latest and highest embodiment of the universal matter-force reality. It would seem that the acceptance of this thesis is equivalent to an abandonment of the belief in immortality, but we shall see that evolutionists like Fiske, and Le Conte, and Mr. Newman Smyth still erect feeble barriers. Meantime, let us dispose of the less advanced critics; those who reflect the ideas of the average church-goer and strive to offer some defence of them.

There is Dr. Horton, for instance, who pleads much for "the naïve, but essentially correct, conceptions of our ancestors." Dr. Horton seems to think it most effective to urge that men who do not share the belief in God and immortality live on "bestial levels," and are "shrunk in soul, warped in mind, and degraded in body." The "intellectual strain" of Haeckel's scientific work is kindly said to relieve him personally from these consequences, but one gathers that we who are not great scientists fall under Dr. Horton's merciless logic. "Accustom yourselves," he says, "to believe that God and freedom and immortality are hallucinations; accustom yourselves to the idea that this stupendous order of being in which we live is not a rational order at all, but the mere fortuitous concourse of atoms [!], and by an inevitable logic, as our anarchist friends see, when you have got rid of the first lie, which is God, you quickly get rid of the second lie, which is righteousness, and then you get rid of all the other lies, which are love, and truth, and peace, and joy, and civilisation and progress generally, and poetry, and life." We will not stay here to discuss this insincere rhetoric. It is too great a libel on Dr. Horton himself, if we take it seriously, and too insulting to the intelligence of his readers—who, one may assume, happen to know a few agnostics. Nor need we be detained with the various criticisms in *Light*. The chief of these articles states that Haeckel relies on "physics" to disprove the immortality of the soul; more curiously still, a second writer in *Light* (Jan. 19th, 1901) *does* rely on physics (the conservation of energy) to rehabilitate the belief. The second writer, moreover, completely ignoring Haeckel's deliberate words, assures his readers that he "is terrified at the thought of life beyond the grave," and adopts the grotesque title of "A Frightened Philosopher." We shall not get much light from that side.

Most of the critics we have already passed, attempting loyally to defend one or other of the supposed breaches in the evolutionary doctrine, so that they make little resistance here. When, in the course of the next ten years, they have fallen back on this last position—probably discovering that, on theological principles, man *must* have been evolved

—they will begin to repeat the arguments of Fiske and Le Conte, which we shall presently consider. But there are several critics who, setting aside the question of evolution as not essential to defend, formulate their objection thus. Science proves up to the hilt that brain and mind are correlative. As brain develops, the mind opens—and in strictest proportion. Lesion or other affection of the brain proportionately mars the mental or emotional life. Psycho-physical observations show that the intensity of brain-action quite corresponds to the intensity of mind-action. Let us grant all this. But, they say, all this throws no light whatever on the question whether the mind may not outlive the brain. "It's logic!" exclaims Mr. Brierley, contemptuously, when he comes to this part of Haeckel's scheme. Mr. Williams and Dr. Horton, and others, make the same reply. Indeed, as accomplished rhetoricians, they offer Haeckel a pretty figurative way of conceiving the relation, which may help his sluggish imagination and correct his logic. Mind-action is like the music a master evokes from the piano or violin. A musical instrument maker would, like the psycho-physicist, find an exact correspondence between the ailments and defects of the violin and the disorders of the music, or between the violence of the molecules of string and wood and the intensity and tone of the music. But—Haeckel has forgotten the player! Brain and thought are instrument and music. Where, in Haeckel's philosophy, is the instrumentalist?

A very singular omission on the part of one of the keenest observers in the world! Let us examine the matter. We have seen in the preceding chapter the immense mass of scientific evidence which goes to show that there is an exact correspondence between brain-action and soul-life. The correspondence is just the same in man as in the ape or the dog. As the shadow varies with the object which projects it, so does thought vary with the quality and action of the brain. There is no dispute about this. No induction is based on a wider and more varied range of observations. This correspondence is the same as we find in the case of the heart and its function, the stomach and digestion, or the lungs and respiration. Now, in all these analogous cases we do not seek an instrumentalist. The instrument is automatic. For its formation we look back along a process of natural evolution which stretches over 50,000,000 years. Whether the evolutionary agencies were divinely guided or no will be considered presently, but at all events in the heart and lungs we have automatic instruments, and we never dream of looking for a present instrumentalist. It is the same with the brain of the dog. When the dog dies, we do not ask what has become of the instrumentalist now that the instrument (brain) is broken and the music (thought) is silent. We never dream of there being a third element. But the mind of man is the same mind more fully developed.

In a sense there is a third factor—both in the stomach, the canine life, and the human life—and this is the only truth there really is in this very misleading figure of rhetoric. I have already mentioned a critic who endeavours to deduce the immortality of the soul from the conservation of energy, and this gives us the clue. Critics very stupidly, or very wilfully, represent Haeckel as saying that thought is a movement of the molecules of the brain, just as they say he resolves all things into matter. They ignore the fact that he lays as much, if not more, stress on force than on matter. He holds, of course, that there is fundamentally only one reality, but it is most improper to call that by the name of *one* of its attributes (extension). Thus we have, in a sense, three elements: the instrument, the music, and the soul or energy associated with the brain. When Haeckel speaks of thought as "a function of the brain," he means the *living* brain—the incomparably intricate structure of material elements and

the natural forces associated with them, in which thought arises. We have no scientific or philosophical ground whatever for postulating any further element to explain the music. Is it scientific to make an exception of this living brain, and say it is the only non-automatic organ in the body? Does its relation to the rest of the body give the least support to the notion? Is it scientific to say the living brain is automatic in the whole animal world, but cannot be so in man because the music is finer and more difficult? Does embryology favour the idea? Does philosophy step in, and bid us suspend the scientific method and admit a breach in the scientific continuity?

Probably it is to philosophy they will appeal. These ideas, Dr. Horton says, "rest on the region of thought and consciousness" to which Haeckel "studiously closes his eyes." By all means let us go to philosophy. Kant will tell us that these psychological proofs of immortality are quite discredited. Schelling and Hegel and Schopenhauer will give us the consolation of disappearing in the world-process. Hume and Mill and Spencer will prove more than sceptical. Most modern philosophers will tell us, as Münsterberg does, that "the philosopher who bases his hope of immortality on a theory of brain-functions . . . stands on the same ground as the astronomer who seeks with his telescope for a place in the universe where no space exists, and where there would be undisturbed room for God and eternal bodiless souls." Certainly one can quote thinkers who wish mind and brain movements to be left parallel, with the relation of the two undetermined. But they advance no reasons which arrest the application of scientific method. Here in the mind-life are phenomena that we can examine from two sides—from without and from within. This may seem at first to give a certain uniqueness to the soul-life. But the only soul-life we can examine from within is our own individual experience. Every other man's soul is a matter of objective examination to us; and by much of the same evidence which convinces us of his similar experiences, we are forced to extend conscious mental action to the brutes. So the uniqueness once more disappears. Philosophy will not help or hinder us. Referring to the work of Professor Royce, a distinguished American philosopher and Gifford Lecturer, Professor Le Conte says: "He gives up the question of immortality as insoluble by philosophy. Well—perhaps it is."[1]

Thus (reserving some further philosophic arguments for the moment) we return unembarrassed to our scientific procedure; and "science," Prof. Münsterberg says, "opposes to any doctrine of individual immortality an unbroken and impregnable barrier."[2] The rigid relation determined by psycho-physics, the rigid relation observed in the evolution of the thinking animal, the rigid relation that is recorded by pathology and ethnology, and that lies on the very surface of life, means something more than parallelism. It is easy to quote Huxley and Tyndall in opposition to Haeckel's formula. The one was an idealist in metaphysics; the other has said much more in the monistic sense than he ever said in the agnostic. Proceeding on realistic and scientific lines, we are driven by the rules of induction to regard thought as wholly bound up with brain, and to look for no third element beyond the matter and force of which the brain is so intricately constructed. The mysteries that still linger about consciousness and memory, just as about embryonic development, for instance, are *scientific* mysteries. To build on them would be to repeat the discredited old tactics. If the theories of them which Haeckel offers are unsatisfactory, wait for better ones. They are the light bridges of the monistic system, forecasting the scientific advance. But that, in whatever way, mind-force *is* an evolution of the general cosmic-force,

[1] *The Conception of God*, p. 75.
[2] *Psychology and Life*, p. 85.

and that it therefore affords no more promise of immortality in the individual human mind than it does in the individual motor-car, is a scientific induction resting on a mass of evidence and drawn up in observance of the most rigid rules.

Let us now consider the arguments brought forward in favour of the belief in immortality by those who have not lingered to defend any evolutionary gap, but who freely admit the evolution of the human mind. These are the "replies by anticipation" which, we are told, should have withheld Professor Haeckel from his extreme conclusions. Let us see how puny and fruitless are the efforts they make to overleap the "unbroken and impregnable barrier" that Professor Münsterberg speaks of. Münsterberg himself offers a curious example of the way modern philosophers, especially idealist philosophers, lend a nominal support to religious doctrines, yet are found to mean something totally different from what the world at large understands by those doctrines. As the words I have quoted show, he is as hostile as Haeckel to any belief in personal immortality. "Only to a cheap curiosity," he says again, "can it appear desirable that the inner life, viewed as a series of psychological facts shall go on and on"; and again: "The claim that the deceased spirits go on with psychological existence is a violation of the ethical belief in immortality."[1] Thus he rejects the only notion of immortality which is in any plausible way connected with those moral consequences that are so much urged upon us. However, he speaks of an "ethical belief in immortality," and so is gathered by controversialists into the imposing category of "scientists opposed to Haeckel." The immortality he promises us is no more consoling than that offered by Comte or by Haeckel himself. "Life lives on." It is a natural expression of his idealism. "For the philosophic mind," he says, "which sees the difference between reality and psychological transformation, immortality is certain; for him the denial of immortality would be even quite meaningless. Death is a biological phenomenon in the world of objects in time; how then can death reach a reality which is not an object but an attitude, and therefore neither in time nor space?" He meets the scientific evidence by getting rid of the body and death, and the material world altogether.

Professor W. James, another able American psychologist whom Mr. Ballard and Mr. Williams and several ecclesiastical papers urge us to read, has made his profession of faith at the close of his recent Gifford Lectures, published under the title of *Varieties of Religious Experience*. We shall see that it does not include a belief in God. On our present question it is little more helpful to the Christian. Professor James is convinced as a spiritist that there are non-human intelligences in existence, but he is not yet convinced that these external intelligences are the souls of men and women who have "passed beyond." So far he lends no real support to the doctrine of immortality. Professor J. Royce, another distinguished American thinker whom the Gifford Trust has invited amongst us, "gives up the question of immortality as insoluble by philosophy"; so Professor Le Conte assures us.

Mr. Le Conte himself, we saw, follows this statement with a candid admission that "perhaps it is." But he is not disposed to yield entirely as yet. Where does so thorough an evolutionist find ground for ascribing this unique prerogative to the human soul? He professes to find it precisely in the "evolutionary view of man's origin." If that view of the world-process which we have hitherto sustained is correct, it follows, he says, that the human mind-force is "a spark of the Divine Energy" and a "part of God." So is the force of a motor-car, on his principles. But, he says, the universal

[1] *Psychology and Life*, p. 280.

spirit (Haeckel's universal substance on its force side) has worked its way upward through the hierarchy of evolution, so that it (or God) "may have, in man, something not only to contemplate, but also to love and to be loved by"; and in view of that project, which is not supposed to be a temporary project, man must be immortal.[1] The frailty of the position is obvious. It assumes that the "Divine Energy" (which is Haeckel's substance) was intelligent and had "designs" from the beginning. We shall consider the grounds of this assumption in the next chapter. But, granting it for the sake of the argument, we are asked to conceive this eternally intelligent principle going through a laborious process of evolution in order to reach consciousness in the human mind and admire itself, and love and be loved by itself, in that form; for the mind *is* God, on these pantheistic principles. Moreover, supposing that we could gather this remarkable project, it contains no promise whatever of immortality for the individual; the "Divine Energy" is incarnated in so many forms, and will be throughout the eternal world-process, that the perishing of one form or of one world will hardly diminish its contemplation or its admiration. Further, if man *is* God, how comes he to be ignorant of the project? What becomes (theoretically) of moral distinctions? But this fantastic theory bristles with difficulties.

Mr. Fiske's conclusion is very similar to Professor Le Conte's, as will be expected from the similarity of his premises. The doctrine of evolution, he says, does not destroy our hope of immortality. "Haeckel's opinion was never reached through a scientific study of evolution, and it is nothing but an echo from the French speculation of the eighteenth century"; and "he takes his opinion on such matters ready-made from Ludwig Büchner, who is simply an echo of the eighteenth century atheist La Mettrie."[1] How Fiske could ever pen such an egregious statement about either Haeckel or Büchner is one of the mysteries of religious controversy. After our review of Haeckel's arguments it may very well be ignored. And when Fiske has come to the end of this petty and petulant criticism of Haeckel we find him presenting a conclusion almost less satisfactory than that of Le Conte. The substance of his argument is that "there is in man a psychic element identical in nature with that which is eternal" (p. 170). On the face of it, that is just what Haeckel says. Man's mind-force is a little eddy or focus in the eternal cosmic force. There is no ground whatever for assuming that *as* such it will be eternal, and will not simply sink back into the eternal stream, like all other temporary concentrations. The only difference is that Fiske takes the eternal principle to be conscious and intelligent from the first—a point we discuss in the next chapter.

There remains only the argumentation of Mr. Newman Smyth in his able but pathetic attempt to reconstruct Christian belief on a scientific base.[2] The argument itself is an old one, but it is put with some freshness. He points out that the evolutionary process has just reached an important stage. Evolving nature has at length passed beyond mere animal life and reached the threshold of the spiritual life. Since, then, we discern an upward purpose in evolution, it is impossible to suppose that the process will end now that so promising a stage has been reached. To this we need only reply that, whether or no "purpose" is discernible in nature (which we shall deny), this further evolution will take place in the race taken collectively. This is so clear that Mr. Smyth makes a desperate effort to apply his argument to the individual. He says the "last word of organic development is the individual

[1] *The Conception of God*, p. 77.

[1] *Through Nature to God*, p. 144.

[2] *Through Science to Faith*, p. 265 and foll.

and his worth," and he appeals to "nature's increasing estimate of individuality in comparison with the species." Now, if we take this in the only sense in which it could be conceived to help a belief in personal immortality, it is totally opposed to the scientific evidence. The only way in which nature seems more concerned about the individual is in the perfection which she gives to the individuals of the later species; but this is absolutely necessary if the species itself is to advance. In all other respects nature, as ever, is indifferent to the individual—or, for the matter of that, if we take a long enough perspective, to the species itself.

The supplementary consideration which Mr. Smyth submits is still feebler. He contends that, though evolution is generally continuous, it shows what he calls "critical periods." He instances the changes which take place in a drop of water as it sinks to freezing-point or rises to the point of evaporation. He thinks science does not preclude the possibility of some analogous "critical period" for the human soul. Nay, he says, getting bolder, biology favours such a view. Look how "very slight and easily changed" is the connection between mind and organism at certain times—at conception, in sleep, and when we near death. Biology, he says, shows that "the mind does not need for its birth and its coming to its inheritance a whole body, a complete brain, a fully-formed organ of sense, or so much as a single nerve; a few microscopic threads of chromatin matter in the egg are enough." Hence, if at both ends of life the bond that links mind and body can wear so thin, it is conceivable that it may be dispensed with altogether. Now, this is a most perverse piece of reasoning. At conception, and long after conception, we have no right to say that the mind is there at all. It appears and grows with the brain—that is all the evidence says. The facts point to a conclusion diametrically opposed to that of Mr. Smyth. They show complete and slavish dependence. As to heredity, it is gratuitous to say it is the mind, and not the body, that inherits. Even Dr. W. N. Clarke (who, with many modern theologians, does not believe that the "soul" is transmitted from parent to child) says the facts of heredity point to the mechanical, not the spiritual, theory. At death we see the same rigid dependence of mind on organism, instead of finding anything like a token of an independent mind. The mind flickers and goes out—as far as evidence goes—in exact proportion to the last spluttering and extinction of the physical life of the body. At both ends of life, as throughout its course, the correlation of mind-action and brain-action is rigid and absolute. And, finally, what Mr. Smyth unfortunately calls "critical periods" in nature have not the least analogy to the notion of the mind-force existing apart from its material substratum. A different grouping of the water-molecules naturally gives rise to different properties; so does a different grouping of brain-molecules (in fever, under opium, &c.) give rise to different mental qualities. When we find a case of the properties or forces of a substance parting company from, or changing independently of, the material substratum, we shall have found some ground in nature for the conception of a disembodied soul; but not until then.

Such are the feeble defences which are to-day set up by the apologists who have scientific attainments in the Christian body. On the strength of these ethereal speculations we are asked to resist the weight of the scientific evidence as to the relation of body and soul, and to admit for man a privilege that is unknown from end to end of the universe. We are asked to believe that with the aid of a fantastic and desperate philosophy such as this we can overleap science's "unbroken and impregnable barrier." We are asked to call Haeckel "an atrophied soul" and "a child in spiritual reasoning" because he will not abdicate his scientific method and

procedure in the face of such speculations as these. I have not, it is true, examined the argument for a future life from the alleged exigencies of the moral order; but this is little urged to-day, and we shall see, when we come to deal with the monistic ethics, that it rests on a false conception of moral law.[1]

I have sought, in particular, and stated with perfect fidelity, the arguments of those modern scholars who are opposed to him as being equally informed in science and equally convinced of evolution. The reader may judge whether he or they are the more philosophic, logical, and scientific in procedure.

Chapter VII

GOD

We now enter upon a new and almost the final stage of our direct vindication of monism. If we have succeeded so far in warding off the objections which have been urged against Haeckel's position, if we have shown that the very latest scientific research increasingly confirms his position, it is clear that we have covered considerable ground. We have discerned in the stupendous process of cosmic evolution the growth or the unfolding of one great reality that lies across the immeasurable space of the universe. An illimitable substance, revealing itself to us as matter and force (or spirit), is dimly perceived at the root of this evolution as a simple and homogeneous medium (prothyl), associated with an equally homogeneous force. Then the continuous prothyl, by a process not yet determined, forms into what are virtually or really discrete and separate particles —electrons: the electrons unite to build atoms of various sizes and structures, and the rich variety of the chemical elements is given, the base of an incalculable number of combinations and forms of matter. Meantime the more concentrated (ponderable) elements gather into cosmic masses under the influence of the force associated with them: the force evolving and differentiating at equal pace with the matter (with which it is one in reality). Nebulæ are formed: solar systems grow like crystals from them: planets take on solid crusts, with enveloping oceans and atmospheres. Presently a more elaborate combination of material elements, protoplasm, with—naturally—a more elaborate force-side, makes its appearance, and organic evolution sets in. The little cellules cling together and form tissue-animals, which increase in complexity and organisation and centralisation until the human frame is

[1] Neither have I, it will be noted, referred to the empirical or spiritistic evidence for the persistence of mind, which gains increasing favour to-day. This is not due to any lack of respect for the distinguished scientists who have admitted such evidence, or for the sobriety and judgment of so many about us to-day who receive it. It is due to the utter futility of discussing evidence of this kind. It is of such a nature, resting so largely on delicate moral considerations, that it must in my opinion be left entirely to personal examination in the concrete. But that Haeckel is right in saying the subject is obscured with much fraud and triviality is admitted, not only by life-long students like Mr. Podmore, but by many earnest spiritists.

produced, the life-force growing more elaborate with the structure, until it issues in the remarkable properties of the human mind.

The tracing of this picture is the ideal that science set itself a quarter of a century ago. The success has been swift and astounding. We are still, as Sir A. Rücker said, living in the twilight; but no man of science now doubts that what we *do* see is the real outline of the universe and its growth. But other and different cosmic speculations held the field, and these were ultimately connected with the powerful corporations and the intense emotions of religion. As science advanced theology began a long process of adaptation to the new thought. The ambition of science was to cover the whole ground with a scheme of mechanical and orderly explanation, because the instinct of science felt that the universe was an orderly and continuous structure. The ambition of the theologian was to detect and exult over gaps and breaches in this mechanical scheme, and introduce his supernatural agencies by means of them. We have seen that many of the ablest theistic apologists of our day (Ward, Smyth, Le Conte, Fiske, Clarke, &c.)—almost all, indeed, of those who have scientific equipment—grant the ability of science, now or in the near future, to cover "the whole cosmological domain" with its network of mechanical causation. We have seen that there is a general disavowal of "a theology of gaps" or of the desire to build on the temporary ignorance of science. But a few heroic souls still linger in the familiar trenches, and we have fully considered what they have to say. With Smyth, Le Conte, and Fiske, we have been forced to conclude that so far we have seen in the cosmic process the orderly unfolding of one sole all-diffused matter-force reality, which we commonly call Nature.

But we have throughout, for the sake of clearer procedure, reserved one consideration that these advanced evolutionists have been urging on us at every step—that is to say, the claim that the evolutionary process must have been intelligently set going and intelligently directed. Haeckel is quite right, they say, in claiming that science can give or adumbrate a mechanical interpretation of the whole process. Quibbles about his particular way of conceiving the first formation of life, or of consciousness, and so on, are irrelevant and distressing to the serious thinkers, as is the diversion of the issue by discussing his taste, or his knowledge of history, or his optimism or pessimism. The important point is that he has proved his case so far in its essentials. But he must now meet this last position of his opponents. Was this monistic cosmic process conceived and designed from the beginning, and guided throughout, by an intelligent being, or no?[1] This is the question of the hour, and especially of the coming hour, in apologetics. As I write a journal reaches me containing an interview with Mr. Ballard. Asked whether he thinks "the rehabilitation of religion would come from the scientists," he replies: "I think that the theistic basis of Christianity will have scientific support more than ever. Modern science is pledged to evolution, and Christianity can only be justified scientifically on evolutionary lines." And Professor Le Conte says: "Here is the last line of defence to the supporters of supernaturalism in the realm of Nature . . . it is evident that a yielding here implies not a mere shifting of line, but a change of base: not a readjustment of details only, but *a reconstruction of Christian theology*. This, I believe, is indeed necessary."[2] And we have already seen passages from Ward and others to the same effect.

Here is a dramatic simplification of the controversy, which every thinker

[1] Let us note in passing that this is not necessarily a question of monism or dualism. Mr. R. Williams and others expressly state they are monists, that God is not distinct from Nature. More about this presently.

[2] *Evolution and Religious Thought*, p. 295.

will welcome. Theology will, as before, spread itself over the whole cosmos, but it will be with the repetition of a single formula. There will no longer be ceaseless quarrels as to whether science can explain this or that phenomenon with its natural or mechanical causes. The new attitude is that this mechanical explanation is precisely the work of science, and if it cannot give a mechanical explanation of a thing—say, consciousness—to-day, we will wait patiently till to-morrow. But, the new theologians say, we want to know in addition how these mechanical causes came to co-operate in producing such remarkable structures. With this science has nothing to do, so we close our thirty years' war and sign an eternal truce. Nay, if we look at the matter rightly, these theologians of the twentieth century say it is very desirable that science *should* complete its mechanical interpretation of the cosmos. An automatic universe, evolving by inherent forces from electrons to minds, would be the most marvellous mechanism ever conceived. The mind would be *forced* to look for the engineer. Those ancient theologians who scoffed at Tyndall for his Belfast address were too hasty; so were those who caused Huxley to compare their dread of the mechanical scheme to the terror of savages during an eclipse of the sun; so are those who beat their wings in vain against Haeckel's structure to-day. The materialist will be the truest auxiliary of the theist. If he can only show that the universe is the unfolding of one form of matter and one force (or one matter-force reality), he has put before us one of the most stupendous machines that ever bore the mark of intelligence.

We are then, it seems, approaching the psychological moment in the great drama of the conflict of science and religion. That I am indicating a true tendency will be perfectly clear from the preceding chapters. We have rarely found men of ability or of complete scientific equipment defending the old trenches that barred the advance of the mechanical system of science. We have constantly heard impatient denials of a love for "gaps." But before I proceed to show how Haeckel has met this teleological position, let me quote a few recent writers, both to show that the formula is as simple as I said, and that concentration on this position is the order of the day.[1] I have quoted Professor Ward's opinion that, "if there has been any interference in the cosmic process, it must have been before the process began." Dr. Croll, in his *Basis of Evolution*, distinguishes between producing (mechanical) and determining (directive) forces, and tells the theologian of the future to confine his attention to the latter: "The grand, the difficult, though as yet unanswered, question is this: What guides the molecule to its proper position in relation to the end which it has to serve?" With Mr. Newman Smyth the supreme question is: "Is evolution without guidance or with guidance?" Mr. Fiske says: "There is in every earnest thinker a craving after a final cause . . . and this craving can no more be extinguished than our belief in objective reality."[2] Dr. Dallinger says that, if the mechanical philosophy is true we have "a more majestic design than all the thinkers of the past had ever dreamed." And the sermon preached on the last Association Sunday at Southport by the Bishop of Ripon points unmistakably to the same tendency—even to a pantheistic identification of God with the forces at work in Nature.

[1] There may be a few fond and admiring souls who are looking out for a reference to Mr. Ambrose Pope's third criticism. Briefly, he finds that Haeckel has got rid of God by a third "half-day excursion," in the course of which he discovered a system of "physiological monism," which, as before, contains the fatal germ under an innocent exterior. The joke may be given for what it is worth, but it gets stale. Mr. Pope goes on to say that when you ask Haeckel about the substance he puts instead of God, he says he is not sure whether it exists. Tableau, and exeunt omnes, of course. We have met this point in the second chapter.

[2] *The Idea of God*, p. 137.

The new teleology flatters itself it differs very scientifically from the old; for "teleology" had fallen into disrepute during the period of "gap" theology which followed the break-up of Paleyism. It is true that there are differences. Aubrey Moore points out that we now do not forget the past (the evolution) of the organ. Dr. Iverach observes that the new teleologist does not think so much of an "external artificer" as of an immanent directive principle, and that we do not now attempt to deduce scientific knowledge from the "purpose" of a thing. These differences, however, do not alter the essential structure of the argument, which remains the same as when Kant rejected it and Paley drove it to death. We may state it briefly in abstract form to this effect: Wherever in Nature we find several agencies co-operating in the production of a certain result which is orderly or beautiful, we see the guidance of mind. The underlying assumption is that the unconscious forces of the universe will only produce chaos unless they are guided. Pre-conceived design followed up by directive control, or else a "fortuitous clash of atoms," is the alternative put before us. The process of evolution taken as a whole has been so orderly, and had such marvellous results, that we must admit the agencies at work in the process were intelligently guided. To suppose that this process should *chance* to culminate in the appearance of man is said to be incredible. So throughout the whole process we find co-operations, adaptations, orderly and beautiful operations, which speak eloquently of design and control. From the very first step, the making of the atom, to the last, the making of man's brain, we see the finger of God.

A few extracts and references will show that this is a correct summary. As regards the inorganic universe a little work recently published by the Rev. W. Profeit well illustrates the argument. The author starts with the principle that "every form of being must act according to its nature," and goes on to say that "the particles of matter have not in them conscious intelligence, and consequently have not of themselves the power of arranging, and so of producing complex order."[1] He then reviews the teaching of modern physics at length, pausing at every few paces, in the familiar manner, to admire the ways of the Creator. "To deal with every particle of matter in the universe, so as to make it of a special type, to order all, so that they might come under types so few and compact, demanded an amount of thought and work of overwhelming greatness, and could not be the result of chance." Chemistry is "crowded with adjustments, packed with adaptations." The moulding of matter into solar systems of such marvellous symmetry and adaptability to life occasions another outburst. In short, theology can easily run to volumes by repeating "Great are thy works" at every forward step in evolution. Chance is out of the question. "Ah! what foolery it is to deem that a mighty world has been produced by chance." Happily, there are no fools of that particular type amongst us. But "necessity" is equally impotent. "No sane mind"—the young theology keeps up the literary tradition, you see, which made even Fiske exclaim against "the intellectual arrogance which the arguments of theologians show lurking beneath their expressions of humility"[2]—"no sane mind can for a moment imagine that from the nature of things it was an eternal necessity that the seventy, or thereby, different kinds of atoms should all exist, or be formed in the numbers and proportions of numbers, in which they help to form our great system obeying the orb of day." So it is to be either "fortuitous concourse" or mind; and as the universe is not a chaotic mess, we must admit it was presided over by intelligence from the first.

Dr. Dallinger offers us the same

[1] *The Creation of Matter*, p. 6.
[2] *Outlines of Cosmic Philosophy*, p. 451.

dilemma of chance or control, and urges that to adopt chance "is surely to trifle with the fundamental principles of our reasoning powers." Rationalists, we may say in passing, had a concern for our "reasoning powers" in days when doctors of divinity looked upon them as mischievous. Dr. Croll argues in the same way. Some principle, he says, must determine why a natural force takes direction *A* instead of direction *B* or *C*. The determination of planetary orbits is not so much due to gravitation as to the *way* in which gravitation acted. So in the formation of crystals or organisms. "Out of the infinite number of different paths, what is it that directs the force to select the right path?" Dr. Croll seems to fancy that in this he has suggested a new idea to the world. Dr. Iverach, both in *Christianity and Evolution* and in *Theism*, follows the same line. For the pre-atomic mass to be made atomic, and to produce the orderly and periodic system of elements with their affinities, the forces at work must have been guided.

The argument does not differ in substance when we pass to the organic world, but, naturally, the notes of exclamation and edifying observations increase. Biological science, says Dr. Iverach, "must admit purpose in the magnificent adjustments it points out." Mr. Newman Smyth gives an admirable sketch of the evolution of the eye, and pleads that the forces which have gradually constructed it did not any the less need guidance and control because they took millions of years to do it. Mr. Ballard takes the evolution of the eye in the fœtus, and says that if a child were to repeat "that God caused it so to do, it is utterly beyond the power of all modern science to contradict."[1] Embryology is, it is true, as yet very imperfect. However, other passages make it clear that, though Mr. Ballard may here be building on a "gap," he generally offers us the usual dilemma, design or "fortuitous concourse of atoms," and characteristically tells us the latter is "fatuous." In fact Mr. Ballard tells even the agnostic, who thinks there is not enough evidence either for or against teleology, that his hesitation is mere "childish fatuity." The Rev. R. Williams—not to neglect him—tells his weaver-admirers that "the solar system is really more wonderful than a loom," which is obviously designed, and that organisms are more wonderful still. And Dr. W. N. Clarke says "it is not probable that the most significant elements in a world came into it without having been entertained during the process as character-giving ideals." He says Darwinism has modified, but not destroyed, teleology. We now know that needs, and contrivances to supply them, "grow up within the universe," but this power of adaptation must have been given to organisms by a purposive intelligence.[1]

The argument, therefore, on which the fate of theism is finally to be determined is now tolerably clear. Leave Haeckel free to perfect his mechanical monism; when he has completed it, we shall point out to the astonished professor that he has been proving the existence of God all the time. If this force which he traces for us in its marvellous ascent through the atom, the nebula, the cell, and the organism, was unconscious from the start, and if it has achieved all this progress in so orderly and determined a fashion, it must have been guided. Well, let us see whether Haeckel *is* quite so naïve and antiquated as these good people assure the world.

To begin with, the flavour of antiquity is quite clearly on the other side. "Chance" and "fortuitous concourse of atoms" are phrases which you will not find outside theological schools for the last 2,000 years. The early Greeks used them. The constant reiteration of them in our time is a grave piece of insincerity, or else ignorance. How Mr.

[1] *Miracles of Unbelief*, p. 51.

[1] *Outlines of Christian Theology*, p. 116.

Profeit and Mr. Ballard come to use these phrases in the year of grace 1903 is best known to themselves. Professor Haeckel deals clearly with the point (p. 97), and explains—as has been explained innumerable times—the only sense in which science admits "chance" events. Mr. Profeit rightly indicates a third alternative, necessity; and Dr. Dallinger somewhat vaguely suggests it. Haeckel and his colleagues hold that the direction which the evolutionary agencies take is not "fortuitous": that they never could take but the one direction which they have actually taken. A stone has not a dozen possible paths to travel by when you drop it from your hand. You do not seek any reason why it follows direction *A* instead of direction *B* or *C*. So it is, says the monist, with all the forces in the universe. Some day science will be able to trace a set of forces working for ages at the construction of a solar system, or at the making of an eye. The theist says the ultimate object must have been foreseen and the forces must have been guided, or they would never have worked steadily in this definite direction. The monist says that these forces no more needed guiding than a tramcar does; there was only one direction possible for them. Here is a clear issue, and in the present state of apologetics, an important one. It is useless to talk, as Fiske does, of the "teleological instinct." "The teleological instinct in man," he says, "cannot be suppressed or ignored. The human soul shrinks from the thought that it is without kith or kin in all this wide universe." This is not only "an appeal to the imagination": it is utterly opposed to the facts of life. Mr. Fiske ascribes his own peculiar temperament to the universe. The matter must be reasoned out.

Now, it seems clear that if a man asserts that the forces of the universe are naturally erratic, and may go in any one of a dozen directions unless they are guided, he must show cause for his opinion. The man of science has never discovered an erratic force yet. Force always acts uniformly, always takes the same direction. If you say this is *only* because the natural forces are guided and controlled, and is not their proper and inherent nature, the man of science naturally asks: How do you know? Science sees nothing in nature to suggest such an idea. "When we consider the movements of the starry heavens to-day," says Mr. Mallock, "instead of feeling it to be wonderful that they are absolutely regular, we should feel it to be wonderful if they were ever anything else . . . . We realise that order, instead of being the marvel of the universe, is the indispensable condition of its existence—that it is a physical platitude, not a divine paradox."[1] That is certainly the feeling the universe inspires in men of science. What *is* the ground for this notion of the essentially erratic character of natural forces? One seeks it quite in vain. Dr. Croll says: "Though our acquaintance with the forces of nature were absolutely perfect, the question as to how particles or molecules arrange themselves into organic forms would probably still remain as deep a mystery as ever, unless we knew something more than force."[2] But he does not offer us a single consideration to convince us of this "probability." When Mr. Profeit tries to bully us into admitting that "no sane mind can for a moment imagine that from the nature of things it was an eternal necessity that the seventy, or thereby, different kinds of atoms should all exist," we timidly venture to inquire: Why not? Force, as far as our experience goes, acts necessarily, inevitably, infallibly. There could be no science if it did not.

The only attempt made to escape this initial difficulty of the teleologist is to appeal to a number of totally false analogies. The favourite is that venerable and imposing sophism, that if you cast to the ground an infinite (or a finite) number of letters, they might after

[1] *Religion as a Credible Doctrine*, p. 162.
[2] *The Basis of Evolution*, p. 24.

infinite gyrations make a word here and there, but we should think the man an enthusiast who expected even a short sentence, and a fool if he expected them ever to make a poem. It is absurd to offer us this as an analogy to-day; or else it is begging the whole question. Take the case of the eye. Quite certainly this is an evolutionary product. Forces acting on matter during millions of years have evolved it. Each step in the process is perfectly complete and intelligible in itself. It is wholly arbitrary to suppose the eye was in view when protoplasm was first formed: or when the first sensitive cells appeared on the surface of the primitive animal body: or when pigment-cells were developed at the foremost part of the body: or when a sensitive nerve was formed under the skin; and so on. Each structure was useful in its turn; and on that very account natural selection fastened on it. It is sheer imagination to suppose that the ultimate form *was* foreseen: and it is sheer scientific untruth to say the ultimate form *must* have been foreseen or else the earlier structures would be unintelligible. Here is a plexus of natural forces acting on matter, without, as far as we can see, the possibility of their acting otherwise; only one result was possible. And we are asked to regard this as curious, because, in the case of the imaginary throw of type, natural forces will not lose their uniform character and act miraculously. Finally, it is a colossal *petitio principii*, because the question is precisely whether Virgil's *Aeneid* or Shakespeare's *Hamlet* is *not* an evolutionary product.

It seems, then, that the initial difficulty of the teleologist is insuperable. He cannot give us a shadow of proof of his assertion that natural forces are erratic. Haeckel is completely within the right of science in speaking of the universe as, in Goethe's phrase, "ruled by eternal, iron laws" (or forces). They have wrought out a certain result—the world we form part of. Until some good reason is shown for thinking they could have acted otherwise, we see no need for designer, or guide, or engineer. Let us put it another way. To an extent the teleologists are playing on the present imperfection of science, as Dr. Croll innocently betrayed. Let us take them at their word, and suppose science will in time give a complete mechanical explanation of everything, for the good reason that God, as they say, created a machine that needed no mending or re-starting. And let us suppose that he designed the ultimate form of the cosmos. Is this design communicated to the unconscious atoms and their forces? Clearly not; no one would say that. Are these forces which build up and impel the atoms supernaturally inflected or modulated at each step? Again, no one would say this. The only possible conception of telic action on a cosmic scale is, when we descend from grandiose phrases to practical ideas, that from the start the matter-force reality was of such a nature that it would infallibly evolve into the cosmos we form part of to-day. Any other conception of "guidance" and "control" is totally unthinkable. And as a fact theists are settling down to formulate their position in that way. The interference, as Ward says, took place before the process began.

But before we take up this last point it is necessary to glance at another side of the question. Haeckel has pointed out that, not only do we see no ground for believing in the presence of some primitive design, but we see very considerable reasons for rejecting it. The world is crowded with features which forbid us lightly to admit a controlling supreme intelligence. There is no answer to this. "The fact stands inexorably before us," says Mr. Fiske, "that a Supreme Will, enlightened by perfect intelligence and possessed of infinite power, might differently have fashioned the universe, though in ways inconceivable by us, so that the suffering and the waste of life which characterise nature's process of evolution might have been

avoided."[1] As to the waste, Dr. Iverach ventures to say that "infinite precision at one point is inconsistent with bad shooting"; but the infinite precision is, we have seen, an assumption, whereas the bad shooting is ubiquitous. At every sex-act millions of spermatozoa are wasted. Others say the glorious final issue puts all right. But as Mr. Mallock says, "Whatever may be God's future, there will still remain His past." Most teleologists retreat into mystery. One might unkindly remind them of their great disinclination to let the monist leave anything unexplained, but it is better to say that when all the tangible evidence is on one side and none on the other, we do not regard it as a fair dilemma. Listen to the impression of a cultured defender of religion after a study of the evolutionary process in nature: "We must divest ourselves of all foregone conclusions, of all question-begging reverences, and look the facts of the universe steadily in the face. If theists will but do this, what they will see will astonish them. They will see that if there is anything at the back of this vast process with a consciousness and a purpose in any way resembling our own—a Being who knows what He wants and is doing his best to get it—he is, instead of a holy and all-wise God, a scatter-brained, semi-powerful, semi-impotent monster. They will recognise as clearly as they ever did the old familiar facts which seemed to them evidences of God's wisdom, love, and goodness; but they will find that these facts, when taken in connection with the others, only supply us with a standard in the nature of this Being himself by which most of his acts are exhibited to us as those of a criminal madman. If he had been blind, he had not had sin; but if we maintain that he can see, then his sin remains. Habitually a bungler as he is, and callous when not actively cruel, we are forced to regard him, when he seems to exhibit benevolence, as, not divinely benevolent, but merely weak and capricious, like a boy who fondles a kitten, and the next moment sets a dog at it. And not only does his moral character fall from him bit by bit, but his dignity disappears also. The orderly processes of the stars and the larger phenomena of nature are suggestive of nothing so much as a wearisome Court ceremonial surrounding a king who is unable to understand or to break away from it; whilst the thunder and whirlwind, which have from time immemorial been accepted as special revelations of his awful power and majesty, suggest, if they suggest anything of a personal character at all, merely some blackguardly larrikin kicking up his heels in the clouds, not perhaps bent on mischief, but indifferent to the fact that he is causing it. . . . A God who could have been deliberately guilty of them [the evolutionary processes] would be a God too absurd, too monstrous, too mad to be credible."[1]

No one who has studied biological evolution can fail to recognise these facts. They make it impossible for us to see a divine presence and guidance at least *during* the process. The only plausible theory is that God set the machine going and left it to itself. If we hold that he is guiding molecules to "their proper place" in the construction of the tiger's eye, we must hold that he has some control of the molecules in the cruelty-centre of the tiger's brain. A universe without carnivora is conceivable enough. Professor Kennedy and others would divert us from a consideration of these facts to contemplate the beauty and sublimity the universe exhibits. But the beauty of the starry heavens is only the effect of distance and position; the beauty of the Bay of Naples could be

[1] *Outlines of Cosmic Philosophy*, p. 462.

[1] Mr. W. H. Mallock, *Religion as a Credible Doctrine*, p. 177. Mr. Mallock has throughout life been one of the ablest opponents of agnosticism, and he has been nothing less than scornful of a profession of atheism. Does he not see how natural and logical atheism seems when one sweeps aside all theistic proof on the one hand, and recognises these dark features of the universe on the other?

shown by science to be a purely accidental outcome of the action of natural agencies. The beauty of the diatoms that are brought from the lowest depths of the ocean, the beauty of the radiolaria that swarm about the coast, and the beauty of a thousand minute animal structures, are obviously not designed and purposed beauties. They were unknown until the microscope was invented: the polariscope reveals yet further beauties: the telescope yet more. The idea of these things being designed for our, or for God's, entertainment belongs, as Mr. Mallock says, "to a pre-scientific age . . . an age which had realised the spectacular unity of the cosmos, but had very imperfectly realised the nature of its mechanical unity: and which, moreover, had never grasped the fact that the forces in virtue of which material things move, such as energy, attraction, repulsion, and chemical affinity, are as much a part of the material things themselves, and as much amenable to scientific experiment, as extension, or shape, or mass, or softness, or hardness, or visibility." Once more we are thrown back on the efficient, mechanical, producing causes.

The point we have reached, then, is this: the notion that molecules are "guided" to their "proper position" by any other than a mechanical force—the notion of "guidance" or "control" *during* the cosmic process is unproved, is unthinkable when examined in detail, and is opposed by an appalling mass of facts (waste, cruelty, suffering, &c.). It starts from an assumption—the assumption that natural forces are erratic in action—for which it does not offer any justification, and which is directly opposed to scientific experience. It rests on a number of fallacious analogies and poetical expressions, on a fallacious application of the term "blind" to natural forces, and on the as yet imperfect condition of our scientific knowledge of the construction of organisms. All that remains, then, is to examine the position of the really consistent evolutionary theist, who does not build his belief on the temporary ignorance of the scientist. This position, to which all apologists are tending, is that "the only interference was before the cosmic process began": that God created a matter-force reality in the beginning of such a nature that it should evolve spontaneously into the universe we know and of which we are a part. This is the ideal and final position of the apologist. Science will drive him back pitilessly decade by decade until he adopts it. Many of the best-informed apologists already adopt it.

Let us see, then, where Haeckel and what remains of his opponents are now. Both admit that the universe is a mechanical system, a great machine that has worked from the first without control, in virtue of its inherent character. But the dualists say such a machine must have been most skilfully designed and constructed: it is, in Dallinger's words, "a more majestic design than all the thinkers of the past had ever dreamed"—and therefore it will commend itself more and more to theists. The position is—it is very important to understand clearly—that God only creates any particular content of the universe—say Plato's mind—in the sense that he imparted to the primitive nebula, or ultimate prothyl, a natural force to evolve it. The germ of everything, the capacity to evolve everything, is in the great matter-force reality. Now, we have seen in the third chapter that "science points to no beginning." It is perfectly consistent with the scientific evidence to say that the universe is eternal. We saw that those who attack Haeckel's ascription of infinity and eternity[1] to the basic substance show no cause why he should not proceed candidly on the astronomical evidence. No better evidence is forth-

[1] Note the remarkably different treatment of Haeckel and Mr. Spencer. Mr. Spencer's First Cause cannot be distinguished from Haeckel's. Yet when he speaks of it with capital letters, as an Infinite and Eternal Power, we hear nothing but admiration.

coming here. Dr. Croll says: "If any man should affirm that the succession of events had no beginning, but has been in operation from all eternity, it would be difficult indeed to prove him to be in the wrong; but, on the other hand, it would be far more difficult, nay, utterly impossible, for him to prove his assertion."[1] But, as we saw, the scientific evidence and the rules of logic and truth-seeking put the burden of proof distinctly on the man who asserts there was a beginning. Professor Ward attempts to infer a beginning from the theory of entropy; but we saw that this is discredited by the latest pronouncements of physicists. "Our experience," as Professor Ward says himself elsewhere, "certainly does not embrace the totality of things; is, in fact, ridiculously far from it"; and so entropy is a "ridiculously" hasty conclusion.

No, there is no proof whatever that the machine ever *began* to exist at all. As far as we can see, it has eternally possessed those forces and properties with which we have agreed to credit it, and has been eternally evolving them. And, as a fact, apologists are rapidly moving on to the identification of God with Nature, which means an abandonment of the idea of creation. A curious symptom falls under my notice as I write. An editorial article in the *Daily News*, the distinguished organ of the Nonconformist Churches, commenting on the Bishop of Ripon's sermon at Southport, endeavours to reconcile science and religion. The laws of science, it says, reveal the working of force, and it goes on to ask: "What is that power? May it not be the synthesis of all the various forces and vitalities which the universe contains; and may not that synthesis be God?" That is precisely what Haeckel says; in fact, in a late German edition of the *Riddle* he calls his system "the purest monotheism." So close are we to "reunion"! Take, again, the *Anticipations* of Mr. H. G. Wells. Looking about on the cultured thought of our time, he says that before the end of this century educated men will have ceased to believe in "an omniscient mind"—"the last vestige of that barbaric theology which regarded God as a vigorous but uncertain old gentleman with a beard and an inordinate lust for praise and propitiation"—and a supreme "moralist" and prayer; and will know God only as "a general atmosphere of imperfectly apprehended purpose." Mr. Rhondda Williams assures us that "it is not for dualism I am arguing. I believe in the unity of the world, and a kind of monism is probably the truest solution of the riddle; but I must find the unity in spirit, not in matter." That means, if it means anything, not only a complete misconception of Haeckel, but an identification of God with Nature. Professor Le Conte says: "God may be conceived as self-sundering his energy, and setting over against Himself a part as Nature. A part of this part, by a process of evolution, individuates itself more and more, and finally completes its individuation and self-activity in the soul of man. . . . Thus an effluence from the Divine Person flows downward through Nature to rise again by evolution to recognition of, and communion with, its own source. . . . And the sole purpose of this progressive individuation of the Divine Energy by evolution is finally to have, in man, something not only to contemplate, but also to love and be loved by."[1] In another place he says: "The forces of Nature are naught else than different forms of one omnipresent Divine energy or will," and "In a word, according to this view, there is no real efficient force but spirit, and no real independent existence but God."[2] We have seen how Mr. Fiske

[1] *The Basis of Evolution*, p. 167.

[1] *The Conception of God*, p. 77. Le Conte tells us, moreover, that he is almost using the language of another "theistic" writer, Mr. Upton, the Hibbert lecturer.

[2] *Evolution and Religious Thought*, p. 301. He frankly allows that he is here close to the opinions of Berkeley, and even Swedenborg.

claims immortality on the ground that "there is in man a psychic element identical in nature with that which is eternal"; and man's psychic element is, he allows, an evolutionary outcome of natural force. Professor Royce, a recent Gifford lecturer and distinguished American thinker, says, when he comes to distinguish man from God: "We therefore need not conceive the eternal Ethical Individual, however partial he may be, as in any sense less in the grade of complication of his activity or in the multitude of his acts of will than is the Absolute. . . . It may be conceived as a Part equal to the whole, and finally united, as such equal, to the Whole wherein it dwells."[1] Professor W. James, another Gifford lecturer, rejects the title of theist altogether, and says "we must bid a definite good-bye to dogmatic theology." The metaphysical attributes of God (omnipotence, omniscience, omnipresence, eternity, &c.) are, he thinks, "destitute of all intelligible significance," and "the metaphysical monster they offer to our mind is an absolutely worthless invention of the scholarly mind."[2]

We are advancing rapidly. To this does a knowledge of science bring the theologian. It is true that some of these evolutionary theists, like Mr. Rhondda Williams, regard it as a great gain that science has destroyed the idea of a "transcendent" God and forced theology to recognise his "immanence" in nature. This is very misleading. The "immanence" of God in nature has been consistently taught in Roman Catholic theology for the last thousand years. You will not find a single Roman Catholic theologian who locates God outside the universe. It is a commonplace with them that God is more closely present in every part of nature than ether is, for instance. Nor do the great Anglican divines speak differently. What, then is the new feature? It is that these modern apologists have been driven to deny that there is any real distinction between God and nature. They talk of God "sundering" himself and of nature being "part" of his substance—which has a strange resemblance to various ancient and mouldy Oriental speculations (Brahmanic, Gnostic, and Manichean)—but the gist of their position is that God and nature are one. God is the "pervading spirit" and the "unifying force" of the cosmos, or the "Eternal and Infinite Energy" behind phenomena, as Sir Henry Thompson puts it. This is the kind of theology which generally lies at the back of the few theistic utterances which our anxious bishops can wring out of men of science to-day. It is the last page of a remarkable history. Man's first idea of deity was animistic and pantheistic, according to one school of hierologists. In the course of ages the shape of God was disentangled from visible nature and dramatically set against it. Now God slowly sinks again into the life of nature. Great Pan is alive once more.

How does this position compare with that of Haeckel? We will not be so rude as to suggest that if Haeckel used capital letters, like Mr. Spencer, they would greet him as a brother. Nor, on the other hand, can we admit that, as Mr. Williams claims, *they* find the unity of the universe in spirit, while Haeckel bases it on matter. We saw that Haeckel does nothing of the kind. Matter and spirit are to him two aspects of one reality, and the unity of the cosmos is the unity of that reality. Spirit-force or energy emerging finally as human thought-force is admitted by Haeckel as freely as by Mr. Williams. An idealist like Ward would very naturally say that the unity of the world consists in spirit, but we assume Mr. Williams admits the existence of matter and corporeal fellow-creatures. But there is one further sense in which the unity of the world could be said to

[1] *The World and the Individual*, vol. ii, p. 451.

[2] *Varieties of Religious Experience*, pp. 445–8. He adds that the "moral attributes" are just as indefensible.

consist in spirit, and in this lies the final difference between Haeckel and his critics on these cosmic speculations. These theistic, or rather pantheistic, monists hold that the cosmic energy is essentially and from the beginning, or from eternity, conscious and intelligent. Haeckel holds that consciousness only arises when a certain stage of nerve-formation appears. What evidence do they offer for this? We may note in passing that, when the real difference between Haeckel and those scientific writers who are the most zealously pitted against him is so small, it would have been better for his critics to say so outright. The average reader who wades through the surging flood of rhetoric will probably learn with astonishment that the chief champions of reasoned Christianity to-day stand so close to Haeckel's position that only one frail metaphysical bridge divides them. Let us examine this last division.

It is clear, in the first place, that the evidence for the position of these evolutionary theists is not of a scientific nature. Science does not find intelligence in the cosmos until a fairly advanced stage of animal organisation is reached. In fact, science finds consciousness so completely and rigidly bound up with nerve-structure that it can only listen with astonishment to the theory of a vast consciousness existing apart from nerve-structure and before it was developed. One wonders, therefore, what Mr. Ballard means when he assured his anxious interviewer that "the theistic basis of Christianity will have scientific support more than ever." The reasons alleged for postulating this intelligence at the "beginning" of things are metaphysical. Mr. Rhondda Williams formulates them more or less clearly, as they are invented by Dr. W. N. Clarke and Dr. Ward and Le Conte. He says first—and this, I believe, is an original contribution—that science finds "law" in the cosmos; but "law" is a mental concept: ergo, science finds mind in the cosmos. We will overlook that little weakness, and come to the plausible arguments he has borrowed. He says (after Ward) that the universe must be the work of intelligence because it is intelligible. The axiom he rests on is that "what is intelligible must either be intelligent or have intelligence behind it." Now, on idealist principles this is quite true; there being no material world at all, if anything exists, mind clearly exists. But, apart from this denial of a real world, the axiom has no sense whatever; it is simply an audacious assertion. Dr Iverach (*Theism*) uses much the same argument, and tries to give it a respectable realistic air. "A system," he says, "which at this end needs an intelligence to understand it must have something to do with intelligence at the other." Many other writers say the same. To show the inanity of the assertion, one has only to ask Dr. Iverach whether even a chaotic and disorderly universe would not need "an intelligence to understand it." If he means by "intelligible" that it is orderly and systematic, he is simply begging the whole question, and asking us to swallow his position in the form of an axiom, because he cannot prove it. He says elsewhere (*Christianity and Evolution*) that "if thought has come out of the universe, if the universe is a universe that can be thought, then thought has had something to do with it from the outset." That is the favourite form of argument that "you cannot get out of a sack what is not in it." It is a long-discredited fallacy. We have seen how out of a simple matter and force have come an immense variety of things. These things were only *implicitly* in the primitive prothyl. Similarly, the evolution of thought only shows that thought was implicitly in the first cosmic principles. Moreover, consciousness evolves out of the unconscious every day—in embryonic development. Mr. Williams finally urges that a thing which has not been made by intelligence should be

reversible, and says: "But it is the essential principle of science that things are not reversible; that they must be where they are, as they are; the *order* of nature is the greatest scientific discovery." This is a curious confusion. It is difficult to see why a thing constructed by mechanical forces should be *immediately* reversible, in any sense which does not apply to an intelligent construction; and *in the long run* the cosmic process *will* be reversed, and begun again, if the scientific evidence counts for anything.

It is on the strength of such verbiage and sophistry as this that Haeckel's critics assume airs of spiritual superiority and spatter his "godless" system with contempt. He has followed up the scientific evidence with a close fidelity. He has not forgotten for a moment that the unseen may be gathered from the seen by valid reasoning (as he himself has gathered many truths by inference from the facts observed); he has not excluded the sober and accredited use of the speculative imagination. Professor Henslow has recently, in a letter to the daily Press, suggested that Rationalists deny the existence of God because it does not fall under observation or experiment. The writer Professor Henslow quoted has himself repudiated this interpretation of his words; and certainly Haeckel has repeatedly endorsed the procedure of passing beyond observation, when the inference is firmly based on the facts and is logical in form. Whether he is not justified in rejecting as unsound these pseudo-metaphysical arguments we have been considering, the reader may judge for himself. Whether his procedure is not more scientific, more logical, and more philosophical than that of his opponents—whose arguments I have, as far as possible, given in their own words—may now be determined. And if his procedure so far is correct, and the objections of his critics futile, we have established the bases of monism. We have followed the great matter-force reality through its cosmic development until it breaks out in the glory of the human mind and emotions. And we have seen no reason for suspecting the existence of any principle or agency distinct from it, or for ascribing to Nature itself any feature that would justify us in transferring to it the title or prerogatives of the dying God.

Chapter VIII

SCIENCE AND CHRISTIANITY

As we have previously seen, the cosmic speculations of the Monist find themselves in antagonism with a set of cosmic speculations which already occupy, not merely the mind, but the heart of a large number of people. Whilst older religions, such as Confucianism and, to an extent, Buddhism, have succeeded in effecting a separation between ancient cosmological notions and religion proper, so that the educated Japanese, for instance, does not confound theistic controversy with religion, Christianity has retained the belief that man is immortal, and that the universe has a supreme controller as essential parts of its framework. Naturally, Christian thinkers who are alert and informed are

beginning to deny this. Mr. R. J. Campbell, for instance, insists that Christianity is "not dogma, but life—a life lived in conscious union with a Divine Person." But that is somewhat bewildering. In one phrase dogma is disavowed, and in the next a dogma of an appallingly metaphysical character is made essential to the definition. A similar inconsistency is found in almost every other ecclesiastic who speaks of removing the emphasis from dogma. The two dogmas of God and the future life *are* still essential to Christianity, and it is precisely these dogmas which conflict with the monistic conception of the universe. The few advanced thinkers we have encountered represent, on the whole, only a small cultured minority. The great bulk of the faithful cling to the old ideas in the old form. And it is because this mass of conventional belief still exists that preachers find it possible and advisable to bespatter the reputations of fearless and sincere speculators, who seek to spread their views amongst the people.

Such a thinker as Haeckel, who has found his faith obstructed throughout life in the supposed interest of Christianity, naturally turns to consider that great religion when the solid frame of his monistic system is compacted. He finds four dogmas chiefly responsible for that strong attachment to Christianity, which seems to him to prolong the life of the errors he has criticised and the diversion of men's interest to another world. These are, briefly—a belief in the supernatural character of the Bible; a belief in the divinity, or the unique character, of Christ; a belief that there is something preterhuman about the historical progress and moral power of the Christian religion; and a belief in the infallibility of the Pope. He therefore seeks to discredit those beliefs, in order to prepare the way for an impartial consideration of the new conception of life which he regards as true and valuable. At once, of course, he is credited with some mysterious "hatred" of Christianity; as if his critics were somehow unable to understand a pure love of truth or regard for its moral and social stimulus. However, it is on this chapter of his work that critics have fastened most eagerly and most ardently.

Now, one cannot but protest in passing against the foolishness of such a procedure. All the world knows that Professor Haeckel is not an expert in ecclesiastical history. If he felt himself constrained to warn his readers that he had no expert acquaintance with physics, lest he might innocently induce the uninformed to attach undue weight to his judgment in that department, he might in return expect from them a reasonable sense of the proportion of his book. His authority lies chiefly in zoology. We saw that he built some of the most important parts of his system on the facts of zoology, or biology, and it is to these that the honest critic will mainly address himself. We saw how few of the critics did so. But the book was intended, as he says, to stand in some measure for the complete system of his thought, which he feared he could now never give to the world. It, therefore, contained an expression of his opinion on a multitude of topics which it is not essential for a Monist, as such, to pass judgment on. In this he naturally challenges the criticism of his opinions, and must meet it. But he had a right to expect that his book and his system of thought should be judged essentially by their essential positions; he had a right to expect that no one who would be likely to read ten pages of such a book would be so unintelligent as to extend his zoological authority into the domain of ecclesiastical history.

Further, no one who takes the trouble to understand Haeckel's system of thought would expect him to devote very considerable time to an examination of the dogmas I have enumerated. If his previous conclusions are true, these dogmas *must* be false. That is a logical and proper attitude. The man who has spent a life in deciphering the message

of the cosmos, and has been compelled to interpret it in a monistic sense, and reject entirely the dogmas of God and immortality, has reached a conclusion which he may apply to Christianity with as strict and full a right as the historian who has devoted his life to the direct study of it. Theistic writers are too apt to forget this. When a man has reached a conviction that God is a myth, he is neither logically nor morally expected to ask himself seriously whether Christ or Christianity is divine. And it is perfectly obvious to any one who reads this seventeenth chapter of the *Riddle* that this has been Haeckel's attitude. He merely skims the surface of a vast historical subject. He abandons the rigid method of the earlier part, with its accumulations of evidence. He hesitates to "devote a special chapter to the subject," and refers to other works. He then decides to "cast a critical glance" at it, protesting that it is only the hostility of the Churches which provokes him to do so. He is mindful of "the high ethical value" of pure Christianity and "its ennobling influence on the history of civilisation." But it still clings to beliefs which Haeckel (and large numbers of its own theologians) believe to have no more than a legendary foundation, and which nevertheless give it an incalculable influence on the minds of millions. Haeckel, therefore, gathers from a group of German works or translations (all of which are indicated in the German edition) points of criticism in regard to these dogmas, and briefly, with a light satire that evinces the absence of prolonged research in this department, fires them at the popular beliefs.

These considerations, which will readily occur to the impartial student, are prompted by the tactics which have been largely employed in the criticism of the *Riddle*. What value there is in the attack on its main position we have already seen. The epithets that have been showered on the distinguished scientist recoil on their authors where there is question of the essential and characteristic portion of his work. But it has been sought to bring the full weight of expert historical scholarship to bear on this episodic chapter on Christianity, and to make any defect discovered in it the occasion of a bitter and violent attack on Haeckel's general authority. The trained thinker sweeps aside such tactics as an impertinence. But the untrained and uninformed millions of the Churches are assured that Haeckel's authority has been discredited. They are taught that his rejection of Christian beliefs is traceable to a "childish credulity" (Dr. Horton) and is supported by "mendacities" (Mr. Ballard). However, let us examine the allegations on which the grossest diatribes against Haeckel have been supported.

The Achilles of the critics in this department is Dr. Loofs, professor of ecclesiastical history at the University of Halle, and from his *Anti-Haeckel* we gather the most formidable censures.[1] This work I have already qualified as one of the coarsest and most painful publications that have issued from a modern university. The story of its writing runs thus. Dr. Loofs tells us —St. Bernard has the same artistic exordium to his attack on Abélard— that he was dragged into the arena by friends and colleagues in Germany. He read the seventeenth chapter of the *Riddle*, and at once wrote an "open letter" to Dr. Haeckel on the errors it contains. This "open letter" first saw the light in the pages of an Evangelical weekly, *Die Christliche Welt*, which circulates amongst some 5,000 pious readers in Germany, and is hardly likely to penetrate into a university. Its tone was bitter and scurrilous. However, it was copied by other periodicals, and Haeckel wrote a brief reply in a scientific and serious review, the editor of the review, Dr. E. Bischoff, support-

[1] An English translation is promised, but has not appeared at the time of writing. It will, no doubt, temper the extreme coarseness and ugliness of the German original.

ing Haeckel with his expert knowledge and with a very plain but dignified comment on Loofs's procedure. At this Dr. Loofs seems to have lost all sense of either humour or dignity, and included these documents with his reply in the *brochure* we are about to examine. Its pages sparkle with incandescent phrases, which are, moreover, usually italicised. "Incredible ignorance," "crass stupidity," "pure folly," etc., are amongst the milder of these phrases. When, towards the close, he looks back on his virulent italics (or that larger type that serves for italics in German), he says deliberately: "It is not the 'point of view,' not the 'system,' of Professor Haeckel, but his *scientific honour*, that I have attacked; and I have done it so unmistakably that any court will convict me of libelling my colleague of Jena, if I cannot support my charges." In a word, he tells us (3rd edit., p. 52) that the Press has ignored his precious diatribe, and that a libel action (though he declines to "provoke" it) will bring his grievance before the public. Such is the famous rejoinder to Haeckel which our ecclesiastical journals have praised so highly.

After all this the reader will expect to find that Haeckel has been convicted of one of the most remarkable series of controversial frauds and literary delinquencies that a university professor—to say nothing of a man with four gold medals and seventy honorary diplomas—ever stooped to. The reality would be amusing if it were not for the vulgarity and coarseness in which it is enveloped. Leaving aside the pedantic discussion of minor points (the date of the Council of Nicæa, the authorship of the *Synodicon*, and so on), and granting that Dr. Loofs abundantly proves that Haeckel is not an expert in ecclesiastical history (if there be any who did not know it), we find that the two chief points are the criticism of Haeckel's observations on the formation of the canon and on the birth of Christ.

Haeckel, it will be remembered, states that the canonical gospels were selected from the apocryphal by a miraculous leap on to the altar at the Council of Nicæa. At this the indignation of our professor of church-history flashes forth. Mr. J. Brierley alludes to this, saying: "He gives the story as though it were the accepted Christian account of the admission of the four gospels to the canon. It is difficult to characterise this statement." Well, it is fortunate that some rationalistic Dr. Loofs does not have to characterise *this* statement. Haeckel does exactly the reverse of this. He gives the "leap" story as a correction of the "accepted Christian account." "We now know," he says, in introducing his version. Further, he gives the statement candidly on the authority of the *Synodicon*; though he should have said this was only *edited* by Pappus. His own honesty in the matter is perfectly transparent; if his acquaintance with ecclesiastical history is very far from complete. The story in the *Synodicon* is not to be taken seriously. The canon of the gospels was substantially settled long before the Council of Nicæa. It is true that Dr. Loofs is himself accused of error by Dr. Bischoff for stating that the Nicene Council did not discuss the canon, but we will keep to the main issue. The story taken from the *Synodicon* is not worthy of consideration as an account of the forming of the canon.

The reader will remember Haeckel's pointed warning in his preface that, not only are his conclusions on all matters "subjective and only partly corrrect," but his book contains "studies of unequal value," and his knowledge of some branches of science is "defective." In the face of those repeated expressions it is ludicrous to suppose that Haeckel wished to employ his great authority as a man of science to enforce opinions in ecclesiastical history. Here is, on the face of it, a department of thought where no one will suspect him to have spent much of his valuable time, and the dis-

covery of defects in this chapter was almost a matter of course. He has acknowledged those defects, and has inserted in the cheap German edition of his work a notification that the authority he followed on this and the following question was unsound. That authority was an English writer, who had had a theological training, and whose work had been translated into German. Haeckel had been wholly misinformed as to his standing in this country, and thus had been betrayed into a reliance on what he understood to be his expert knowledge. In the case of a writer who claimed infallibility, or at least a uniform weight, for the whole of his book, such a defect would be more or less serious. Whether it was in point of fact one-tenth as serious as some of the procedure of his critics which we have reviewed, whether it is a matter for violent discussion at all, and not one that might have been pointed out by a colleague without loss of dignity—I leave it to the reader to say. The section in which the passage occurs shows a fair average acquaintance with its subject, but it is clear from the authorities explicitly mentioned in it (Strauss, Feuerbach, Baur, and Renan) that it was written, or prepared, years ago. Any modern expert would find it defective. Whether this defect is a fitting ground for Dr. Loofs's structure of rhetoric and scholarship may be called into question. But whether it is either sensible or honourable to seek to discredit Haeckel's earlier positions in science, which we have reviewed, by a microscopic examination of such a section as this, cannot long remain undecided.

Before we pass to a consideration of the second chief charge, there is one more point that it is highly expedient to make clear. The average inexpert reader, about whom our ecclesiastical writers have suddenly grown so concerned, will be apt to suppose that this deadly attack by the spirited theologian of Halle is prompted by a devotion to the current belief in the unique value of the Gospels. He will learn with surprise that Dr. Loofs by no means shares the conventional reverence for the New Testament. The synoptic Gospels were written, he thinks, between the years 65 and 100, and the Gospel of "St. John" before 125. That is the general opinion of biblical scholars to-day; but it is by no means the general opinion of the readers of *Die Christliche Welt*, or of religious people in this country. What is more important, Dr. Loofs, as we shall presently see, rejects as worthless, if not dishonest, interpolations some of the most treasured and familiar passages of the New Testament. Let us remember what *is* really at stake in these controversies.

To come, then, to the cardinal offence of Haeckel's book—we will take a few detailed criticisms later—we find it in the statement that Jesus was the son of a Greek officer of the name of Pandera. Now let us approach the subject with some sense of proportion. For Haeckel it is (legitimately) a foregone conclusion that Jesus was a human being, born in a normal manner. The conclusions he has already so laboriously reached compel him to assume this. If there is no God, Jesus was a man—a "noble prophet and enthusiast, so full of the love of humanity," Haeckel generously describes him. This is a standpoint which Haeckel is by no means alone in taking to-day. The vast majority of the cultured writers of every civilised country share it with him. It is very largely held within the ranks of the Christian clergy themselves. Mr. Rhondda Williams preaches it openly. The position of our own Broad Church theologians is known. Even Dr. Loofs—remember well—holds as frankly as Haeckel does the natural human parentage of Jesus, and has formulated his opinion, as the opinion of the average cultured theologian, in a German theological encyclopædia. He angrily resents the imputation that he believes in the virgin-birth, and says no historian of

dogma can entertain it. He affirms that the birth-story in Matthew and Luke is a late interpolation in the Gospel, and is quite discredited.

What then *is* the great difference between the two? It is that Loofs awards the paternity of Christ to Joseph, and Haeckel assigns it to the Greek officer of a Roman legion. Our average Christian neighbour will probably feel that in substance it is a case of the devil and the deep sea.

Further, it is easy to see in what frame of mind a scientist like Haeckel would approach such a matter. The birth of a Saviour-God from a virgin is a legend that we find in all kinds of religions anterior to Christianity. We know that in all these cases the prophet, or god—supposing his historical reality—was awarded this distinction by later admirers to enhance the repute of his divinity. When, therefore, Haeckel is commenting on the dogma of the Immaculate Conception,[1] he turns aside for a moment to discuss the question of paternity. Not attaching an overwhelming importance to the question, Who was Christ's father? he does not make a profound inquiry into it. But in one of his authorities—the English writer whom I have mentioned—he finds the curious statement that the father was a Greek officer, and it seems to harmonise with the other statements. He finds that the Gospels emphatically exclude the notion that Mary was at that time married to Joseph, or that Joseph was the father. He finds, too, that as a matter of history these miraculously born children were generally illegitimate. In fact, the introduction of a Greek strain would help not a little to interpret the scriptural figure of Christ, if it is taken to be historical. It has long been an argument for the divinity of Christ that the figure depicted in the New Testament is so very un-Hebraic in many of its features. We who know the composition of the Gospels understand this Greek element. But the supposition that Christ had a Greek father is not a little attractive in the circumstances. When, therefore, Haeckel learns from his authority, or supposed authority, that in one of the apocryphal gospels (the Gospel of Nicodemus) Jesus was said to be the illegitimate son of a Greek officer, and that this is confirmed by the *Sepher Toldoth Jeschua*, he at once embraces it as the most plausible explanation of the "high and noble personality" of the Galilean. These apocryphal Gospels are, he tells the reader, no less and no more reliable in themselves than the canonical Gospels, but this version of the birth seems to accord best with the general situation.

Now this is a perfectly honest procedure for a man who makes no pretension to expert knowledge or research. Haeckel has again been misled by his authority, it is true. The sentence he quotes from "an apocryphal gospel" is not found in any of those books in that form. The Gospel of Nicodemus merely states that the Jews declared Christ to be illegitimate. The *Sepher Toldoth Jeschua*, which gives the story, is an early mediæval Jewish work of no authority. The story can, indeed, be traced back well into the second century (to about 130 A.D.), since Origen gives it as being told to his opponent Celsus by the Jews, in his *Contra Celsum* (I, 32); but this was unknown at the time to Haeckel and his authority. Further, it is misleading to say "the official theologian" burks the story. It is perfectly true that the *Sepher Toldoth Jeschua* is little commented on, but it is a worthless document; and Strauss, the author of the *Life of Jesus*, had contemptuously rejected the story. These are undoubted errors on Haeckel's part. But, after all, the

[1] Which he misunderstands. The dogma of the Immaculate Conception does not refer to the conception of Christ by Mary, but to the conception of Mary by her mother. Dr. Horton is astonished at Haeckel's ignorance. For my part I am astonished at Dr. Horton's knowledge. The version Haeckel follows is quite the ordinary non-Catholic version of the dogma. You will find it even in Balzac (*La messe de l'athée*). Nay, even Mr. Ballard, B.D., thinks it is correct (*Miracles of Unbelief*, p. 348).

radical error is that he took a superficial and unreliable author as his authority. To have been misinformed as to the weight and qualifications of a foreign writer on a subject completely outside his own territory, and to have neglected to verify his information, is the full extent of Haeckel's delinquency. Dr. Horton, who gives Vogt and Büchner as shining lights in the spiritualist firmament, pompously tells us this was "childish credulity." Mr. Ballard, who deals in such a remarkable fashion with Haeckel's observations on the pyknotic theory and abiogenesis and determinism, says he is "ashamed to put such mendacities into print," and that if Haeckel is not ashamed of himself he has not developed "an elementary degree of morality." Dr. Loofs calmly pours out such a stream of invective that he thinks it well to remind Haeckel of the text and section of the German law which covers the case! He is afraid, he says, that Haeckel will not be stung into dragging the matter into court, and so he continues to the end to dredge up the strong sediment of the German dictionary.

A more ludicrous situation it would be difficult to conceive. Haeckel frankly states that in his opinion this is a subject on which none of the evidence is worth much. But he finds one legend more plausible than that given in the canonical gospels, and he points out that it *seems to be* the most plausible. There is not the slightest deception, as he openly relies on the intrinsic plausibility of the story, and openly states the immediate and the ultimate sources from which he takes it. No doubt he should have examined more closely into the subject, and should have looked into more weighty and more recent literature. He would then have found that the passages which deny Joseph's paternity "belong to the least credible of New Testament traditions," as Dr. Loofs says.[1] But that his opponents should attack him with this virulence and viciousness on that account is one of the most disgraceful episodes of this dreary controversy.

The other defects which Dr. Loofs discovers with his microscopic eye in this chapter of the *Riddle* are mostly pedantic rectifications of minor statements, or corrections with which only an expert would concern himself, and as to which opinions sometimes differ. Many of them are quite paralleled by Dr. Bischoff's examination of Loofs's own statements. The year of the Council of Nicæa and the number of bishops present are incorrect; the number of apocryphal gospels and of the genuine Pauline epistles is not according to the latest vagary of the critics; the statistics of religion are not up to date; the Immaculate Conception and Immaculate Oath are improperly described. These are the other points of the indictment. The reader may judge for himself whether there is anything more than a lack of expert knowledge in these things; and whether Haeckel ever claimed, and did not rather disclaim from the outset, such expert knowledge.

But we now turn to another aspect of the matter. Haeckel, I said, set out to discredit four dogmas which he found hindering the progress of scientific knowledge amongst the people at large. The serious reader, impatient of all this dust-throwing and mud-throwing, will ask how far the substance of Haeckel's attack on these dogmas survives this scrutiny, and how far it is supported by sound historical research. The dogma of the infallibility of the Pope does not appeal to the sympathies of these Protestant critics, so that Haeckel's attack on the papacy is allowed to stand. Let us consider his position with regard to the other points—the uniqueness of the Bible, of Christ, and of the history of Christianity. Whether Haeckel is infallible or not is hardly a subject for prolonged discussion, provided his "scientific honour" and "scientific conscience" are not involved in the

[1] *American Journal of Theology*, July, 1899.

manner that Dr. Loofs would have the readers of *Die Christliche Welt* to believe. The serious question is: Can we sustain his attack on these dogmas, apart from the incidental errors into which his unfortunate reliance on "Saladin" has betrayed him? This is a study in Church History, in the full sense in which that science is understood to-day.[1] We shall see that the substance of Haeckel's position is completely supported by our present knowledge of the subject.

In the first place, that implicit reliance on the statements found in the Bible, which Haeckel set out to impugn, is now wholly discredited. We need not consider the Old Testament, and Haeckel does not discuss it. The cosmological speculations of Genesis are now known to have been borrowed from earlier religions; the historical books are so full of error that we can only trust them when we have independent verification; whole books (Daniel, Esther, Tobit, etc.) are given up as wholly unhistorical. This can be learned from the works of Christian scholars to-day. The Old Testament remains a work of surpassing interest, containing some fine literature and some of the highest moral teaching of the ancient world. But it no longer obstructs the path of the scientist or the historian. As to the New Testament, the work of reconstruction is not equally advanced. Writers like Archdeacon Wilson confuse the issue by taking "verbal inspiration" to be the butt of the rationalist attack. No doubt one will still find many simple believers in verbal inspiration, but that is not the serious difficulty. The opinion that the rationalist seeks to discredit—the opinion of the majority of Christians to-day (solemnly propounded to the world only a few years ago by the official head of the Church of Rome)—is the belief that the Bible contains no error. Once the infallibility of the Bible is abandoned, it ceases to be a barrier to progress. The infallibility of the Old Testament is not now held by any Christian scholar; and the infallibility of the New Testament is rapidly being expelled from the cultured Christian mind. We have seen how Dr. Loofs himself rejects the account of the virgin-birth (Matt. i., Luke ii.) which had worn itself into the very heart of Christianity. "No well-informed, and at the same time honest and conscientious theologian, can deny that he who asserts these things as indisputable facts affirms what is open to grave doubts," he says, significantly enough, in his article in the *American Journal of Theology*. In his article ("Christologie Kirchenlehre") in the *Real-Encyclopädie für Protestantische Theologie* he talks freely of "layers of biblical tradition" and their relative trustworthiness. This statement, which has been taken throughout the Christian era to be the most characteristic and one of the most important statements of the New Testament, is now relegated to "one of the latest and least reliable" of these "layers." The article on the Gospels in the *Encyclopædia Biblica*, which reflects the condition of cultured biblical thought in England, is written entirely in the same spirit; the author finds only nine texts in the Gospels which are "entirely credible," and without which "it would be impossible to prove to a sceptic that any historical value whatever was to be assigned to the Gospels."

The inexpert reader is often misled by statements to the effect that the critics are returning on their traces, and are denying the late dates assigned by the Tübingen school to the Gospels and the fewness of the genuine epistles of St. Paul. The second point is not important for our purpose, but the first statement is

[1] As a fact, the real secret of Dr. Loofs's bitterness and animosity seems to be that Haeckel has laid a strong charge against Church History. Apart from one historian, whom he mentions by name, there was no reason for thinking he included advanced writers like Harnack and Loofs. But that his charge against conventional Church History was solidly grounded is well known to every student of history, and will presently be fairly established.

gravely misleading. When an ecclesiastical journal or a tactical apologist reproduces Harnack's saying that recent criticism is vindicating "the essential truth of tradition" about the Gospels, one can only regret that one is incompetent to borrow some of the phrases of Dr. Loofs. The simple believer is encouraged to think that the miraculous life of Jesus is being fully rehabilitated. The composition of the Gospels is being put back to the period 65–125: that is to say, 65–70 for Mark, 70–75 for Matthew, 78–93 for Luke, and 80–120 for John. It is not thought proper to explain that the critics by no means refer to the Gospels as we have them to-day, and that these Gospels consist of earlier and later "layers"—in plain English, interpolations. It is not considered necessary to explain that the return to the Gospels only means, in the words of Loofs, "a return to the *sayings* of Jesus in the synoptic gospels," and that the miraculous legends may be sorted out as unprovable and incredible. Well may the *Christian World* complain of "the lack of honesty" in theological literature! The truth is that the historical value of the New Testament is shattered, and Christian scholars are, as in the case of the Old Testament, retreating upon its ethical value. Thus the putting back of the composition of the synoptic Gospels into the first century does not save that popular reliance on their legends which Haeckel solely regarded.

This brings us to our second point, the consideration of the person of Christ. In this, as a matter of fact, Haeckel takes up an exceedingly moderate position, and falls far short of the advanced position of many of the ablest recent Rationalist writers. He assumes not only the historical character of Christ, but also that we know enough about him to speak of "his high and noble personality" and to describe him as "a noble prophet and enthusiast." He denies the divinity of Christ, the miraculous powers that are assigned to him in the Gospels, and the originality of some of the chief ethical sayings attributed to him. This is not merely a position that will readily be endorsed by numbers of Christian theologians, but it is one that many theologians, to say nothing of non-Christian writers, will regard as granting too much to the religious tradition. How widely the divinity of Christ is rejected to-day few can be ignorant. The vague and fluid phrases in which even the belief in it is expressed very commonly now mislead only the inexpert. The older Rationalistic attitude as to Jesus—that we might omit the supernatural portions of the Gospel narrative and take the rest as historical—is giving way to a more scientific procedure, and the figure of Christ is dissolving into a hundred elements. Comparative religion traces numbers of the Gospel legends, such as the virgin-birth, if not all the features of the birth-story, to pre-Christian religions. The death and burial, many incidents of the life, and very much of the teaching, are not more difficult to trace. Whilst Christian scholars are separating the Gospel-story into "layers of tradition" (thus explaining the obvious contradictions), the study of the Greek, Egyptian, Mithraist, and other religions, which prevailed at the time and in the place where the Gospels were written, is assigning their proper sources to the "later layers."[1] The virgin-birth, which has been so prominently brought before the mind of English readers through the famous denial on the part of a dignitary of the Church of England, is only an illustration of the process of dissolution that is going on. When that process is complete we shall see how little will be left of the figure of the Crucified that has been graven on the heart of Europe for nearly 1500 years. Most assuredly Haeckel's position is a modest one. And

[1] Read the able and learned efforts to trace many of the gospel-elements in Mr. J. M. Robertson's *Pagan Christs* and *Christianity and Mythology*. For the analysis of the Gospels read especially Dr. Schmiedel's article in the *Encyclopædia Biblica*.

to conceal the strength of his position (as opposed to the conventional position) by the dust of a heated conflict as to whether Christ's father was Joseph the carpenter or Pantheras the Greek is only another specimen of "the lack of honesty in apologetic literature."

The third point to which Haeckel addresses himself is the belief that there has been anything unique about the history or power of the Christian religion. Here not only is Haeckel's position very moderately expressed, but the belief he attacks is dissolving more rapidly than the preceding beliefs. The term "unique" is—people so often forget—a relative or comparative term; yet nine-tenths of the ordinarily educated Christians who talk of the uniqueness of the Bible have never read a line of the Babylonian, Persian, Egyptian, Hindoo, or Chinese religious literatures; nine-tenths of those who talk of the unique character of Christ are totally ignorant of the work and (traditional) character of Zoroaster, Buddha, Lao-Tse, Kung-Tse, Apollonius, or the Bab; and nine-tenths of those who think the history of Christianity is "unique" have never studied, even in the most general way, the growth and work of Buddhism, or Confucianism, or Parseeism, or Manicheeism, or Mohammedanism, or Babiism. They have trusted their ecclesiastical historians—not men like Loofs and Harnack, but the "popular" writers and the apologetic writers of the Churches. Through this literature most of us have waded at one time or other; we can appreciate the justice of the heaviest censure that can be passed on it. It is one of the most questionable implements in the employment of the modern Churches. Complaint is frequently heard that rationalist writers are ever seeking to belittle and besmirch a religion which, with all its defects, has had, in Haeckel's words, "an ennobling influence on the history of civilisation" (p. 117). The reason is found in the gross mis-statement and perversion of the moral and religious life in Europe during the last 1500 years which the ecclesiastical historians have been guilty of.

I will take in illustration one of the most characteristic and interesting periods of this history of which I chance to have expert knowledge—the fourth century. Not many years ago I taught in a seminary, and preached from a Catholic pulpit, the conventional theory of a spiritual conquest of the Roman world by Christianity—of "Rome, oppressed by the weight of its vices, tottering to embrace the foot of the crucifix." That is the historical theory you will hear from almost every pulpit in this land to-day, and will find, not merely in Christian Evidence and S.P.C.K. and R.T.S. Tracts, but in Sheppard and Milman and Villemain and Döllinger and other standard authorities. It is a ridiculously false picture. Schultze has shown [1] that in some of the most important provinces of the Empire not more than two and a half per cent. were Christian at the beginning of the fourth century. The old religion had almost lost all serious influence, and a number of Oriental religions were pervading the Empire with an ascetic and spiritual gospel. Of these religions Christianity was one—not the most ethical or spiritual or most successful. When the persecutions ceased, and the Christians came out into the light of day, their spiritual poverty was—with few exceptions—a notable feature. Until 323 they proceeded quietly with their proselytic work, like the Mithraists and the Manicheans, whom they closely resembled, when the conversion of Constantine to Christianity suddenly gave them an immense advantage. The emperor's "conversion" is not claimed to have been important either as an intellectual or a spiritual phenomenon, but it was supremely important in the political sense. Courtly senators followed his example. It became, as Symmachus, one of the last of the great pagans, says, "a new form of ambition to desert the altars" of the gods. Successive Christian

[1] *Geschichte des Untergangs des Heidenthums.*

emperors sat on the Western throne, but preserved a political neutrality, so that Christianity advanced slowly. The short reign of Julian showed how far Christianity was from a triumph, and his successors, though Christian, still declined to interfere politically in the rivalry of religions.

By the year 380 the overwhelming majority of the people and "nearly the whole of the nobility" (St. Augustine says) were still Pagan; and the letters of St. Jerome show that the Christians were less spiritual than ever. But in 382 the "triumph of Christianity" began; within twenty years it became the religion of the Empire. How? From the accession of Gratian (aged sixteen) and Valentinian II. (aged four) there was a succession of youthful, weak, and religious emperors in the West. The court was at Milan; its spiritual director was St. Ambrose, one of the finest, strongest, and most ambitious (for the Church) of the fathers. He used his influence, threatened the boy-emperor with excommunication, and soon decree after decree went out in favour of Christianity. The pagan revenues were confiscated: then the pagan temples were destroyed or sealed up: finally any who dared to cultivate any other than the Christian religion were fined, imprisoned, and threatened with death. At the same time the Christian Churches adopted, or had already adopted, all the attractions of the temples. They had gorgeous vestments and ceremonies and processions, aspersion with water, incense, banquets and dancing in the Church on feast-days (generally ending in drunken revelry), and all that the Roman cared for in "religion." The pagan merely walked over to the Christian temple, when he found his own barred by soldiers or razed to the ground, and took with him his music and flowers and incense and wine and statues. There was no great moral reform, no great spiritual conversion, except in a few distinguished cases like that of St. Augustine.[1]

This gross misrepresentation of historical truth by ecclesiastical writers is the sole reason for the Rationalist's playing "the devil's advocate." Almost the whole period of Christian history has been treated with similar untruthfulness. The good has been greatly exaggerated: the evil suppressed or denied. The belief in the uniqueness of the growth of Christianity and of its moral and civilising influence rests on a mass of untruth and of calumny of other religions and sects. Christianity and its sacred books take their place in the great world-process. We see them growing naturally out of the older religions and literatures, and linking us with thoughts of other ages. When theological literature has ceased to offend us and to mislead the people with its "lack of honesty," we will study them with impartial interest, and seek to establish their influence for good as well as their share in the degradation of Europe from the first century to the twelfth. Until then the work of the Rationalist historian is bound to seem destructive and one-sided.

[1] Fuller details may be found in the author's *St. Augustine and His Age*: or in Boissier's *Fin du Paganisme*, Beugnot's *Histoire de la Destruction du Paganisme*, or Schultze's *Geschichte des Untergangs des Heidenthums*.

Chapter XI

THE ETHIC AND RELIGION OF MONISM

Mr. H. G. Wells, the accredited prophet of these latter days, predicts in his well-known *Anticipations* that by the end of the present century Christianity will have been wholly abandoned by people of culture. There will be, he thinks, "a steady decay in the various Protestant congregations," whilst Catholicism will increase for a time, but only amongst "the functionless wealthy, the half-educated, independent women of the middle class, and the people of the Abyss." Another recent writer, Sir Henry Thompson, says in his essay on *The Unknown God*: "The religion of Nature must eventually become the faith of the future; its reception is a question for each man's personal convictions. It is one in which a priestly hierarchy has no place, nor are there any specified formularies of worship. For 'Religion [in the words of Huxley] ought to mean simply reverence and love for the Ethical ideal, and the desire to realise that ideal in life.'" Recently, too, Mr. J. Brierley wrote one of his widely-read articles in the *Christian World* on the theme that there is impending "a more radical and *more effective* attack on Christianity" than any that have preceded. Mr. Rhondda Williams says that "already it is the fact that the cultured laity on the one hand, and the great bulk of the democracy on the other, are outside the Churches." It is true that Mr. Ballard wrote in the *British Weekly*, in July of this year, that Christianity "is at all events larger in quantity and better in quality than ever before, and has a brighter promise than in any previous period of its history." But within two months we find him expressing himself as follows: "The outlook is a serious one; but I am not a pessimist, although too many of my colleagues regard me as such. I am only sensitive to the danger of the day. What they call pessimism I call open-eyed honesty. We are entering on a very grave and probably prolonged struggle, as Dr. Flint has recently stated. The modern atmosphere is in general tending away from rather than towards all that is distinctive of Christianity."[1]

Many things happened during the course of the last summer to elicit or to confirm these vaticinations. Haeckel's *Riddle of the Universe* was circulating to the extent of some eighty thousand copies in this country alone. Ecclesiastics affected to believe that it was only ignorant and thoughtless workers and clerks who were deluded by its show of learning, but they must have known that it was being eagerly read by tens of thousands of thoughtful artisans and middle-class readers.[2] Letters began to trickle into the religious Press, telling of increasing secessions and expressing extreme alarm. Within twelve months the Rationalist Press Association, labouring under the usual disadvantages of an heretical publisher, put into circulation nearly half a million of its publications;

[1] See interview by Mr. Raymond Blathwayt in *Great Thoughts*.

[2] So much pity is expressed in this connection for the poor artisan that I must make this observation. I have had intimate knowledge of the clergy—Roman Catholic clergy, who, as a rule, have had more definite philosophical instruction than their Protestant colleagues—and have lately, in the course of lecturing and wandering, made a fair acquaintance with the working and lower middle-class readers, who so largely purchase sixpenny editions. I do not hesitate to say that there are tens of thousands of the latter in England who can read Haeckel more intelligently than the majority of the Catholic clergy.

and almost every journal in England was disturbing the peace of the faithful with a reminder that there *was* a riddle of the universe. A Socialist journal, the *Clarion*, made a drastic and sustained attack on Christianity, in spite of threats and jeers, and immediately found itself in touch with the predominant sentiment of its readers. Other working-class organs found it equally safe to open fire on the Churches. Two independent and rigorous inquiries were conducted into the religious condition of London, where the Churches display incalculable wealth. Both inquiries—that conducted by Mr. C. Booth and that conducted by Mr. Mudie-Smith for the *Daily News*—proved that the Christian Churches in London do not attach to themselves more than a quarter of the population, and that the great majority of their adherents are women. A census taken in Liverpool was equally depressing; and observations made in several small provincial towns showed that the condition was very general in the country. At the Trade Union Congress at Leicester the representatives of several million workers declared for the exclusion of religious instruction from the schools. A superficial inquiry at New York discovered the same condition in America, and the latest Australian census also showed a decay of the Churches, especially the Catholic Church and the Salvation Army. M. Guyau discovered that in Paris not one in sixteen of the population attended church, and Protestant ministers have reported that scarcely 8,000,000 of the population of France remain under the obedience of the Roman Church. The Belgian elections show that half the population of that "Catholic" country has definitely ranged itself against the Church. The success of the Social-Democrats in Germany, and the reports from Spain and Italy, point to the same general defection of the people from Church influence.[1]

With the various sources of consolation which the clergy point out to each other we are not concerned. The chief of these seems to be hope; and a complete ignorance of the grounds on which it rests prevents me from discussing it. We know that the Churches have enormous wealth; one secondary denomination having recently collected a sum of a million guineas, and another having erected a cathedral at a cost of a quarter of a million. We know that no odium attaches to the *defence* of Christianity, if a scientist or historian be disposed to defend it. We know that no intrigue or menace is directed against the publication or circulation of Christian literature. We know that the wealthier journals of this country and the general cultured sentiment is averse to attacking even when it does not believe. We know that the clergy have made enormous concessions to the secular spirit of the age, until in places their definite religious ministration can only be timidly and apologetically slipped in between a cornet solo and a phonographic entertainment. Yet "the outlook is serious," and "the cultured laity and the great bulk of the democracy are outside the Churches." Mr. Ballard has made merry over the fact that Haeckel opens his work in a despondent strain, and yet his translator prefaces this with "a pæan of triumph." He forgets that there is an interval of several years (not two *months*, as in his own case) between the two passages. The twentieth century opened with—most Rationalists considered—a brighter prospect for the Churches. Already this

[1] One of the points in which Dr. Loofs joins issue with Haeckel is in relation to religious statistics. Haeckel had given (from another writer) the number of Christians as 410,000,000. Dr. Loofs quotes two recent authorities who give the figures as 535,000,000 and 556,000,000, respectively. This is a fair illustration of the "victories" of our apologists. Everyone knows that these figures are obtained by lumping together the populations of what are called "Christian countries." So France and England are each credited with about 40,000,000 Christians instead of 10,000,000. Belgium and Italy and other countries are similarly treated. The figures are totally worthless.

has wholly faded, and it seems impossible for the Churches ever to regain a foot of the lost territory.[1]

This is not a "pæan of triumph," but a statement of fact. In the days when a profession of unbelief involved social ostracism and malignant calumny, when men were thrown into prison with the dregs of society for selling critical literature or uttering critical sentiments, when nearly every advance of science was opposed by ignorant clergymen, when women were bade to see their husbands and sons in Hell for refusing to frequent the church, and the mind of England was enslaved to dogmas that all abhor to-day, the attack on Christianity was necessarily predominantly negative and destructive. Growth was impossible until the iron bonds were broken. To-day Rationalism, still rightly militant and critical, has a conspicuous constructive side. It has a sociological outlook and an idealist gospel. After all, the life of Europe has rested on doctrinal foundations so long, and has grown so accustomed to the stimulus of religious thought, that some idea must be substituted for the sources of inspiration that are rapidly exhausting. Haeckel turns, therefore, at the close of his cosmic speculations and his historical glance at the Christian Church to consider this question of the successor of Christianity. Years ago he offered Monism as "a connecting link between science and religion"; as a system that could unite harmoniously the finest ethical truths of the Christian religion with the unshakable truths of modern science. Even the believer in Christianity must at times contemplate with misgiving the practice of grounding the moral life on beliefs which are to-day disputed and attacked in every workshop in the land. The child who has been trained to honesty and sobriety on the ground of supernatural reward or punishment, or on the mere ground of giving offence to an injured deity, must be of a singularly robust character to withstand entirely the sneers at Hell and Heaven and the open disbelief in God that will presently assail his ears. If it be desirable to have a humane, temperate, and honourable community, it behoves every thoughtful man to cast about for some other ground for the commendation of these moral qualities than an enfeebled and disputed dogma. Increasing stress is, therefore, laid on the ethical and religious aspect of Monism.

One result of this is that, although the Churches of our day profess a tolerance which would have outraged the feelings of their earlier leaders, their apologists have by no means ceased to gird at the alleged disastrous consequences of materialism and agnosticism. Mr. Ballard, who is supposed to have studied "unbelief" and "unbelievers," introduces his study (*Miracles of Unbelief*) with this amiable quotation:

> "Hold thou the good: define it well:
> For fear divine philosophy
> Should push beyond her mark and be
> Procuress to the Lords of Hell."

Mr. Rhondda Williams says "ideal has no place in Haeckel's philosophy"; and that on his principles "over the crimes of a Cæsar Borgia you must write a great 'Can't help it.' . . . The sweater who grinds the faces of the poor can't help it." Dr. Horton says that "men who have no belief in God and immortality sink to the level of the brutes," and "come down to the level of the stocks and the stones"; that their "soul is shrunk, the mind is warped, and the very body must carry its marks of degra-

[1] Mr. Campbell makes a rhetorical point by challenging a comparison between the census of church-goers and a census of "all the professedly atheistic assemblies in London, all the Hyde Park atheistic platforms, and the people who are listening to atheistic propaganda." Such a quibble is unworthy of a serious speaker. The limitation to "professedly atheistic" gatherings makes the comparison ludicrous and unmeaning. Let me in turn issue a challenge. Let the figures of the circulation of the sixpenny Christian publications be honestly compared with an equal number, in an equal time, of the Rationalist sixpenny works. Rationalism, Mr. Campbell knows quite well, is almost entirely unorganised.

dation." Mr. R. J. Campbell says that if the soul is not immortal, then the right philosophy is to "eat and drink and be merry"; that the real obstacles to Christianity are the thirst for money, sensual pleasure and entertainment; and that atheism is "the gospel of destruction, disease, and death."[1] This sentiment is repeated weekly from scores of pulpits all over the country; it is a commonplace of ecclesiastical literature and of a certain type of fiction.

Such tactics are malignant and dishonourable. I remember reading an article in the *Daily News* some months ago by Mr. Quiller Couch—a religious author writing in a journal with a preponderantly religious following. He touched on the current calumny of the man without belief in God and immortality, and he urged that his readers knew as well as he that when they wanted a man of honour and humanity to confide in they most probably looked to an agnostic. Without claiming so much as this, without enumerating the Stephens and Morleys and Harrisons that for years have adorned our letters and our public life, one asks oneself whether these cultivated clergymen can have had an experience of their fellows so different from that of this candid novelist and essayist that we can at least credit them with sincerity. It is impossible. The statement is an argument, a stratagem, a flimsy piece of theorising. It overrides for the moment every gentlemanly impulse, and closes its eyes to the pain and the heart-burn that many a gentle Christian mother will suffer as she broods over it and thinks of her wandering son. It is a mighty palliative —I will not say justification—of the violent language which often returns to these gentlemen. Did you ever meet a Christian who felt a moment's anxiety about his *own* character in the event of his ceasing to believe in Christian teaching? I never did. They could not face their fellows with an avowal that they were humane (when not defending the faith) and honourable only or chiefly because of reward hereafter, or because God willed it. They are proud of their own manliness. Their anxiety is ever for the welfare of others, for "the people."

What, then, is the ethic of Monism which these rhetoricians so completely ignore? One does not need a profound or prolonged research to find it. It rises out of the very ground on which they base their ignoble appeal. They would have us retain the outworn creed of Christianity because it has been an inspiration to character-forming, and because character and a quick sense of honour are amongst the most valuable qualities of life. They do not see that if honour, and sobriety, and high aims are of value in and for themselves, humanity will not lightly part with them, whether or no it reject the miraculous setting of them which the preacher commends. If "to eat and drink and be merry," to extinguish all ambition of spirit, to forego the visions of an Emerson or a Mazzini, to pour one's whole energy into money-making and sensual pleasure —if all these are social dangers and personal misfortunes, humanity will see to it that they are restrained. The issue is plain. If moral qualities may disappear without the faculties of man being stunted and the grace and glory of life being endangered, they will disappear. No power on earth will prevent it, now that man has begun to reflect. But if justice, and honour, and truthfulness, and self-control, and kindness are qualities that enrich and gladden the personal and the social life, they will be cultivated on that account. And as a fact, if we take a broad and true survey, the world was never richer in those qualities, yet the influence of dogma was never less. What does the humanitarian movement mean? What the movement for the extinction of the flames of war, the increase in philanthropic effort, the

[1] Sermon in the *Christian Commonwealth*, July 30, 1903. This was Mr. Campbell's first sermon in the City Temple, and must be regarded as an exceptionally deliberate utterance.

growing social service of the rich, and a score of other movements? What has shattered the barbaric doctrine of hell, and extinguished for ever the fires of persecution? A development of men's moral and humane feeling, which has proceeded simultaneously with a decay of belief.

But, we are told, you are still so near to the age of universal belief that the Christian ethic is in your blood in spite of you. You are severed twigs that are still green with the sap of the tree. I reply, firstly, that it is the modern rationalist and humanitarian movement that has *reformed Christianity*. Compare the degraded condition of Spain, where the Church has been able to stifle criticism, with England and Germany, where a century of criticism has been directed upon Christianity *from the outside*. And I reply, secondly, that we are perfectly conscious that the sap of Christianity is in our moral fibres. "We firmly adhere to the best part of Christian morality," says Haeckel (p. 120): and "the idea of the good in our monistic religion coincides for the most part with the Christian idea of virtue." Why should we be so foolish as to set aside the moral experience of the last 2000 years? It is the heritage of the race. We have been lifted above that petty sectarian attitude that distinguishes the church-member. We survey the whole moral and religious life of humanity as one broad stream. Christianity is a stage, a phase, in the continuous history of the world. It borrowed its ethic from Judæa, from Greece, and from Egypt. It was made in Alexandria, the centre at that time of the civilised world, and the converging point of three great spiritual streams. There is not a single ethical element in primitive Christianity that cannot be traced to its predecessors. Moreover, the notion that the Hebrews had a "genius for morality" has no longer even the semblance of plausibility. Read the 125th chapter of confessions or protestations in the Egyptian Bible, and you will find, a great Egyptologist (Budge) says, a system of morality "second to none among those which have been developed by the greatest nations of the world." And this chapter was *compiled*, from very much earlier teaching, fifteen centuries before Christ appeared, and at a time when the Hebrews were yet uncivilised. The *Book of the Dead*, as Dr. Washington Sullivan says, is so lofty that "if every vestige of Christianity were obliterated from the earth, it would provide an admirable ethical outfit for the reorganisation of morality in Europe." Further, we have within the last two years discovered the very source of that lofty morality with which the Hebrew prophets lifted their nation from its barbaric level. At a date when the Hebrews were sacrificing human victims to their idols, two thousand years before the decalogue in the Old Testament was written, the Babylonians (from whom the Hebrews obtained their wisdom and civilisation) were living at a very high level of moral idealism. The Code of Laws of Khammurabi—laws promulgated between 2285 and 2242 B.C.—is seen to be the foundation of the "Mosaic legislation." We now know, Dr. Washington Sullivan says, that the Hebrews "were positively *the last* of all the peoples of remote antiquity to discover those high truths of the moral life which constitute the unchanging foundation of society."[1]

But, while, in taking over from Christianity the moral heritage of humanity, we owe it gratitude for new development in some directions, we must with Haeckel acknowledge that it has overlaid moral truth with false ideals that must be set aside. I am not speaking merely of those mediæval horrors which all Christians avoid and evade to-day. I am thinking of some of the most distinctive features of the composite Christ-ideal. When Mr.

[1] *Ancient Morality*. The reader will find in this admirable booklet a fuller account of this and the preceding point. It can be obtained at a moderate price from "The Ethical Religion Society," Steinway Hall.

Campbell says that Christ "has manufactured more nobleness than all the moral codes in all the world put together," we see at a glance how little he knows of "all the moral codes" and what they have done. We who watch the advance of comparative religion and ethics, and of the criticism of the New Testament, know what will eventually become of this kind of Christianity which stakes its existence on the historical truth of the Gospels. Christ is dissolving year by year. But even when apologists have removed the stress from the (largely, at least) legendary person of Christ to that moral teaching which appears in the first century as "primitive Christianity," we still join issue with them. Haeckel has indicated several features of the Christian ethic which we cannot receive. Some of these features are already abandoned by our Christian neighbours. There is the ascetic principle, one of the most prominent elements of the Christ-teaching, which even the Catholic Church is quietly dropping. There is the Gospel of opposing violence by submission and Hooliganism by emptying your pockets, which one honest Anglican bishop has pronounced "impracticable." There is the contempt of art and nature, which follows from the ascetic principle. There is the commendation of virginity, which no one regards to-day, with its implication of the inferiority of marriage, so expressly preached by the Church fathers. There is the suppression of woman, inspired by the Old Testament teaching, which, as Mr. Lecky has shown, put back her emancipation (which the Romans were initiating) for more than a thousand years. All these were errors of the enthusiastic but ignorant compilers of the Christ-ideal, and the modern world agrees to abandon them.

We claim, further, that this moral teaching must be set once for all on a purely humanist ground. "With eyes fixed on the future," says the great Mazzini, "we must break the last links of the chain which holds us in bondage to the past, and with deliberate stages move on. We have freed ourelves from the abuses of the old world; we must now free ourselves from its glories. . . . To-day we have to found the polity of the nineteenth century—to climb through philosophy to faith; to define and organise association, proclaim humanity, initiate the New Age." The doctrine of Hell and Heaven is no longer a fitting foundation for moral conduct, as most educated Christians recognise to-day. But the personality of God or the personality of Christ is just as little fitted. Have you ever seen how the little-minded villagers, along those parts of our coast where the sea is steadily invading the land, build time after time close to the edge of the cliff? "My grandfather lived there," some old man will tell you, pointing his lean finger out into the sea. And he knows that in twenty years more the cottage he has himself built will be undermined and swept away. That is the procedure of those theologians who base their ethic on the successively dissolving dogmas of Christianity. Their grandfathers staked the moral condition of the community on a belief in Hell; their fathers grounded it on faith in the supernatural character of the Bible. They are basing it to-day on belief in God and the historical reality of Christ. And year by year the waves of criticism and the tunnels of research are undermining their position. Let us retreat once for all from the land of dogma. Morality is too important a matter to be left at the mercy of scientific or historical controversies. Cling to your beliefs if you must—if you can; but in view of the controversy that surrounds them, and will soon thicken about them a hundredfold, do not seek to bind up the moral tone of the community with so frail a speculation.

People who imagine that this proposal to transfer the moral interest from the care of the Churches has a violent and unnatural character are little acquainted with the history of the subject. The leading writers on com-

parative religion assure us that, in the words of Professor Tiele, "in the beginning religion had little or no connection with morality." In other words, morality had a quite different and independent origin from theology. It was only at a fairly advanced stage in the development of priesthood that the notion was advanced of the gods being the authors and the priests the guardians of the moral law. We have seen how Babylon had the decalogue and an elaborate moral code centuries before the supposed giving of the tables to Moses on Mount Sinai. The existence of a fully-developed moral sentiment can thus be discovered ages before the first claim of a revelation. If, further, we study the moral feeling of the lowliest tribes, and ascend gradually through the semi-barbaric peoples known to history, such as the ancient Mexicans or our own forefathers, we can trace clearly enough the growth of the moral ideal. When men began to live in community they discovered that certain restraints must be placed on individual impulses. They saw the enormous advantages to each of a communal life, of co-operation and the division of labour, of mutual help and service, of substituting trial or arbitration for bloody combats, and of being able to trust each other. In other words, they discovered that, if they were to advance in the construction of social life, which promised so many advantages, certain new habits or rules or qualities were necessary. Justice, kindness, respect for age, care of youth, truthfulness, sobriety, and self-control were necessary. In proportion as they acquired these qualities their social life was healthy and effective. The individual gained far more than he had relinquished in the occasional restraint of his impulses. And in proportion as they fell away from this ideal their social life was enfeebled and disturbed. Thus there grew up a sense of the importance of the moral ideal—such a sense as we find, for instance, amongst the ancient Germans long before their contact with Christianity. In this way the decalogue came to be written. Man was its author. The experience of 200,000 years was his inspiration. And to-day, when we see how vitally necessary moral fibre is for progress in the exacting race of our national and international life, it is hardly likely that we shall return to the lawlessness of prehistoric life. There came a stage in the evolution of the moral ideal when men considered it so wonderful a thought that they hailed it as a gift of the gods, just as the Hebrews did when they composed, or borrowed, the legend of the giving of the law on Sinai. In this way morality became intimately associated with theology. It is probable that, whilst this association has hindered moral development in some ways—compare the stagnancy of the "ages of faith" with the great ethical advance of this "age of unbelief"—it has in other ways greatly promoted it.

However that may be, the time has come for humanity to claim its own from the gods. There is an obvious danger that, as the theological structure with which morality has so long been associated breaks up, morality may suffer for a time. Scepticism about the one naturally leads to scepticism about the other. To say that we should on that account refrain from hastening the dissolution of theology is the very reverse of wisdom or statesmanship. We must insist on the formation of a purely humanitarian ethic. We must jealously remove this deeply important interest from the arena of controversy. Our children must not be taught, as they are still taught, to restrain their impulses to lying, stealing, and unhealthy practices, merely on the ground of certain religious beliefs. In a few years they will hear those beliefs ridiculed and torn to shreds on every side, and it may be that the whole structure of their moral habits will be shaken to the ground. This is a grave social and humanitarian problem. Our educational authorities insist that moral training shall be given by the teacher only in connection with the legends of the Old Testament, which

are not taken to be historical by clerical scholars themselves to-day, or with the stories of the New Testament that are being rapidly reduced to myths. The child is too unsophisticated to see what is called a "symbolic truth" in these, and it is well known that the teachers in our schools, often with great repugnance to their own feelings, have to treat these stories as historical, or leave them to be considered historical. It is a pitiful situation, and ought not to be tolerated even by those who still adhere to religious beliefs.

An organisation has been created to meet this situation; to agitate for the introduction of purely humanitarian moral instruction for the children in our elementary schools, and to formulate schemes of such teaching and provide model-lessons and expert teachers to show its practicability. Already several local educational authorities have adopted the ideas of this organisation. But over the country at large the moral instruction of our children is still totally bound up with that teaching of the Bible which is to-day so seriously controverted. Every man, and especially every woman, who is alive to the folly and the danger of our present system should consider the aim and work of this organisation.[1]

A more difficult question arises when we turn to consider moral culture amongst the adult portion of the community. Dr. Haeckel is of opinion, as are very many rationalist writers, that we need look forward to no substitute for the Churches in this respect, except for a certain minority of the community. "The modern man," he says, "who has 'science and art,' and therefore 'religion,' needs no special church, no narrow, enclosed portion of space. For through the length and breadth of free nature, wherever he turns his gaze, to the whole universe or to any single part of it, he finds indeed the grim struggle for life, but by its side are ever 'the good, the true, and the beautiful'; his church is commensurate with the whole of glorious nature. Still, there will always be men of special temperament who will desire to have decorated temples or churches as places of devotion, to which they may withdraw." No doubt, when we have introduced an adequate scheme of purely natural moral instruction into our primary and secondary schools instead of leaving this most important section of the child's education to the casual observations of a reluctant and untrained teacher in the course of a Bible lesson, there will not be the same need for church-assemblies in later life. But it would seem that the tendency to form new groups and organisations for moral and humanitarian culture is on the increase. Already there is in the field an important "Ethical movement," with branches in America, England, France, and Germany, and with an international organ (*The International Journal of Ethics*) and international congresses. The English branch includes some fifteen societies in London and the provinces, most of which are gathered into a Union of Ethical Societies,[1] and is spreading rapidly. It has an organ of its own (*Ethics*, one penny weekly), and takes an active part in all social and humanitarian work. There is also the Positivist Movement; and there are numbers of Humanitarian, Tolstoyan, and other societies with similar aims. Even churches and chapels are slowly casting off their raiment of dogma and speculation, and restricting their aim to moral culture. In many parts of England this transformation has already completely taken place. The tendency everywhere is in the direction of an abandonment of dogma, and a relinquishment of cosmic speculation to the philosopher and the scientist. Some

[1] I am referring to the Moral Instruction League. Its central office is at 19 Buckingham Street, Strand, London, W.C.; any inquiries addressed there will be promptly answered by the secretary. Branches of the League have been formed in various parts of the country.

[1] Central office at 19 Buckingham Street, London, W.C.

day our Churches will perceive at length that the belief in God is itself a cosmic speculation, exposed to a hundred hazards of discovery and controversy. Then, in the words of Emerson, "there will be a new Church, founded on moral science; at first cold and naked, a babe in a manger again, the algebra and mathematics of ethical law, the Church of men to come, without shawms, or psaltery, or sackbut, but it will have heaven and earth for its beams and rafters, science for symbol and illustration; it will fast enough gather beauty, music, picture, and poetry."

That Haeckel is right in this, his final judgment and expectation, none will question who have long observed the development of religious thought and church life. Strong and eloquent voices plead already within the Churches for the elimination of dogma, for an exclusive concern for moral culture. If the modern art of anticipation have any validity, it is certain that theological speculation and moral culture are severing their long association. We are taking the step that some of the great religions of the world took ages ago. Buddha, wiser in this than the founders of Christianity, pleaded solely for moral reform, and coldly discountenanced theological speculation. Enlightened Buddhists hold to the spirit of his teaching, though Buddhism has, as a whole, been unfaithful to his spirit. But another great oriental religion, Confucianism, the religion of the cultured Chinese and Japanese, had taken the step we are taking to-day centuries before Christ was born. The followers of Kung-Tse have for ages maintained moral culture without dogma. Their Bible, the *Bushido*, is the model Bible of the world. It is the turn of Christianity to make religion "the service of man" instead of "the service of God." If there be a God, he needs not the sacrifices, and he must disdain the flattery and adoration, of a poverty-stricken humanity. We must turn at length from the land of shadows, where the supernatural lurks, and pour the whole intense stream of religious emotion into the task of uplifting ourselves and our fellows. We must free the religious and moral ideal from every entanglement of controverted dogma, and set it on a natural base. Then will cease the long anxiety and the foolish resistance to every advance of thought. Then each new discovery will shed new light on our ideal, and science will be eagerly pursued.

"Oh Science, lift aloud thy voice that stills
The pulse of fear, and through the conscience thrills—
Thrills through the conscience with the news of peace—
How beautiful thy feet are on the hills!"

Chapter X

THE POSITION OF DR. A. R. WALLACE

The reader will probably remember a famous passage in one of Huxley's essays where the anxiety that theologians betray, as the mechanical interpretation of the universe advances, is compared to the terror which savages exhibit during an eclipse of the sun. Whether Huxley had had a rude experience of that

ecclesiastical rhetoric, of which we have seen so much under the name of "criticism" of Haeckel, and had yielded to a malicious impulse in his choice of an analogy, we need not inquire. We have seen that the apologists are still eager to throw every obstacle they can suggest in the way of the advance, or of the acceptance, of the mechanical view. We have encountered them at every step in our course. Sometimes, indeed, we have found ecclesiastics with scientific qualifications desperately recommending us to read criticisms that aim at discrediting scientific procedure; as when Mr. Ballard tells his readers to study Stallo's *Concepts of Modern Physics*, a work "the most of which," says Sir O. Lodge, "is occupied in demolishing constructions of straw." But these tactics have long ago ceased to be effective. Science has won too solid a position in modern life to be shaken by the ill-informed criticism of Stallo or the academic subtleties of Professor Ward. Nor is the general reader greatly moved by the efforts of our modern theologians to sit in judgment on science in its own domain. The obvious plan for the Churches to adopt with the largest hope of success was to obtain, and give a wide publicity to, utterances by prominent scientists that tend to rehabilitate theology. I am not suggesting that these distinguished scientists only speak out under a strong pressure from the clergy. On the part of Sir O. Lodge, for instance, and Dr. A. R. Wallace, there is a very clear concern for religion, which is entitled to our full respect. But it cannot be denied that the use which is made by the clergy of these occasional utterances is gravely misleading. We have already seen this in the case of those German scientists to whom Haeckel refers as having changed their views. The only statement that Haeckel makes is that they have ceased to defend the positive views which he expounds in the *Riddle*; yet almost every clerical writer represents them as having, to use Dr. Horton's words, "come to recognise spirit as the author of consciousness"—this in spite of the fact that Haeckel expressly mentions Du Bois-Reymond's agnosticism on this point (p. 6). Dr. Horton, with his inclusion amongst the elect of the most notorious materialists that ever lived, has a title to leniency, in a sense, because of his obvious ignorance of the entire subject. The position of those apologists who have some scientific culture is more serious. These German scientists—Wundt, Baer, Virchow, and Du Bois-Reymond — are agnostics. Professor Haeckel assures me that in Germany the clerical writers call them "atheists." They lend no support whatever to even the most advanced and liberal form of theism. Writers who so thoroughly mislead the English public as to their position have little right to discuss the taste of Haeckel's analysis of his colleagues' views. The oriental saying about straining at the gnat and swallowing the camel is painfully pertinent.

We have now to examine those utterances on the part of English men of science which are so much quoted of late, and we shall find how little support they really give to the religious position. Of the later views of G. J. Romanes I will speak later, when we come to deal with the somewhat similar ideas of Mr. W. Mallock. Romanes saw to the end the terrible strength of the scientific position. It was only by an appeal to "extra-rational" and unscientific testimony that he sought to evade it. With Sir O. Lodge we need not deal in detail. His chief line of argument is of a teleological nature, and is exposed to the difficulties we have already indicated. Nor do I propose to deal with the spiritist convictions of Sir O. Lodge or Dr. Wallace, or (if they still exist) Sir W. Crookes, or (in a degree) Professor James. Spiritist evidence is a subject for personal investigation. We may also hold ourselves dispensed from dealing in detail with the views of the late Dr. St. George Mivart. They are not urged upon us to-

day.[1] But there have lately been published two remarkable pronouncements by distinguished English scientists, Dr. Wallace and Lord Kelvin, and these it is incumbent on us to examine. It is chiefly on the strength of these utterances that clerical apologists talk of a reconciliation of science and religion, if not of "a rehabilitation of religion by science." These utterances have, in their bald and misleading outline, been published throughout the country. We shall see, in this and the following chapter, how wholly ineffectual they were, how swiftly they were torn to shreds by the proper experts on the subjects involved, and how clearly the episodes show that the science of to-day is overwhelmingly favourable to the positions we have defended against Haeckel's critics.

Dr. A. R. Wallace, one of the most distinguished naturalists of our time, has long been famous for his opposition to the doctrine of the evolution of the human mind. This opposition, maintained in face of a remarkable and increasing consensus of scientists and scientific theologians, is ceasing to impress inquirers as it once did. The opinions of a man of such ability, expert knowledge, and candour, must always be examined with respect. But we have seen that the problem is very different to-day from what it was thirty years ago. To-day we all admit that evolution is a cosmic law: Haeckel says it is "the second law of substance," and the theologians say it is God's way of making things. We all admit the evolution of matter and the evolution of solar systems; and most of us admit the evolution of life and the evolution of species. On the other hand, we trace back the distinctive human institutions of to-day—art, civilisation, science, philosophy, religion, moral codes, and language—along a line of evolution to very primitive beginnings. Grant a glimmer of intelligence and reason in early man, and we can very well conceive the natural development of these institutions in the course of the last 200,000 years. We *must*, indeed; because we know that the prehistoric man, whose remains we unearth to-day, had not these things. We have, therefore, only to bridge the interval between the brain of the Neanderthal man and that of the anthropoid ape, between the mind of the highest animal and that of the lowest man. The difference is one of degree, not of kind. Comparative psychology finds in animals the same emotions and reasoning power as in man, only less highly developed. Further, we have a period of at least 600,000 years in which the advance might be effected. The anthropoid apes appear in the Miocene period (about 900,000 years ago). Man is not held to be developed from them, but from a common ancestor with them; so that from that period to the time when we find unmistakable trace of man (250,000 to 220,000 years ago) natural selection must have been at work. Finally, we have lately discovered a most important link in the chain of development (the *pithecanthropus*), and the study of the brain is, as we saw, suggesting some very remarkable and illuminating possibilities. If Canon Aubrey Moore could say that Mr. Wallace's view "had a strangely unorthodox look" sixteen years ago, it has certainly not lost its singularity in our day. When Dr. Haeckel went to Java, two years ago, on a scientific expedition, the Press assured us that he had gone to search for more bones of the pithecanthropus. As a fact, though his researches and travels took him within a hundred miles of the spot where Dubois found the famous remains in 1894, he did not go there. The evidence for the complete natural development of man is so great that such discoveries are unnecessary.

But Dr. Wallace has very recently entrenched his position with a very

[1] Had Mivart lived, the public would have seen a sensational development in the exposition of his later opinions. He told me, some years before his death, that he intended to speak out fully before he quitted the stage, and he frankly admitted that his scepticism was deep and his concern for religion little more than a belief in its moral efficacy.

remarkable attack on current scientific conceptions. He purports to undo a large and important section of the scientific procedure of our earlier chapters, and we must enter upon a thorough examination of his statements.[1] He says that the "new astronomy" entirely discredits that "cosmological perspective" which we have taken from Haeckel and supported with recent evidence. Instead of finding indications of infinity, he says, modern astronomers have discovered very definite limits to the material universe. Instead of our sun being a neglected and unimportant element in the stellar universe, it is the very centre, or near the centre, of the whole system. Instead of our earth being a very ordinary fragment of matter, torn, in some way, from the central mass, and forming a casual crust at its cooled surface, it is a unique body in the universe; it is fitted to support life in a way that no other planet of our system is, and that most probably no other planet in the universe is. Thus, instead of man being a mere casual product of natural development, he is the very centre and culmination of its processes, a unique creation, for whose production the whole universe seems to be one vast and orderly mechanism, set up for that purpose by a Supreme Intelligence.

If this is true, it is one of the most startling and dramatic discoveries ever made. Let me point out at once that if all this (except the last line) were established to-morrow it would not add one grain of evidence to the religious position, and would not break a line in the essential structure of Monism. The universe would still be a mechanism, with no indication of ever having begun to exist; and Dr. Wallace's teleological plea for a guiding intelligence would be as illogical as we have seen that argument to be. This new discovery would greatly impress (because it would greatly unsettle) the imagination, but would have no philosophical significance. Dr. Wallace says we could no longer attribute the appearance of life to chance; but we do not attribute it now to "chance." We attribute it to a mechanism which is *not* erratic, but fixed, in its action. Setting aside the imagination and the emotions, there is no more philosophic significance in the fact of the materials and conditions of life being found in just one cosmic body than in a million. Dr. Wallace seems to make much of the "remarkable coincidence" of these curious privileges of our planet with the actual appearance of life on it. Most people will think there would be some reason to use the word remarkable if the conditions were here and the life was not forthcoming. There is no religious significance in all that Dr. Wallace urges. But it is in direct opposition to much that we have established in the earlier stages of Haeckel's position, and we must examine the evidence adduced in support of it. If it is true, Monism can assimilate it without strain. We shall see that it is not only not proved, but the attempt to prove it only shows again the correctness of even Haeckel's minor positions.

It is, naturally, to astronomy that Dr. Wallace turns for evidence. He is not an expert in that science, but, of course, every philosophic thinker must borrow material from many different sciences. The truth is, however, that no sooner were Dr. Wallace's views published than there was immediately a loud and unanimous condemnation of them on the part of astronomers. The astronomers of France and Germany were frankly cynical about them, two of the leading French astronomers writing to combat them in *Knowledge*. Our chief English astronomers, of all schools, at once repudiated the alleged evidence. Professor Turner, the Savilian Professor of Astronomy at Oxford, said that Dr. Wallace had "not suggested anything new which was in the least likely to be true. He seems to me to have unconsciously got his facts

[1] The book he announces is not published as I write, so that I follow the two articles he wrote in the *Fortnightly Review* (March and September, 1903).

distorted, and to indicate practically nothing wherewith to link them to his conclusion." Dr. Maunder pronounced the new theory "a myth," and was not sure if Dr. Wallace intended the article to be taken as "a serious one." A number of other astronomers joined in the discussion, and, apart from one or two details in his evidence, not a single expert undertook to defend him. But we must examine his several positions in succession, so as to bring out once more the fact that Haeckel is supported by the most recent science.

The first point, and the most interesting for our purpose, is the contention that the new astronomy discovers the universe to have a definite limit. We have urged that Haeckel was in harmony with the evidence when he spoke of the universe as "infinite," so that here is a clear contradiction. It need not be said that the validity of Monism is not at stake in the matter. Whether the universe is limited or unlimited, it remains a Monistic universe. The question is whether Haeckel has misread the evidence of astronomy on this incidental question of limit or no limit. It is well to remember that "infinity" is a negative idea. It merely denies that there is a limit to the scheme of things. What we have to see, then, is whether the most recent investigations of astronomy point to the existence of such a limit or not.

The evidence for a limit on which Dr. Wallace lays most stress is, instead of being a study in "the new astronomy," a very old and threadbare fallacy. Flammarion says[1] it was "the subject of long and learned discussions during the course of the eighteenth century and up to the middle of the nineteenth," and he adds that "it would not be difficult to settle it to-day." The argument is that if the number of luminous stars were infinite the sky would be at night as bright as it is at noonday. The infinite number would compensate for the distance. But the actual star-light is only about one-fortieth the light of the moon, and that is only a five-thousandth of the intensity of the light of the sun. Dr. Wallace has taken this specious calculation from Professor Newcomb, but has, as Dr. Maunder points out, omitted two conditions which Newcomb carefully gives, and which make the speculation totally inapplicable to the actual universe. Newcomb's calculation assumed that no star-light was lost in transmission, and that "every region of space of some great but finite extent is, on the average, occupied by at least one star." Neither of these conditions is found in our universe. Light *is* absorbed in its passage to us; and the stars are distributed with nothing approaching the uniformity which the speculation demands. The second point needs no proof. The irregular structure of our stellar system is familiar enough; and there is not the slightest scientific difficulty about supposing that other stellar worlds may be separated from ours by immeasurable deserts of space. As to the absorption of light, a number of causes are pointed out. In the first place, we now know that there are dark as well as luminous stars. No astronomer supposes that these are less numerous than the light stars. Sir Robert Ball thinks they are so much more numerous that to count the stars by the light and visible spheres would be like estimating the number of horse-shoes in England by the number of those which are red-hot at a given moment. These dark stars must intercept the light of their incandescent fellows.[1] Dr. Maunder says that if we take them as a basis of our calculation

[1] *Knowledge*, June, 1903.

[1] In his second article Dr. Wallace replies that Mr. Monck has shown that, even if the dark stars were 150,000 times more numerous than the light ones, the sky would, if these were infinite, be as bright as moonlight. Once more Dr. Wallace omits a condition stipulated by his authority, who says this would be so if they "were distributed in anything approaching a similar density." For that we have no assurance whatever. Moreover, Dr. Wallace almost ignore the other and more important sources of absorption.

we could prove that "we are shut in by a veil which no light from an infinite distance could pierce."

But in addition to these incalculable dark stars there are other sources of absorption. The astronomer to whom Dr. Wallace appeals, Mr. Monck, holds that ether itself absorbs light. At any rate we know that space is full of cosmic dust—meteorites, etc.—and that this must be an important source of absorption. Mr. Monck says that, "if sufficiently remote, the star would thus for all practical purposes be blotted out." And Sir N. Lockyer also emphasises this factor. Moreover, we have just learned a further source. Before Newcomb's latest work was published, in February, 1901, a new cosmic element was discovered in the shape of a dark nebula. Certain peculiarities of a new star led to the discovery that it was surrounded by a nebula that reflected its light. Thus, we have the presence in space of another and powerful screen in the shape of dark nebulæ, the number and distribution of which we are unable to conjecture. Our universe is something infinitely removed from that theoretical system to which Professor Newcomb's calculations might apply. Thus, once more, does the very latest science come to our assistance. We may add that, even apart from the absorption of light and the irregular distribution of the stars, the calculation is enfeebled by another possibility. We have no proof that ether is continuous throughout infinite space. There may be several galaxies or stellar systems, unconnected by ether, so that one would not be visible to another. Assuming that (according to a calculation of Lord Kelvin's) there are a thousand million stars in our system, "there may be," says Flammarion, "a second thousand beyond an immense void, or a third, or fourth or more." And, finally, Professor Pickering has shown that, even with a continuous infinite ether, our present star-light is quite consistent with the existence of an infinite number of luminous stars, "if the distance between the stars becomes (on the average) greater the farther we go from the solar system," if we assume this to be central.

Thus the most emphatic of Dr. Wallace's proofs has been absolutely riddled by expert astronomical opinion. It is "founded," says Dr. Maunder, "on a careless reading of Professor Newcomb's book," and cannot be sustained for a moment.[1] Nor is his other line of argument more capable of defence. He urges that, although up to a certain point an increase in the power of the telescope reveals new worlds in greater number, this increase is not sustained in the case of our largest telescopes; and, in the case of photographs of the stars, an exposure beyond three or four hours does not bring us into touch with an increasing number of worlds. From this he would infer that the powerful instruments we use to-day have exhausted the universe and brought us to its extremities. If the number of stars were infinite, an increase of power or exposure should always reveal new worlds. Once more, Dr. Wallace has drawn his conclusion too precipitately. In the first place, as I said, there is the possibility of other systems being cut off from ours by empty space. But there is a simpler and readier answer to his argument. The fact to which he appeals—in so far as it *is* fact; a study of the long-exposure photographs of Dr. Isaacs by no means sustains it[2]—really means that we are approaching the limit of the effective range of the telescope, not the limit of objective reality. Every increase in the aperture of a refracting telescope means

[1] Nor is Professor Newcomb's book itself above dispute, great as is the authority of the writer. Mr. R. A. Gregory, reviewing it in *Nature* (March, 1902), says that "the outlook described is not only limited, but imperfect," and points out a number of errors in it.

[2] In his second article Dr. Wallace appeals to these photographs, but makes it clear that he has in mind photographs of nebulæ and star-clusters. It is obvious that there must be a limit to the number of stars in a given cluster or nebula; but the eight-hour exposure photographs of other parts of the heavens read differently.

an increase in the absorption of light by the lens itself. We are, Dr. Maunder says, approaching the limit beyond which the absorption will neutralise the advantage of a large objective. So in the case of stellar photography, it is only when we deal with "medium luminosities" that a longer exposure avails. Thus Dr. Wallace not only exaggerates the fact—Mr. Monck, for instance, speaks of "the constant detection of additional stars by more powerful instruments"—but he misinterprets its significance. He has not, says M. Moye, "brought any convincing proof against the universe being infinite." "Space cannot be otherwise than infinite," says M. Flammarion; a limit to either space or time is unthinkable. The latest researches of astronomers bring us no nearer than ever to a limit of the material universe.

Dr. Wallace's second point, that our planet occupies a significant central position in the universe, collapses of itself when he fails to prove that that universe is finite. There is no centre in infinity. But, as Dr. Wallace has committed the radical error of "reasoning from the area we see to the infinite," it is at least interesting to examine how far our sun may be described as occupying a central position in the vast stellar combination we call the Milky Way. Now, it has long been obvious that our sun is roughly in the centre of this huge system. We have only to glance at the great belt of light the system forms around us in the heavens to see this. But astronomers once more totally reject the expression of this fact which Dr. Wallace presents. The system is so irregular in structure that we could not with propriety assign a definite centre to it if our knowledge were greater than it is. You may talk of the centre of a bowl, says Professor Turner, but you cannot talk of the centre of a saucepan; and there is a projection of the system visible in the southern heavens which answers to the "handle" in this figure. Flammarion believes there are clusters in the heavens that do not belong to our system at all. Moreover, even if we consent to speak of a "centre" of this irregular structure, with its clefts and projections, it is wholly inaccurate to say that our sun is awarded that position by astronomy. Mr. Monck doubts "if any astronomer could go within one thousand light years of the centre of the star system as at present known"; that is to say, in non-technical language, no astronomer would venture to assign a centre within the broad limit of 6000 billion miles! Other astronomers think it clear that we are nearer one side of the system than its opposite, and point out that if the motion of our sun (about ten miles a second) is in a curve determined by gravitation (as it surely is) round the centre of gravity of the solar system, it must be at an enormous distance from that centre, as we can learn from the analogy of motion in a globular cluster. All agree that we have no greater right to consider ourselves in a central position than are fifty other suns, the nearest of which is twenty-five billion miles away from us.

Thus Dr. Wallace has once more considerably strained the evidence in order to vindicate a central position for us. But there is a further consideration which must be taken into account. Our sun is calculated by astronomers to be travelling through space at about ten miles per second. Dr. Wallace seeks to enfeeble this doctrine of astronomy, when it is turned against him, by urging that the motion is relative; it may be the stars that move while we remain stationary. That is to say, he would suggest an anomalous character for our sun without a shadow of proof and in direct opposition to the law of gravitation, which he himself invokes at other times. The idea of a vast central sun, round which all the stars in the Milky Way would revolve, as planets do round a sun, has been long since rejected by astronomers. Its mass would have to be incalculable; and the mass of our sun is small compared with that of its measurable neighbours. To save itself from being sucked in (or impelled

towards) its gigantic double and triple neighbours it must move. It is probable that it follows a curved path round the common centre of gravity of our system (not a central mass). In any case the curve of its path is so great that astronomers can as yet detect no curve at all. It follows that, if to-day we happen to occupy a central position, it is only a temporary occupation. Many of Dr. Wallace's critics argued on the supposition that our path lay in a straight line through the universe, but others pointed out the probable curve, so that Dr. Wallace does not escape the point by rejecting rectilinear motion. He had argued that the special advantages which this supposed central position gave to our sun had been enjoyed by it during the whole period of the evolution of life. Astronomy wholly discredits that assumption even when we bear in mind all that he urges as to the relativity of cosmic movements.

Let us next examine the advantages which our planet is supposed by Dr. Wallace to possess in the way of habitability. The conditions of life which he enumerates are the usual conditions of a certain temperature (say, between 0° C. and 75° C.), a circulation of water, and an atmosphere of proper density and extent to effect this. Our own distance from the sun, with an atmosphere and tidal movements to equalise the distribution of heat and cold, ensures a moderate temperature. Our deep, permanent oceans hold a supply of water, which is admirably circulated by the heat of the sun, controlled by the atmosphere, and assisted by the dust which our deserts and volcanoes largely contribute. Thus we have, he thinks, in the position of our planet, its distribution of land and water, its atmosphere, its satellite, and its physical features, a combination of favourable circumstances that is not likely to be found elsewhere, The distance of the other planets from the sun is either too great or too little. Atmosphere is largely determined by mass, and so Mars is in this respect disqualified. Venus has no moon, and this "may alone render it quite incapable of developing high forms of life." We know, he says, with "almost complete certainty" that this combination of favourable conditions is not found on any other planet in our solar system.

To this series of affirmations the expert astronomical critics oppose a very decided series of negatives. "In our solar system," says Flammarion, "this little earth has not obtained any special privileges from Nature." M. Moye regards our earth and sun as "very ordinary orbs, having no special characteristics, and as no more suitable for life than innumerable other suns and planets." Mr. Monck has "sufficient faith in the principle of evolution to think that man might accommodate himself to the conditions of life on almost any of the planets, provided that the change were sufficiently gradual, and a sufficient time were allowed to elapse." It is true that Miss Clerke says, "Dr. Wallace's contention, that our earth is unique as being the abode of intellectual life, corresponds in a measure with the recent trend of astronomical research." Miss Clerke, it is not impertinent to observe, approaches the subject with the same prejudice as Dr. Wallace about the uniqueness of man, but the phrase "in a measure" saves the passage from inaccuracy; and she later makes an exception in favour of Mars. But the whole idea of seeking identical conditions in other planets is erroneous. "To limit the work of Nature to the sphere of our knowledge is," says Flammarion, "to reason with singular childishness." They are of the same material as earth, and have been evolved by the same forces; there is likely to be a general likeness of features, and that is enough for our purpose, when we remember the infinite adaptability of the life force. M. Moye examines in detail the conditions Dr. Wallace lays down, and points out many errors. To say that Mars is disqualified on account of its smaller mass than the earth is "a purely

gratuitous assumption." Aqueous vapour has been detected by the spectroscope in the atmospheres of at least Venus and Jupiter. Tidal motion is caused by the sun as well as the moon, and may be so caused in Venus; nor is it essential to life. "The distance from the sun to the earth in the general plan of our solar system is not peculiar or extraordinary in any way." While, as to deserts, each of the other planets must, on Wallace's theory, be one vast desert; nor have we any ground for thinking that deep, permanent oceans are a peculiar feature of our planet.

It would, of course, be no more than an interesting discovery, of no grave consequence to Monism, if our planet were proved to be the only habitable body in our solar system; but astronomers utterly discountenance the idea. "Life is universal and eternal," says Flammarion, almost in the words of Haeckel. "Yesterday the moon, to-day the earth, to-morrow Jupiter . . . Let us open the eyes of our understanding, and let us look beyond ourselves in the infinite expanse at life and intelligence in all its degrees in endless evolution."

Professor Turner points out that Dr. Wallace has completely failed to show, after all his laborious proof of our central position, that this would give our earth any advantage in the way of habitability. He says that Dr. Wallace, "with the deftness of a conjurer," has substituted for this question a discussion of the impossibility of there being life at the confines of the universe. It is true that Dr. Wallace has since admitted that he had no proof to offer at the time, but will present one in his forthcoming work. However, we may profitably close with a glance at his attempt to prove that life is impossible towards the imagined limits of our system. Even his fellow spiritualist, Miss A. Clerke, protests that "it cannot be reasonably supposed that the conditions of vitality deteriorate with remoteness from the centre"; and Dr. Wallace has been forced to admit that the reasons he suggested were ill-considered and erroneous. He surmised that gravitation might be less at the verge of the system; which is not only "a pure assumption," but is opposed by our knowledge of the most distant double stars. He compares the movements of the stars with the molecules of a gas, and is eventually compelled to acknowledge that "there is probably no justification for the idea." And he quite gratuitously supposes that the action of electric and similar rays is different at the edge of our stellar system than it is elsewhere.

We may conclude, then, that Dr. Wallace's excursion into astronomy has been singularly and painfully disastrous. In general and in detail his theory is shattered to fragments by the criticisms of all the experts who join in the discussion. The idea of man's spiritual uniqueness obtains no support whatever from the great cosmic investigations of "the new astronomy." On the contrary, the most recent discoveries and speculations confirm the "cosmological perspective" which Haeckel urges in his *Riddle of the Universe*. We have no ground in scientific evidence for assigning limits of time or space to the material universe; we have no ground for believing that man is a unique outcome of natural evolution, and that "the supreme end and purpose of the vast universe was the production and development of the living soul in the perishable body of man"; and we have no ground for thinking there is so peculiar a combination of circumstances in our planet as to force us to appeal to a Supreme Intelligence.

Chapter XI

LORD KELVIN INTERVENES

Whilst this storm of astronomical indignation was beating about the luckless pronouncement of Dr. A. R. Wallace, the second intervention on behalf of religion, of which I spoke, took place. Once more, it is important to observe, the intervention consisted of a declaration by a distinguished scientist that some science *other than his own* tended to support conventional religion by its recent investigations. Dr. Wallace, the naturalist, purported to speak for astronomy; and we have seen what the astronomers themselves made of his declarations. Lord Kelvin, the most distinguished living physicist, assured the world that biology was coming to recognise a field of phenomena with which it was so incompetent to deal that it was retreating to the old notion of a "vital principle" and the action of "Creative Power." We have now to see what our biologists had to say about this statement of their attitude.

The circumstances of Lord Kelvin's pronouncement will be easily recalled. Certain of the students of the University College, London, have formed themselves, or been formed, into a "Christian Association," and have lately set about "converting" their less religious fellows to the belief in their particular cosmic speculations. A series of lectures was arranged for the spring of this year, the Botanical Theatre of the University College was somehow secured, and a certain show of scientific names was scattered over the programme. The first lecture was by the Rev. Professor Henslow (M.A., F.L.S., F.G.S.), and a vote of thanks was accorded to the lecturer by Lord Kelvin for his "examination of Darwinism." The second lecture, on "The Book of Genesis," was given by the Dean of Canterbury, and the chair was taken by Sir Robert Anderson (K.C.B., LL.D.). The Rev. Professor Margoliouth gave the third lecture, on "The Synoptic Gospels," and was supported by a distinguished physician (Sir Dyce Duckworth) and a military man. The other two lectures were also given by reverend lecturers, and were supported by Sir T. Barlow, M.D., and Mr. Augustine Birrell. Lord Kelvin was the lion of the display, and his few closing words were at once published from end to end of England. He claimed that "modern biologists were coming once more to the acceptance of something, and that was a vital principle." He asked: "Was there anything so absurd as to believe that a number of atoms by falling together of their own accord could make a crystal, a sprig of moss, a microbe, a living animal?" And he concluded that this was an appeal to "creative power." On the following day he re-affirmed his opinion, with a distinction, in a letter to the *Times*. He wrote: "I desire to point out that while 'fortuitous concourse of atoms' is not an inappropriate description of the formation of a crystal, it is utterly absurd in respect to the coming into existence, or the growth, or the continuation of the molecular combinations presented in the bodies of living things. Here scientific thought is compelled to accept the idea of Creative Power. Forty years ago I asked Liebig, walking somewhere in the country, if he believed that the grass and flowers which we saw around us grew by mere mechanical forces. He answered, 'No, no more than I could believe that a book of botany describing them could grow by mere chemical forces.'"

The echo of this sturdy utterance is still reverberating through the provinces, soothing the anxious feelings of thousands of believers, and being triumphantly quoted against the unbeliever. In London its echo was quickly drowned in a chorus of condemnation. Lord Kelvin's letter was at once followed in the *Times* by letters from three of our most eminent experts on the subject he had ventured to touch, as well as by letters from Mr. W. H. Mallock, Professor Karl Pearson, and Sir O. Lodge. The three experts unanimously condemned Lord Kelvin's statement, as did also Mr. Mallock and Professor Pearson; and even Sir O. Lodge said that "his wording was more appropriate to a speech than a philosophical essay," it had a "subjective interest," but he "would not use the phrase himself." Sir W. T. Thiselton-Dyer, our most distinguished botanist, complained that Lord Kelvin "wiped out by a stroke of the pen the whole position won for us by Darwin," said that the reference to a fortuitous concourse of atoms was "scarcely worthy of Lord Kelvin," and "denied the fact" that "modern biologists were coming to accept the vital principle." Sir J. Burdon-Sanderson, the Regius Professor of Medicine at Oxford, while resenting the strong terms of Sir W. T. Thiselton-Dyer's censure of Lord Kelvin's personal procedure, said that it had been demonstrated to the satisfaction of physiologists that "the natural laws which had been established in the inorganic world govern no less absolutely the processes of animal and plant life, thus giving the death-blow to the previously prevalent vitalistic doctrine that these operations of life are dominated by laws which are special to themselves." Professor Karl Pearson was astonished that an institution with accredited professors in biology "should open its doors to irresponsible lecturers on 'directivity,'" and said that "if Lord Kelvin wishes to attack Darwinism, let him leave the field of emotional theological belief and descend into the plane where straightforward biological argument meets like argument."

Professor E. Ray Lankester, from the side of zoology, said: "I do not myself know of anyone of admitted leadership among modern biologists who is showing signs of 'coming to a belief in the existence of a vital principle,'" and that "we biologists, knowing the paralysing influence of such hypotheses in the past, are unwilling to have anything to do with a 'vital principle,' even though Lord Kelvin erroneously thinks we are coming to it," and "we take no stock in these mysterious entities." Sir O. Lodge, drawn by an allusion to his belief in telepathy, took occasion to disclaim and deprecate Lord Kelvin's use of the phrases "creative power" and "fortuitous concourse of atoms."

With these weighty and emphatic pronouncements from some of the ablest biologists in this country—without a single line in defence of Lord Kelvin, either by himself or by any known expert—we might dismiss Lord Kelvin's intervention as the most unfortunate episode of his career, and as a pitiful failure to give the slenderest support to the reverend lecturers of the Christian Association. But an appeal to authorities is a fallacious and unsatisfactory settlement. We shall better vindicate the strength of Haeckel's position by a brief analysis of this most recent attempt to demolish it.

Let us see, then, first what truth there is in the statement that "modern biologists are coming once more to a firm acceptance of the vital principle." This three of our most representative biologists, Sir W. T. Thiselton-Dyer, Professor Ray Lankester, and Sir J. Burdon-Sanderson, flatly deny. Clearly Lord Kelvin was guilty of the gravest impropriety in saying that "modern biologists are coming," &c., and "scientific thought is compelled," &c. The implication of these phrases is obvious, and it is totally untrue. When Professor Ray Lankester, one of the most distinguished biologists, tells us he does "not know of anyone

of admitted leadership among modern biologists" who is accepting the vital principle, it is clear that the statement was gravely misleading. That there is a certain revival of vitalistic ideas is another matter. The clergy need not have waited for Lord Kelvin's assurance to that effect. In the fourteenth chapter of the *Riddle of the Universe* Professor Haeckel long since informed us of that revival. It would not be surprising—ironic as the circumstance would be—to learn that Lord Kelvin obtained the grain of fact which underlay his assertion from Haeckel's book. In all countries there have been of late years a few scientific men of secondary rank who have urged the acceptance of something more or less resembling the old vital force. Professor Lionel Beale and Dr. Mivart are well-known advocates of "vitality" in this country; several French biologists still speak of the vague *idée directrice* which Pasteur imagined to control the growth of the organism; in America, Cope and Asa Gray advocate a form of vitalism; in Germany it is urged by Nägeli, Bunge, Rindfleisch, Dreisch, and Benedikt, in Italy (more or less) by Gallardi, in Denmark by the botanist Reinke. The ideas of these writers differ considerably, but they agree in holding that some directive or "dominant" principle must be superadded to the physical and chemical forces of the organism.

We have seen in an earlier chapter how "modern biologists" as a class, and "scientific thought" as a whole, wholly reject the vitalistic hypothesis, and maintain that we have no reason to go beyond ordinary natural forces. We have seen what Professor Le Conte, Professor Ward, Sir A. Rücker, Sir J. Burdon-Sanderson, Professor Dewar, and others, say of the condition of "scientific thought." "For the future the word vital, as distinctive of physiological processes, might be abandoned altogether," said Sir J. Burdon-Sanderson, and our recent authorities fully concur with him. Professor Beale is one of those scientists who would sing a joyful *Nunc Dimittis* if he saw any important sign of the revival of vitalism. But if Lord Kelvin consults his most recent publications he will find only a deepening of the pessimism which Professor Beale has expressed on the matter for the last twenty years. In *Vitality—V.*, published two years ago, he tells us the very reverse of the assurance of Lord Kelvin. "Probably no hypotheses or doctrines known to philosophy or science," he says in his preface, "have been so generally favoured, and more persistently forced on the public by 'Authority,' and therefore widely accepted and taught by educated and intelligent persons, than doctrines of physical life and its origin in non-living matter" (p. vii); and later he says: "Purely mechanical views of life are again, possibly for the last time, becoming very popular" (p. 5). Further on he quotes Professor Dolbear as saying (in his *Matter, Ether, and Motion*) that "there is little reason to doubt that when chemists shall be able to form the substance Protoplasm it will possess all the properties it is now known to have, including what is called life; and one ought not to be surprised at its announcement any day"; and he refers us to the appendix of Professor Dolbear's book for a long list of weighty pronouncements in favour of the mechanical hypothesis. We may, therefore, dismiss once for all the attempt to commit "modern biologists," as a class, to a belief in vital principles and creative powers as a serious, though unintentional, misstatement—one that it is painful to find over the name of Lord Kelvin.

Haeckel was perfectly right. He awarded a larger proportion to Neo-Vitalism than any of our own biologists (even Dr. Beale) are prepared to do, but he rightly claimed that the mechanical view of life was the predominant one in biology to-day. Sir W. T. Thiselton-Dyer, writing of Huxley (*Nature*, June 5th, 1902), said: "Huxley was firmly imbued with what is ordinarily called a 'materialistic conception' of the universe.

I think myself that this is probably a true view." The representation that Haeckel is alone, or almost alone, in his view of life is a gross and audacious *mis*-representation.

And when we come to examine on its merits this revival of vitalism—such as it is—we find it has no promise whatever of gaining wide scientific recognition, because it rests essentially on a familiar fallacy. The reader who wishes to study the grounds of it may consult Professor Beale's various editions of his *Vitality*, or Reinke's *Welt als That*, or Dreisch's *Die organischen Regulationen*, where all the evidence of the Neo-Vitalists is ably mastered. Happily it is not necessary for us to cover the whole ground of this evidence even superficially. As we saw in the case of teleology, the principle of the argument is one, however infinite may be its applications; and it is the principle itself that lacks logical validity. There are, the Neo-Vitalist urges, scores of features of the life of the animal or plant that the biologist cannot explain by chemical and physical forces; therefore we must have recourse to a non-mechanical or new kind of force—an *idée directrice*, a "dominant," a "vital power," and so forth. What these inexplicable phenomena are we need not consider at any length; they are such phenomena as—the processes of segmentation and differentiation in the growth of the embryo, the selection of food from the blood or surrounding media, the replacing of tissues or organs that have been cut away (in the hydra, the newt, and even higher animals), the formation by an animal of a protective anti-toxin, the acquisition of protective mimicry, the power of adaptation in organs to changes in environment, and so on. There are, every biologist admits, scores of phenomena which are not as yet capable of explanation by mechanical forces; and the new vitalist urges that these point to the presence of a specific principle in the animal or plant. "Up to this day," says Professor Beale, "no cause, no explanation, can be found, and therefore we attribute those vital phenomena to Power—to Power which is special and peculiar to life only, power which we know cannot be derived from matter. Is it not, therefore, perfectly reasonable to believe that all vital power has come direct from God?"[1]

The reader will at once recognise the principle of the argument. It is that familiar sophism which has made the theistic doctrine "a fugitive and vagabond" (to borrow the words of Dr. Iverach) in scientific territory for the last century or more. It is the sophism that Laplace expelled from astronomy, Lyell from geology, Darwin from phylogeny, and that we have found desperately clinging to every little imperfection of our scientific knowledge of the universe. It is a philosophy of "gaps." It is the familiar procedure of taking advantage of the temporary imperfectness of science. It is an argument that has been wholly discredited by the advance of science, sweeping it from position after position; it is as superficial philosophically as it is unsound in logic and prejudicial in science. "The action of physical and chemical forces in living bodies can never be understood," said Sir A. Rücker, "if at every difficulty and at every check in our investigations we desist from further attempts in the belief that the laws of physics and chemistry have been interfered with by an incomprehensible vital force." "The revival of the vitalistic conception in physiological work," said the president of the physiological section (Prof. Halliburton, M.D., F.R.S.) at the British Association meeting of 1902, "appears to me a retrograde step. To explain anything we are not fully able to understand in the light of physics and chemistry by labelling it as vital, or something we can never hope to under-

[1] Dr. Beale's last conclusion is not, of course, shared by the continental Neo-Vitalists. Even if we were forced to admit a specific vital principle, it would not "come from God" any more than other natural forces. But the analogy with Lord Kelvin's vague phraseology is noticeable.

stand, is a confession of ignorance, and, what is still more harmful, a bar to progress. . . . I am hopeful that the scientific workers of the future will discover that this so-called vital force is due to certain physical or chemical properties of living matter, which have not yet been brought into line with the known chemical and physical laws that operate in the inorganic world. . . . When a scientific man says this or that vital phenomenon cannot be explained by the laws of chemistry and physics, and therefore must be regulated by laws of some other nature, he most unjustifiably assumes that the laws of chemistry and physics have all been discovered." "We think," says Prof. Ray Lankester, "it is a more hopeful method to be patient and to seek by observation of, and experiment with, the phenomena of growth and development to trace the evolution of life and of living things without the facile and sterile hypothesis of a vital principle." If we accepted it, says Weismann, "we should at once cut ourselves off from all possible mechanical explanation of organic nature."

It is very difficult to reconcile Lord Kelvin's present attitude with the principle he laid down in 1871, and presumably still holds. "Science," he said, "is bound by the everlasting law of honour to face fearlessly every problem which is presented to it. If a probable solution, consistent with the ordinary course of nature, can be found, we must not invoke an abnormal act of Creative Power." Prof. Dewar reproduced this passage in this very application in his presidential speech of last year; and within a few months we find Lord Kelvin approving the attitude of those few biologists who depart from that principle to-day, and, impatient at the slow growth of our knowledge, rush to the conclusion that science must abandon this portion of the cosmological domain to the theologian once more. Lord Kelvin quotes Liebig, who was not a biologist, and who lived in an earlier scientific period.[1] But immense progress has been made since Liebig's day in the mechanical interpretation of life.[2] Lord Kelvin also would have us think that the only alternative to the "vital principle" is "the fortuitous concourse of atoms." Even Sir O. Lodge is stirred to protest against this descent from the level of science to the level of Christian Evidence lecturing. We have seen that science discovers only the work of fixed, determinate forces, not erratic and confused agencies. "The whole order of nature," says Prof. Ray Lankester, "including living and lifeless matter—man, animal, and gas—is a network of mechanism." There is nothing "fortuitous" whatever in the concourse of atoms."

We have, then, to set aside the unfortunate and undefended utterance of Lord Kelvin, and the claims of old-

[1] It is not a little amusing to find that this famous German chemist, whom Lord Kelvin introduces as a friend to Christian Associations in England, was regarded as an atheist by similar bodies in Germany in his own time. When Bishop Ketteler urged the Grand-Duke of Hesse to take restrictive measures against materialists, the Grand-Duke pointed out that Liebig had recently undertaken to refute them. "Don't make too much of that, your highness," said Ketteler; "Liebig is a materialist himself at the bottom of his heart." (Büchner's *Last Words on Materialism*, p. 42.)

[2] Dr. Horton assures us, about Haeckel's carbon-theory, that "no leading man of science treats it seriously, and it only has its whimsical and uncertain place in the rationalist Press which gulls the ignorance of the public." One wonders what it is *not* possible to say from a pulpit. Compare the words of the expert reviewer of Professor Verworn's *Biogen-hypothese* in *Nature* (February 26, 1902): "It seems quite clear from the results of numerous investigators that, whatever the nature of the sequence of chemical events, the carbohydrates are proximately the substances that are most intimately affected." Let me add here also a reference to a letter from Sir O. Lodge to *Nature* (December 4, 1902) in which he points out the possibility of germs being preserved intact in the cold of space. It was thereupon shown, not only that Lord Kelvin's old hypothesis of the origin of life assumed a new importance, but that, as W. J. Calder said, "if it is proved that vitality can survive for a protracted period in such circumstances, the conclusion that it is a molecular function seems inevitable." The most recent experiments of life at very low temperatures confirm this.

fashioned Vitalists like Dr. Beale[1] and Neo-Vitalists like Reinke. Our knowledge of vital phenomena, and of chemical and physical forces, is as yet very imperfect. The vitalist hypothesis supposes that our knowledge is complete, and that we clearly see certain features of life to be beyond the range of mechanical explanation. We see ourselves how illogical and temporary such a position is, and we are not surprised to find the leading biologists standing solid with Prof. Haeckel for a mechanical interpretation and mechanical origin.

Sir O. Lodge, the persuasive and able and ever courteous leader of the Birmingham University, offers another version of Neo-Vitalism which it is proper to consider. In a paper which he read to the Synthetic Society at London on February 20 of this year (published in *Nature*, April 23) he observes that "if guidance or control can be admitted into the scheme by no means short of refuting or modifying the laws of motion, there may be every expectation that the attitude of scientific men will be perennially hostile to the idea of guidance or control." He therefore proposes a theory of guidance (to apply to the divine guidance of the world, the human will, and the vital principle) without interference. He distinguishes between force and energy—or static and dynamic power. A column supporting a building, or a channel guiding a stream, is a force, but does not produce energy. The action of life is to be conceived as that "of a groove, or slot, or channel, or guide." "Guidance and control are not forms of energy, and their superposition upon the scheme of physics perturbs physical and mechanical laws no whit, though it may profoundly affect the consequences of those laws." Thus life becomes "something the full significance of which lies in another scheme of things, but which touches and interacts with the material universe in a certain way, building its particles into notable configurations for a time—oak, eagle, man—and then evaporating whence it came."

The objections to Sir O. Lodge's theory (which seems to be not unlike that vaguely suggested by Pasteur) may be well indicated by following his own words. He will not admit that life is a form of energy (thus rejecting both the old Vitalist and the Monistic theories) because "energy can transform itself into other forces, remaining constant in quantity, whereas life does not transmute itself into any form of energy, nor does death affect the sum of energy in any way." The sentence is hardly consistent. If death has not affected the *sum* of energy it must have transmuted it, for most certainly the energies in the dead body differ from those of the living. To assume that the energies are the same, but that which differs is *not* energy, looks like a begging of the question. Indeed, it is impossible to conceive life otherwise than as energy. We might regard the structure as a static force in Sir Oliver's sense, but there must be a living energy in addition. The death of the animal is like the death of the motor-car. The energy has been transmuted, or has returned into the elemental forms belonging to the several parts of the now irreparable structure. Then, as a later writer in *Nature* points out, it is the place and the ambition of science to explain the direction or determination of working energy as well as the origin of the energy. Sir Oliver gives the illustration of a stone falling over the cliff; it may make a harmless dent in the sand, or it may be guided to the firing of a charge of dynamite. So with the passage of a pen over paper; it may make a series of unmeaning daubs (if it rolls mechanically) or it may be guided in the signing of a treaty of war or peace. But it is in each one of these cases the function of scien-

[1] At the eleventh hour I discover a lengthy reference to the *Riddle of the Universe* in an obscure corner (p. 65) of Dr. Beale's *Vitality—Y.*, so that the announcement in the *Times* was not wholly in vain. But as the notice does not contain a line of definite and tangible refutation of any statement in the *Riddle* I am compelled to forego the pleasure of dealing with it.

tific explanation to trace the energies which determine the line of motion as well as to trace their origin and proper motion. We cannot conceive of energies being directed except by energies. In the case of the upbuilding of an organism it is impossible to conceive the particles being guided to their several places, or the energies being impelled to put them in their several places, by something that is not an energy. In the parallelism which Sir Oliver suggests we can only see "life" as a superfluous partner. If the mechanical scheme is complete, as he seems to suggest it will be, it must contain an explanation of the direction of energy. To say otherwise is to declare again the inadequacy of mechanical theory (solely because its ever-growing material is as yet comparatively scanty) and to court the "perennial hostility" of men of science.

Thus the second attempt to prove that Haeckel's views rest on "the science of yesterday," and are contradicted by the science of to-day, fails as ignominiously as did that of Dr. Wallace. Our leading biologists declare emphatically that they and their science accept the mechanical, if not (as Sir W. T. Thiselton-Dyer says) the materialistic view of life. This interpretation of life must for some time to come leave unexplained considerable tracts of vital phenomena. Haeckel has never pretended that he "has explained everything." But so far as our knowledge goes, we find only ordinary natural forces at work in the living organism, and we should be wholly unjustified in the present condition of science in assuming that they are incompetent to explain the whole of life. We gain nothing whatever philosophically by simply sticking the label "vital" on these mysterious phenomena, and we are forbidden by the elementary laws of logic and scientific procedure to bring in such entities as "creative power" and "vital principles" as long as "a solution consistent with the ordinary course of Nature" can be suggested.

Chapter XII

MR. MALLOCK'S OLIVE-BRANCH

The last critic of Haeckel's position —last, that is to say, in the logical order which it seems expedient to follow—is the distinguished essayist, Mr. W. H. Mallock. Professor Haeckel, it will be remembered, intended his work to be, not only a comprehensive statement of his views, but a summary of the issues of the many conflicts between religion and science in which he had played so conspicuous a part during the nineteenth century. Mr. Mallock, declaring that neither theologian nor scientist was competent to analyse those issues quite impartially, undertook, as a neutral observer, to balance the controversial ledgers of the departed century on his own account. It may be granted that Mr. Mallock occupies a position of some advantage for the discharge of this function. He is adequately informed, philosophic in temper, and neutral in the sense that he clearly does not believe in theology, yet strongly opposes the final conclusions of the scientists. To use an expressive colloquial phrase,

he has sat on the fence throughout the last forty years, and shot his sharp criticisms at the combatants on both sides with a certain impartiality. But those who are acquainted with his attractive writings know that he has really only riddled the theologians for their ultimate advantage; whilst he has attacked the Agnostics in the interest of religion. However, an analysis of his last publication, *Religion as a Credible Doctrine*, will serve not only to clear up the popular mystery about his position, but to show us an interesting plea for the retention of theology, even admitting that we have fully established the theses of the preceding chapter.

Mr. Mallock emphatically rejects the idea of hampering scientists on their own territory, and he fully admits that "the whole cosmological domain" *is* their territory. He would have no sympathy with efforts, like those of Dr. Wallace and Lord Kelvin, to restrict the ambition of the mechanical theory, or to try to wrest some shred of evidence for theism out of the teaching of science. We shall see that he falls away from his ideal here and there, but in his deliberate mood he fully accepts the conclusion that, on scientific and philosophic evidence, "the whole world"—in the words of Huxley—"living and non-living, is the result of the mutual interaction, according to definite laws, of the powers possessed by the molecules of which the primitive nebulosity was composed." I have, in fact, freely drawn upon Mr. Mallock's excellent book for support in the vindication of Professor Haeckel. He takes the *Riddle of the Universe* as the finest summary of the scientific hostility to religion. He accepts Haeckel's statement that the three essential propositions in religion are the belief in a personal God, the liberty of the will, and the immortality of the soul; and he assures Haeckel's critics, often in more vigorous language than Haeckel presumes to use, that their arguments are utterly fruitless and their positions untenable. After devoting eight chapters to the struggle over these doctrines, he concludes (p. 217): "The entire intellectual scheme of religion—the doctrines of immortality, of freedom, and a God who is, in his relation to ourselves, separable from this [cosmic] process—is not only a system which is unsupported by any single scientific fact, but is also a system for which, amongst the facts of science, it is utterly impossible for the intellect to find a place." Yet Mr. Mallock has announced that he is going to prove that these fundamental doctrines of religion are "worthy of a reasonable man's acceptance." How will he accomplish this?

In the first place he does not intend to evade the difficulties by an appeal to the "religious feelings" or "religious instinct"—at all events, not primarily; he is going to appeal to us "as perfectly reasonable beings." He quite realises that the growing habit of taking refuge in the emotions is little more sensible than the fabled practice of the ostrich. He devotes three chapters to a closely reasoned plea for the retention of the doctrines, as to which he has so far cordially endorsed Haeckel's arguments. Before entering on a careful analysis of his reasoning I will state his argument as concisely as is compatible with justice to it. These beliefs are to be retained on the ground of their moral and spiritual value to humanity. They are the chief source of all higher aspiration and effort, and are essential for the maintenance of our mental, moral, and social progress. So far the argument is more familiar than Mr. Mallock imagines. The peculiarity of his position is that he says they may be true, although they are flatly and most properly contradicted by science. And he justifies this by attempting to show that our accepted doctrines, even in science, freely contradict each other, and that such contradiction is not at all an indication of falsity. We may, and must, accept all that Haeckel says, and then add to it all that Dr. Horton says, without his "worthless and hopeless arguments."

In an age of scepticism like ours such peculiar evasions of the advancing criticism are not infrequent. Mr. Balfour's famous attempt to show the rest of the world an escape from Agnosticism is still fresh in the memory, though already too antiquated to detain us. The later thoughts of G. J. Romanes we will consider presently, as they are much quoted in opposition to Haeckel. Other singular attempts at pacification, of a less distinguished order, are met almost monthly. There is somehow a conviction abroad that Agnostics are languishing for some rehabilitation of their old beliefs, or that humanity at large—always excluding the peace-makers themselves—cannot maintain its advance without religious belief. Hence arises the singular spectacle of sceptical writers constructing elaborate defences of the conventional beliefs, which they do not share. The reception of Mr. Mallock's book hardly suggests the belief that his olive-branch will be respected by either group of combatants; but its ability and interest, and its indication of a possible ground for religion when all we have advanced has been fully established, compel us to examine it with respect.

Mr. Mallock begins with his proof that all our knowledge ends in contradictions when we analyse it, so that we may reconcile ourselves to Haeckel's disproofs. He first shows this in the teaching of theology, where, as he observes, the Monist will cordially agree with him. But he goes on to say that Haeckel's "substance" is no less contradictory, yet we accept it. The elementary substance (ether or prothyl) either consists of minute separate particles, or it is continuous. If ether consists of disjointed atoms, separated by empty spaces, all action must be an "action at a distance," which science rejects as absurd and impossible. If ether is continuous, yet the atoms of ponderable matter arise from it by condensation, then we are postulating condensation and rarefaction in a substance which has no particles to be pushed closer together or thrust wider asunder. But the elementary substance must be either one or the other, so that in either case we accept a contradictory proposition. Further, when we say that the nebula with its varied elements was evolved out of a homogeneous ether by a rigidly determined process, we are at once saying the ether was simple and homogeneous, yet was of so specific a structure as to grow into an elaborately varied cosmos. Again, we say time is infinite, yet an addition is made to it every moment; and we say space is infinite, yet it is divisible, and each part must be infinite (and so equal to the whole), or else we make up infinity from a finite number of finite quantities. Thus our scientific doctrines hold innumerable contradictions. Therefore, the contradiction between religious and scientific teaching need not deter us from accepting both.

Now, in the first of these illustrations Mr. Mallock has devised a fictitious contradiction; in the second he is following the vulgar fashion of building an argument on the imperfect condition of scientific knowledge; and in the third he is giving us some familiar metaphysical quibbling. Dr. Haeckel inserted in his work the theory of ether which was in favour amongst physicists at the time he wrote. Physics is changing yearly as to such theories; all is as yet tentative and provisional. But this is certain; physicists will never adopt any theory of matter that is self-contradictory. If the pyknotic theory, or the vortex-theory, or the strain-theory, of the atom reveals any such contradiction, it has no chance of acceptance. It is thus quite false to say we here complacently accept contradictories. It is, moreover, clear that Mr. Mallock's dilemma is "lame in one horn," at least. It supposes that these discrete particles are at rest. Science on the contrary supposes them to be eternally in motion, so that the empty space only facilitates their impact and mutual interaction. In the second case,

Mr. Mallock is, as I said, merely drawing our attention to the acknowledged fact that we have as yet nothing more than vague conjectures about the origin of atoms; but we embrace no contradiction whatever, and no theory will be received that contains such. The prothyl is conceived by scientists (apart from philosophers) to be just as simple and homogeneous as the scientific evidence will allow it to be. There is no disposition whatever to credit it with contradictory attributes. In the third case, Mr. Mallock is serving up to us metaphysical arguments for theism from those very theologians whose methods he has so severely denounced. Almost any recent Catholic apologist gives these subtleties of word-play. The contradiction is fictitious. When we say that, as far as the astronomic evidence goes, the universe is unlimited, we do not expose ourselves to this metaphysical antithesis of finite and infinite. Both as to space and time (in the concrete) the argument makes us say far more than we do.

Mr. Mallock thus entirely fails to show that we accept contradictory propositions as true. On the contrary, in scientific procedure the emergence of a contradiction is at once greeted as an indication of falseness, and is forthwith acted upon by the rejection of one of the contradictory theses. The groundwork and most essential and novel part of his structure of reasoning is invalid. He proceeds, however, to show (ch. xii) that science is not the only source, or the only test, of our convictions. There are as good grounds for accepting these particular contradictions as for admitting those of science.

It is at once apparent that we have in fact a large number of convictions which it is not the function of science to establish or examine. Our comparative judgment of conduct, of beauty, of spiritual values generally, is not tested by standards that the scientific reason sets up. Our belief in "the sanctity of human life" does not rest on scientific grounds; and the *influence* of religious ideas—the *truth* of which science criticises—is also a subject for non-scientific judgment. We might, indeed, complain at once that Mr. Mallock has here completely lost his accustomed lucidity. If he means by "science" the disciplines which to-day bear that name, it is true that many of our judgments lie outside them. But what will lie outside the range of the science of to-morrow it would be difficult to say. The science of æsthetics and the science of ethics are obviously creeping over much of that territory which Mr. Mallock holds to be extra-scientific. As a matter of fact the very question he is leading us to—the question of the mental and moral influence of religious ideas—is mainly a question for ethics and sociology to determine by objective and scientific standards. If Mr. Mallock means that the ethical standard is not scientifically determinable, he is begging an important question. However, let us hasten to examine the vital part of his eleventh chapter.

He says that it "has never occurred to Haeckel" to ask himself whether the ethic of Christianity, which he accepts, may not chance to be inseparable from its dogmas. In face of the nineteenth chapter of the *Riddle* this is a hard saying. Haeckel cuts away most of the ethic which is at all peculiar to Christianity, and finds that the valuable remainder is a purely humanitarian ethic. We have already seen this. But Mr. Mallock is thinking of that great problem of his whole career—the problem of free will or determinism—and he holds emphatically that on Haeckel's principles morality is absolutely impossible. Suppose, he says, that we in theory set up a world with a general belief in the determinism of the will. From such a world all moral condemnation and all moral appreciation must disappear; in it vice and virtue are indistinguishable; men and women are no more responsible for

their characteristics than the apple is for its colour or shape. Now one of the most effective parts of Mr. Mallock's book is that in which he shows that scientific determinism is absolutely irresistible. The contradiction he would ask us to accept is therefore the sharpest conceivable. He asks us to accept this contradiction—this irrefutable proof that the will is not free and this equally irrefutable proof that it must be free—on account of the moral importance of the belief in freedom. On the same ground we are to admit the beliefs in God and immortality which the scientific evidence has wholly disproved; the effect of our rejecting them would be "a shrinkage in the importance, interest, and significance which we are able to attribute to human life in general, and to the part played in it by ourselves in particular; and with the growth of scientific knowledge, and the habit of completely assimilating it, the shrinkage would become more marked, and its moral results more desolating." Hence, since we are prepared in other cases to swallow contradictories, we must yield to these grave reasons and embrace the contradictory theses of science and religion.

The second fallacy in Mr. Mallock's procedure seems to be worse than the first. Let us grant, for argument's sake, that these religious beliefs had all the efficacy Mr. Mallock claims for them whilst they were uncontradicted by science and philosophy, were sincerely and serenely held, and were thought to be based on tangible cosmic evidence. It is surely a monstrous fallacy to suppose they will retain that power when their position is so seriously changed; when men are assured that, in Mr. Mallock's own words, "it is utterly impossible for the intellect to find a place for them amongst the facts of science." We are, in fact, invited to regard these beliefs as efficacious because they are really held, and then to hold them because they are efficacious. To say that these considerations—if they are correct—should dissuade us from promulgating or defending Haeckel's views is an arguable, though a mistaken, position. But Mr. Mallock has just concluded one of the most vigorous and skilful attacks on the evidence for these doctrines that has appeared of late years. Does he imagine that people who read that attack will be disposed to cling to these beliefs because it would be morally beneficial to hold them? that people are so simple as to accept moral efficacy as the guarantee of the truth of doctrines which can only be morally efficacious when they are believed to be true? It reminds one of the American critic who said that J. S. Mill negotiated a certain difficulty by getting under himself and carrying himself across. Surely the simplest and the only possible procedure is to fasten on this very importance of moral idealism as a humanitarian gospel, and to show the world that it will taste a very real hell, here on earth, if it allows moral culture to be swept away along with the cosmic speculations with which it has so long been associated. The difficulty about the freedom of the will may turn out to be largely due to our slavery to language. That which formerly went by the name of freedom is disproved by science. But the fact remains—and it is a *scientific*, a psychological, fact—that we are conscious of being able to influence our character and our actions, and so we cannot deny our responsibility within limits. It is for ethics and psychology to determine those limits and to re-adjust our terms and conceptions.

I have only granted for the sake of the argument that these doctrines have all that moral importance which Mr. Mallock claims for them. He says this is clear from the attempts of Agnostic thinkers to find a substitute for them. Their ethical reasoning is irreproachable, but they recognise that they must also make "an appeal to the moral and spiritual imagination of the individual." Prof. Huxley does this with a plea for

"reverence and love for the ethical ideal," and Mr. Spencer urges reverence for the Unknowable and recognition of our unity with it. Mr. Mallock is very scornful about both, and he may be right that reverence of this cosmic order will pass away with the passing of theology. Haeckel has not appealed to such reverence, so that he may contemplate its disappearance without undue concern. He has urged us to find the practical ground for moral culture in the future in the recognition of its value to humanity. No one recognises this value more clearly than Mr. Mallock. It is the chief support of his whole argument. The loss of the higher aspiration would, he says, spell ruin to a nation, and the "belief in human nature is as essential to civilisation as is a good circulation to the healthy body." Now, if all this is true, as it is, it seems perfectly obvious that, when men have got over the confusion and reaction caused by the decay of ethical theology, they will turn to moral culture for its own sake. It is inconceivable how a subtle thinker, who believes men are capable of continuing to worship God and dream of immortality because it is useful to do so, though contradicted by the most solid evidence, cannot see the possibility of setting up moral culture on a sociological base. Confucians have done it for ages, and with quite as great success, to say the least, as Christianity. The bulk of cultured people, like Mr. Mallock, have done so for several generations.

Theoretically, we should expect that the transition from a divine to a humanitarian ethic will be attended with a certain amount of moral disorder. But as a fact, the change is taking place without any such disorder. The working class, which is irreligious to the extent of nine-tenths to-day, is no worse than it was a century or five centuries ago; it is, in fact, far nearer to "a belief in human nature." The middle-class, still largely religious, is hardly likely to deteriorate. The educated class—to ignore the money-line—is almost wholly without those beliefs in a personal God and personal immortality which Mr. Mallock thinks essential, yet will compare very favourably with its class in almost any former age. In a word, if we consult the facts of life instead of theory, we find no ground for supposing that moral culture—not to speak of intellectual, artistic, and social aspiration—is bound up with certain "cosmic speculations." Underneath all the transcendental imagery with which the Churches have clothed morality, there has always been an instinctive feeling that it was a very human affair, and this feeling asserts itself as the theological imagery passes away. There will be changes, of course. The proud intolerance and arrogance of the old moralists, with the horrible persecutions they inspired, have gone for ever; the ascetic contempt of "the flesh" is going and must wholly disappear; humility and meekness have no sociological value; virginity is a matter of taste, but marriage is a more virtuous condition; the stress on chastity (in a transcendental sense) has led to an appalling amount of real immorality in every age, because few were prepared to respect it; the old classification of virtues and vices, as so many rigid moral boxes to put other people's conduct in, must go; the old antithesis of selfishness and altruism will be replaced by an organic conception of man's relation to his fellows; the relation of the sexes will be subject only to a purely rational ethic, grounded on justice, not sentiment, and so there may be at length some hope of putting an end to hypocrisy and vice. When writers like Mr. Wells, or Mr. G. B. Shaw, or Mr. Karl Pearson, talk of the disappearance of ethics, they are thinking of one or other of these changes. But ethics will only gain by such changes. "Many are called, but few are chosen," said the founder of Christianity. It was a profound anticipation of the influence of Christian morality throughout the ages. Apart from certain special periods, apart from the relatively small areas that could be reached by a St. Bernard or a

St. Francis, Christian morality has been a stupendous failure. It was too transcendental, too false to the natural moral sense of the ordinary individual, to be otherwise. The cultivation of a kindly and humane disposition, of a sense of justice and honour, of tolerance and broad-mindedness, of concern for health of body and mind, of temperance and self-control, of honesty and truthfulness, is what humanity really needs; and all this it can and will have for its own inherent worth.

Thus Mr. Mallock has failed to prove that we anywhere complacently accept contradictions in our beliefs; and that, even if we did (to the utter confusion of any notion of truth), there is any special reason for retaining these theological doctrines; or that, if we did retain them in the teeth of scientific teaching to the contrary, they would be of the slightest value. There are, however, one or two confirmatory thoughts in his last chapter which we may still consider. It follows, he says, that our judgment deals with two worlds, the cosmic and the moral, the world of objective facts and the world of subjective values. One is the world of science, the other is reached by some other faculty of mind. It would be equally absurd to question the validity of our judgment as to either. In fact, there is, in the long run, a similarity in the ground of judgment in both cases. It is a mistake to suppose that in the scientific world everything is "proved." The fundamental belief, the conviction that there is a material world at all, is quite unprovable. If it is an inference from our sensations, reason refuses to ratify it. It is the outcome of "an original instinct"; and it is just such an instinct that is at the root of our judgment of moral values. Science must study the objective world; "analytic reason and a study of human character" must investigate the moral world. They find these three beliefs essential to progress, and their decision is as valid as that of science in its own sphere. The contradiction between the two need not trouble us. The mind is limited, and can "grasp the existence of nothing in its totality." "We must learn, in short," is his closing sentence, "that the fact of our adoption of a creed which involves an assent to contradictories is not a sign that our creed is useless or absurd, but that the ultimate nature of things is for our minds inscrutable."

This reasoning is only a new formulation of the argument of his preceding chapters, but one or two points call for notice. In the first place, it is perfectly true that all our convictions are not capable of "proof," because they cannot all be inferences. Our knowledge must ultimately be grounded on facts which are directly intued. These are gathered into general laws and principles, and from these inferences are drawn. And it is true that our perception of the external world is—in its rudiments—intuitive. It is not an inference from our states of consciousness; it would not be valid if it were. When metaphysics has grown tired of the current idealism, it will probably tell us more about this intuition. But Mr. Mallock's attempt to set up a number of little oracles in the mind in the shape of "primitive instincts" must be carefully watched. Further, what he calls the subjective or moral world is by no means wholly subjective. It is useful for his purpose to lead us on from æsthetic judgments to moral. We may, fortunately, leave out of consideration the difficulty of our æsthetic judgments, because our moral judgment is purely objective. The effects which Mr. Mallock anticipates from a Monistic ethic are emphatically objective; and so are the effects he claims for the Christian ethic. The determination of those effects, and so of the relative value of the two systems, is a study in objective reality. "The sanctity of human life" has nothing to do with it. The "belief in human nature" is a conviction that, of the various phases of life which humanity has experienced—virtue and vice, strength and enervation, social

order and anarchy, mental culture and sensual dissipation—the former alternatives are the most conducive to peace and happiness, which we happen to desire. That conviction is, therefore, wholly based on an objective inquiry. Hence the antithesis of the subjective and objective worlds does not help Mr. Mallock. And in point of fact the sooner we apply scientific methods to his second world, to the determination of moral values, the better it will be for us.

Finally, there is in Mr. Mallock's closing observations an important confusion of ideas. That the mind is limited, that we can only focus it on successive spots in the great panorama of reality, is a familiar truth. It is further true that we may not be able to see the connection between our little areas of knowledge, as they are often separated by leagues of ignorance. In this passive sense we may say we are unable "to reconcile" them. But to admit two or more statements that are clearly contradictory is quite another matter. To do so in one single instance is to admit the most radical and irreparable scepticism. Even the Catholic Church has strongly denounced the principle that "a thing may be true in theology yet false in philosophy." If contradictories may be true, we cannot rely on a single affirmation of the mind. Some "primitive instinct" may yet find out that it is also false. We should discredit our knowledge in its very source. Mr. Mallock is likely to remain to the end a Peri at the gate of Eden. Theology is not more likely than science to give ear to such a proposal.

I have said that Mr. Mallock's theory in some respects recalls the later thoughts of Mr. Romanes, and as these are much quoted in correction of Haeckel's procedure we may glance at them in conclusion. In his later years Mr. Romanes, once a thorough Monist, jotted down some of his "thoughts on religion," and they were published after his death by Bishop Gore. This solitary "conversion" amongst the scientific men of the last century has naturally attracted some interest, but it is not usually properly understood. In the first place the works of both Mrs. Romanes and Bishop Gore repel the Rationalist inquirer by the offensive and insulting insinuation that character had anything to do with the matter. "Blessed are the pure in heart for they shall see God," they both constantly exclaim. The inference as to those who do not see God is obvious. In the second place, Mr. Romanes, though he died in the communion of the Anglican Church, seems to have reached a theology of a very slender character. His God is pantheistically immanent in nature. All causation, he suggests, may be Divine action, so that God melts into the forces of the universe. The distinction between the natural and supernatural he wholly rejects; and he thinks the determinism of the will, established by science, is consistent with the belief that all causation is an act of Divine will. And thirdly, without discussing the illness which overcast the later years of Mr. Romanes, these "thoughts on religion" contain some sorry sayings. "The nature of man without God is thoroughly miserable," he says, projecting his morbid condition on the world at large; and "there is a vacuum in the soul which nothing can fill but God." Again, "Unbelief is usually due to indolence, often to prejudice, and never a thing to be proud of." However, let us examine his position in itself.

It may be said in a word that he appeals to a religious instinct or intuition, which is independent of reason. "If there be a God, he must be a first principle—the first of all first principles—hence knowable by intuition and not by reason." Of the two temperaments—the scientific or rational and the "spiritual" or mystic—he says "there is nothing to choose between the two in point of trustworthiness. Indeed, if choice has to be made, the mystic might claim higher authority for his

direct intuitions." "No one can believe in God, or *a fortiori* in Christ, without a severe act of will." He shows how often belief is influenced by desire in politics and is by no means an outcome of reasoning, and adds: "This may be all deplorable enough in politics and in all other beliefs secular; but who shall say it is not exactly as it ought to be in the matter of belief religious?" And, speaking of "the continual sacrifices which Christianity entails," he says "the hardest of these sacrifices to an intelligent man is that of his own intellect."

We will not do Romanes the injustice of analysing in detail these sad reflections of a suffering and diseased condition. It is with reluctance that a Rationalist approaches the question at all, but it is forced on us. Just as I write, an American correspondent sends me a copy of the *Literary Digest* for September 26. It appears that Professor J. Orr, of the Glasgow Free Church College, has been telling the Americans that there is in England a strong current from scepticism to faith. He "claims to speak as an expert," and "has in his possession a list of some twenty-eight Secularist leaders in England and Scotland who have become Christians." The truthfulness of this assertion may be judged from the fact that he only gives three names—Joseph Barker, Thomas Cooper, and G. J. Romanes. The former two were, I learn, men who were associated with the Secularist activity years ago, but were of no intellectual standing and are hardly to be termed "leaders." Romanes, he says, "bit by bit came under the power of the gospel, and died a Christian in full communion with the Church of England, avowing the faith of Jesus, his deity and his atonement, and the resurrection of the dead, and every other great article of our faith."[1] We are thus forced to set in its true light the death-bed communion of Romanes. As he says, it was by the sacrifice of his intellect, by ignoring his scientific temperament, by an effort of will, that he succeeded in assenting to what he calls "pure Agnosticism."

In a sense, however, his idea of a "religious intuition" is widely accepted in the decaying Churches. Many dispense themselves on the ground of this intuition or instinct from examining the criticisms that are urged. We need only make two observations on this last resort of the theist. Firstly, this "intuition" has, in the course of the last few thousand years, given men the most contradictory messages, and it is to-day supporting a hundred divergent beliefs about God and the future life. Its own vagaries sternly condemn it as a channel of truth. Secondly, modern psychologists agree to regard instinct as an inherited tendency or disposition.[1] It follows that if we have an "original instinct" impelling us to accept religious doctrines—I say *if*, because I am conscious of no such instinct, nor is any other person of whom I have inquired—this is only the disposition towards them which we have inherited, and has nothing whatever to do with their truth or untruth. It means, at the most, that our fathers have accepted these beliefs for many generations. We were aware of that already.

[1] To finish with this miserable effusion—quoted by the *Digest* from *Zion's Herald*—I must add that he then goes on to speak of Germany, where Haeckel's *Riddle* "has been discarded for fully a quarter of a century" (the first edition appeared a very few years ago). Professor Orr says that "nearly all the great scientific authorities that Haeckel quotes changed their views some thirty or forty or twenty-five years ago." He will give "the names of one or two of them," and out come the inevitable Virchow, Wundt, and Du Bois-Reymond. The last-named "has reaffirmed the soul of man, reaffirmed the spiritual principle in man, and reaffirmed the supernatural element in man"—compare what Haeckel *does* say of this Agnostic writer on p. 6 of the *Riddle*. If these things are not untruths, one wonders what is. One thinks of poor Romanes's awful statement that "this may be all deplorable enough in politics, but who shall say it is not exactly as it ought to be in religion?"

[1] See Villa's *Contemporary Psychology*, p. 292; Sully's *Human Mind*, I, 137; and Lloyd Morgan, Wundt, Ribot, and Masci.

Chapter XIII

CONCLUSION

We find, then, that the recent efforts to evade the onward march of Monistic science do not promise any great measure of success. Neither the speculations of Dr. Wallace, nor the assurances of Lord Kelvin, nor the suggestions of Mr. Mallock, provide a safe path of retreat, if the positions of our earlier chapters have been established. As long as scientists were willing to remain silent on these cosmic speculations, it was possible for ecclesiastical writers to assume that they were not hostile, even to assume that they were friendly, and so to represent Professor Haeckel as a Quixotic and isolated defender of an extreme position which mature science had deserted. It is certainly not possible to do so with any regard for accuracy to-day. I have throughout supported his positions with the most recent utterances of scientific leaders, and the excursions of Dr. Wallace and Lord Kelvin have only served to show how far science is to-day from lending support to theology.

It may not be without interest, in concluding, to resume my work from the point of view and in the order which one finds in the *Riddle* itself. Chaps. II. to V. are devoted to the proof that man is descended, as regards his bodily frame, from some earlier animal species. This position is not now challenged by a single anthropologist of the first or second rank, and it is almost universally admitted by cultivated theologians. Chaps. VI. to X. are occupied with the proof that the mind of man has been developed from the mind of an animal of an earlier species. Dr. A. R. Wallace is almost the only anthropologist (if we may describe him as such) of high rank who still questions that this fact has been established, and we have seen that theologians acquainted with the facts began twenty years ago to acquiesce in this truth. The majority of the scientifically cultured apologists of our day admit it. We have noticed the overwhelming mass of evidence in favour of it, and the fact that the most recent researches of anthropologists tend to elucidate it more and more. We have seen that so critical a theist as Professor J. Ward speaks of the doctrine of the evolution of man, mind and body, being "accepted with unanimity by biologists of every school." When, however, Haeckel goes on (Chap. X.) to conclude, in the purely scientific spirit, that mind-force is therefore only an upward and more elaborate extension of the world-force that gradually advances from the inorganic to the organic universe, we find him denounced as "crude" and "unscientific." We have seen how wholly logical and scientific his procedure is. When, further, he goes on to say that this explanation of the origin of the human soul leaves no room for those claims of unique prerogatives on which man once based his hope of immortality, we again find the advanced company of apologists at variance. Some think the question is "insoluble by philosophy"; others elaborate novel speculations about the aim of the cosmic process which we have patiently considered. The very latest scientific researches, we saw, do no tend to ascribe any peculiar significance to human life or to the planet we inhabit.

Thus, in the first half of the book, which deals with man, we find that all Haeckel's scientific assertions are supported, almost without exception, by his colleagues in the anthropological sciences,

and are admitted by most of the apologists. His conclusions from these facts, touching the nature and the destiny of the soul, are not denied by his colleagues (who do not now, as a rule, trouble themselves about the relation of their knowledge to religious belief), but are contested in the name of religion by the theologians. They appeal to philosophy, and by philosophy we have judged them.

The second half of the work deals with a number of problems. Chaps. XII. to XV. are occupied with the nature of the cosmic substance, its unity, and its evolution, through the inorganic world, to the forms of living organisms. On the nature of matter and force Haeckel correctly gives the theories of the time he wrote, and his system readily assimilates any modification of these which the advance of physics may entail. The unity he claims for inorganic nature is undisputed, as is its evolution. When he proceeds to unify the inorganic and the organic worlds—to assume that life arose by evolution, and that the life-force is not of a specific or isolated character—he has all the leading biologists and most of the leading theists with him. We have seen what befel Lord Kelvin when he questioned this. He then (Chap. XV.) attacks the question of the existence of God. Here, save for a vague allusion to a "creative power" or a "directive principle" on the part of a few great scientists and the fuller theology of a small number of other well-known men of science, he again advances beyond his colleagues. Most of the scientists of our day (including those German scientists who are so much quoted) are Agnostics, and do not concern themselves about religion. Haeckel here speaks as a philosopher. He is confronted with certain metaphysical considerations which purport to prove the existence of God. We saw that for most of the cultured apologists this merely means a principle immanent in nature, and not distinguishable from it. In other words, the ultimate question is: Is the evolution of this Monistic universe of such a nature that we are compelled to suppose there was an intelligence guiding it from the outset? That is the problem on which all forces are concentrating. The defence of gaps is falling into disrepute, and, as a policy, is disdained by the very men who practise it. We saw that the forces which have evolved the world are not erratic in their action, and so needed no control; that science points to no beginning of the scheme of things, and so we need no creator; and that, on the other hand, the cosmic process shows many features which are inconsistent with the existence of a supreme designer and controller.

When Haeckel passes on to the moral sciences, we saw that he is substantially borne out by the latest research. Biblical criticism and comparative mythology have thoroughly shaken the belief in the miraculous life of Christ; and whether Haeckel has or has not the right version of his paternity is not an important matter. His judgment on the natural growth and the limited influence of Christianity is that of most historians. His theory of a humanitarian ethic is in harmony with the whole trend of ethical discussion to-day.

We have seen, on the other hand, how scattered and mutually conflicting are the critics of Haeckel's position. We have been able, during quite two-thirds of our course, to silence the majority of these critics with the weapons of the minority. The majority of those amongst them who have a wide scientific culture are warning their smaller-minded or less-informed colleagues to desert the defence of gaps. Almost the whole library of apologetics up to within the last ten years is useless to-day. The apologists of yesterday mistook gaps in scientific knowledge for gaps in the course of natural development. A few not very clear-minded theologians do so still; and the old instinct is so strong, and the fallacy appeals so strongly to the imagination, that we have found even the most advanced critics occasionally

falling from grace. The tendency is, however, to-day to allow that science may build up a complete mechanical interpretation of the universe and all its contents; the apologist is content to hope that he may enter at the close with his transcendental speculations on the supposed origin of the cosmic elements and the alleged purpose of the cosmic process. We have seen that already cultured and sympathetic observers like Mr. Mallock are telling them that this last position will be no better than the first, and that science allows them no foothold whatever in the objective world.

That it is the ambition of science to give a mechanical explanation of the whole contents of the universe has been made clear. The dream of Tyndall and Huxley is by no means abandoned. For the inorganic universe no one seriously doubts that this is only a question of time. And the angry resentment by our leading biologists at Lord Kelvin's interference in their domain amply shows how little they are disposed to give up the ideal of a mechanical interpretation of life. So far the vast majority of the leading scientists of the world are with Haeckel. I do not say that they endorse all his suggestions on points of detail. His system, we saw, is not a rigidly uniform structure, for all parts of which he claims equal weight. He throws out theories, and hypotheses, and suggestions, in advance of the demonstrated conclusions. These are temporary and provisional. That scientists reject or dispute about any of these detailed suggestions—whether it be on the evolution of ether, or the first formation of protoplasm, or the fatherhood of Jesus—does not affect his main position, or his attitude towards religion. He frankly says he may very well be wrong in these details, and that he merely suggests that the evidence so far seems to point in this or that direction. Whether the advance of science proves or disproves these suggestions does not affect the main issue. The main issue is the unity and evolution of nature. So far, as I said, scientists in general are with him. When he goes on to deal with consciousness, creation, design, and religion, it cannot be said that they are with him. But it is a gross deception to represent that they are with his opponents. They are Agnostics, as a rule. They prefer not to concern themselves with these subjects. They are Monists in the sense that they accept the unity and evolution of the cosmos, and refuse to see any positive breach in the continuity of nature. But they are, as Dr. Ward says, "Agnostic Monists," in the sense that they are content with a negative attitude on these later problems. The number of great scientists who give a positive and explicit support to personal theism may be counted on one's fingers.

In conclusion, I would respectfully submit to these Agnostic men of science, and the vast cultured following they have in every educated country to-day, two considerations. The first is a request that they will reflect on the spirit and procedure of the apologists for conventional religion, as these are exhibited in the attack on Dr. Haeckel, one of the most distinguished and most honourable of living scientists. If he cares to invade every department of thought in search of anti-theological arguments, and to throw out scores of positive explanations in the teeth of the theologians, he must, of course, expect battle. It is just what he desires. But he desires honourable warfare. Truth is a frail spirit that must be sought with patient and calm investigation. Its pursuit should be conducted with dignity and especially with a scrupulous honesty. We have seen that, on the contrary, this campaign against Haeckel's views has been marked by malignant abuse and persistent misrepresentation, by statements which cannot be conceived as other than untruths, by gross perversion of the teaching of modern science, and by a score of devices and stratagems that would disgrace the conduct of a heated political campaign. It is by these means that one-fourth of the people are held attached to the old

beliefs—people who, to a great extent, would carry into the new humanitarian religion a humane and proper spirit that would enormously facilitate the transition to a new inspiration. Is it conducive to the interest of truth, or of science, or of human welfare, that this corporation of the clergy should continue in the twentieth century that mistaken conceit about the truth of their cosmic views which inspires them with such dishonourable tactics?

Secondly, I would ask whether it is not too late in the history of the world to be inventing fanciful theories for the detention of the people in the Churches. Three-fourths of the people are wholly beyond the influence of the clergy, and as these controversial devices become known the defection is bound to increase. It is too late to speak of the welfare of the race depending on a religion which the great majority have for ever abandoned. Scepticism is in the atmosphere of the world to-day. The more we educate the more we extend its influence. If this is so the true humanitarian will desire the change to be effected as speedily as possible, and the moral ideal to be swiftly disentangled from its decaying frame of dogma. In one respect the world is in a pitiful plight to-day. Thousands of the clergy of all denominations are only too eager to disavow the old formulæ and to devote themselves to character-building alone. They are prevented by the lingering concern of the majority of church-members for dogma. They are forced to utter untruths ("symbolically") at the very moments when they are pleading for truth, and honour, and sincerity. We have the spectacle of ecclesiastical scholars of all denominations being forced to disavow the convictions which have crept to their lips, and of Christian journals complaining that the lack of honesty is one of the most prominent features of theological literature. How this state of things is held to be conducive to the social good it is hard to imagine.

One of the great social needs of our time is to sweep away the whole tottering structure of conventional religion and worship. Whilst we talk of "continuity" the world is deserting it altogether. The moral tone of the clergy is lowered by their corporate alliance with cosmic speculations. The stream of enthusiasm which has so long flowed through the religions of the world is being dissipated. Only one change will infuse new life into the Churches and rehabilitate religion—the swift abandonment to metaphysicians of all these cosmic speculations. When that revolution has been completed we shall have given a new meaning to religion that will change the present contempt into concern. It will be an affair of this world, a visibly important element of this life. Men will turn their eyes from the clouds to discover new potencies in earth. That is the sociological basis of the work of the Rationalist Press Association. Behind it are scores of humanitarian constructive movements ready to guide and inform the religious or idealist ardour. Its work is the attack on unthinking superstition, the war against hypocritical professions, the promulgation of a standard of intellectual honesty, the cultivation of a virile and rational attitude on all the problems of life. It claims and deserves the support of every man or woman who is sanely and sincerely concerned for progress.

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