

ДЖОН СТЮАРТ МИЛЛЬ

AUGUSTE COMTE AND
POSITIVISM

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John Stuart Mill

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PART I.

THE COURS DE PHILOSOPHIE POSITIVE

For some time much has been said, in England and on the Continent, concerning "Positivism" and "the Positive Philosophy." Those phrases, which during the life of the eminent thinker who introduced them had made their way into no writings or discussions but those of his very few direct disciples, have emerged from the depths and manifested themselves on the surface of the philosophy of the age. It is not very widely known what they represent, but it is understood that they represent something. They are symbols of a recognised mode of thought, and one of sufficient importance to induce almost all who now discuss the great problems of philosophy, or survey from any elevated point of view the opinions of the age, to take what is termed the Positivist view of things into serious consideration, and define their own position, more or less friendly or hostile, in regard to it. Indeed, though the mode of thought expressed by the terms Positive and Positivism is widely spread, the words themselves are, as usual, better known through the enemies of that mode of thinking than through its friends; and more than one thinker who never called himself or his opinions by those appellations, and carefully guarded himself against being confounded with those who did, finds himself, sometimes to his displeasure, though generally by a tolerably correct instinct, classed with Positivists, and assailed as a Positivist. This change in the bearings of philosophic opinion commenced in England earlier than in France, where a philosophy of a contrary kind had been more widely cultivated, and had taken a firmer hold on the speculative minds of a generation formed by Royer-Collard, Cousin, Jouffroy, and their compeers. The great treatise of M. Comte was scarcely mentioned in French literature or criticism, when it was already working powerfully on the minds of many British students and thinkers. But, agreeably to the usual course of things in France, the new tendency, when it set in, set in more strongly. Those who call themselves Positivists are indeed not numerous; but all French writers who adhere to the common philosophy, now feel it necessary to begin by fortifying their position against "the Positivist school." And the mode of thinking thus designated is already manifesting its importance by one of the most unequivocal signs, the appearance of thinkers who attempt a compromise or *juste milieu* between it and its opposite. The acute critic and metaphysician M. Taine, and the distinguished chemist M. Berthelot, are the authors of the two most conspicuous of these attempts.

The time, therefore, seems to have come, when every philosophic thinker not only ought to form, but may usefully express, a judgment respecting this intellectual movement; endeavouring to understand what it is, whether it is essentially a wholesome movement, and if so, what is to be accepted and what rejected of the direction given to it by its most important movers. There cannot be a more appropriate mode of discussing these points than in the form of a critical examination of the philosophy of Auguste Comte; for which the appearance of a new edition of his fundamental treatise, with a preface by the most eminent, in every point of view, of his professed disciples, M. Littré, affords a good opportunity. The name of M. Comte is more identified than any other with this mode of thought. He is the first who has attempted its complete systematization, and the scientific extension of it to all objects of human knowledge. And in doing this he has displayed a quantity and quality of mental power, and achieved an amount of success, which have not only won but retained the high admiration of thinkers as radically and strenuously opposed as it is possible to be, to nearly the whole of his later tendencies, and to many of his earlier opinions. It would have been a mistake had

such thinkers busied themselves in the first instance with drawing attention to what they regarded as errors in his great work. Until it had taken the place in the world of thought which belonged to it, the important matter was not to criticise it, but to help in making it known. To have put those who neither knew nor were capable of appreciating the greatness of the book, in possession of its vulnerable points, would have indefinitely retarded its progress to a just estimation, and was not needful for guarding against any serious inconvenience. While a writer has few readers, and no influence except on independent thinkers, the only thing worth considering in him is what he can teach us: if there be anything in which he is less wise than we are already, it may be left unnoticed until the time comes when his errors can do harm. But the high place which M. Comte has now assumed among European thinkers, and the increasing influence of his principal work, while they make it a more hopeful task than before to impress and enforce the strong points of his philosophy, have rendered it, for the first time, not inopportune to discuss his mistakes. Whatever errors he may have fallen into are now in a position to be injurious, while the free exposure of them can no longer be so.

We propose, then, to pass in review the main principles of M. Comte's philosophy; commencing with the great treatise by which, in this country, he is chiefly known, and postponing consideration of the writings of the last ten years of his life, except for the occasional illustration of detached points.

When we extend our examination to these later productions, we shall have, in the main, to reverse our judgment. Instead of recognizing, as in the *Cours de Philosophie Positive*, an essentially sound view of philosophy, with a few capital errors, it is in their general character that we deem the subsequent speculations false and misleading, while in the midst of this wrong general tendency, we find a crowd of valuable thoughts, and suggestions of thought, in detail. For the present we put out of the question this signal anomaly in M. Comte's intellectual career. We shall consider only the principal gift which he has left to the world, his clear, full, and comprehensive exposition, and in part creation, of what he terms the Positive Philosophy: endeavouring to sever what in our estimation is true, from the much less which is erroneous, in that philosophy as he conceived it, and distinguishing, as we proceed, the part which is specially his, from that which belongs to the philosophy of the age, and is the common inheritance of thinkers. This last discrimination has been partially made in a late pamphlet, by Mr Herbert Spencer, in vindication of his own independence of thought: but this does not diminish the utility of doing it, with a less limited purpose, here; especially as Mr Spencer rejects nearly all which properly belongs to M. Comte, and in his abridged mode of statement does scanty justice to what he rejects. The separation is not difficult, even on the direct evidence given by M. Comte himself, who, far from claiming any originality not really belonging to him, was eager to connect his own most original thoughts with every germ of anything similar which he observed in previous thinkers.

The fundamental doctrine of a true philosophy, according to M. Comte, and the character by which he defines Positive Philosophy, is the following: – We have no knowledge of anything but *Phaenomena*; and our knowledge of *phaenomena* is relative, not absolute. We know not the essence, nor the real mode of production, of any fact, but only its relations to other facts in the way of succession or of similitude. These relations are constant; that is, always the same in the same circumstances. The constant resemblances which link *phaenomena* together, and the constant sequences which unite them as antecedent and consequent, are termed their laws. The laws of *phaenomena* are all we know respecting them. Their essential nature, and their ultimate causes, either efficient or final, are unknown and inscrutable to us.

M. Comte claims no originality for this conception of human knowledge. He avows that it has been virtually acted on from the earliest period by all who have made any real contribution to science, and became distinctly present to the minds of speculative men from the time of Bacon, Descartes, and Galileo, whom he regards as collectively the founders of the Positive Philosophy. As he says, the knowledge which mankind, even in the earliest ages, chiefly pursued, being that which they most needed, was *foreknowledge*: "*savoir, pour prévoir.*" When they sought for the cause, it was mainly

in order to control the effect or if it was uncontrollable, to foreknow and adapt their conduct to it. Now, all foresight of phaenomena, and power over them, depend on knowledge of their sequences, and not upon any notion we may have formed respecting their origin or inmost nature. We foresee a fact or event by means of facts which are signs of it, because experience has shown them to be its antecedents. We bring about any fact, other than our own muscular contractions, by means of some fact which experience has shown to be followed by it. All foresight, therefore, and all intelligent action, have only been possible in proportion as men have successfully attempted to ascertain the successions of phaenomena. Neither foreknowledge, nor the knowledge which is practical power, can be acquired by any other means.

The conviction, however, that knowledge of the successions and co-existences of phaenomena is the sole knowledge accessible to us, could not be arrived at in a very early stage of the progress of thought. Men have not even now left off hoping for other knowledge, nor believing that they have attained it; and that, when attained, it is, in some undefinable manner, greatly more precious than mere knowledge of sequences and co-existences. The true doctrine was not seen in its full clearness even by Bacon, though it is the result to which all his speculations tend: still less by Descartes. It was, however, correctly apprehended by Newton.¹

But it was probably first conceived in its entire generality by Hume, who carries it a step further than Comte, maintaining not merely that the only causes of phaenomena which can be known to us are other phaenomena, their invariable antecedents, but that there is no other kind of causes: cause, as he interprets it, *means* the invariable antecedent. This is the only part of Hume's doctrine which was contested by his great adversary, Kant; who, maintaining as strenuously as Comte that we know nothing of Things in themselves, of Noumena, of real Substances and real Causes, yet peremptorily asserted their existence. But neither does Comte question this: on the contrary, all his language implies it. Among the direct successors of Hume, the writer who has best stated and defended Comte's fundamental doctrine is Dr Thomas Brown. The doctrine and spirit of Brown's philosophy are entirely Positivist, and no better introduction to Positivism than the early part of his Lectures has yet been produced. Of living thinkers we do not speak; but the same great truth formed the groundwork of all the speculative philosophy of Bentham, and pre-eminently of James Mill: and Sir William Hamilton's famous doctrine of the Relativity of human knowledge has guided many to it, though we cannot credit Sir William Hamilton himself with having understood the principle, or been willing to assent to it if he had.

The foundation of M. Comte's philosophy is thus in no way peculiar to him, but the general property of the age, however far as yet from being universally accepted even by thoughtful minds.

The philosophy called Positive is not a recent invention of M. Comte, but a simple adherence to the traditions of all the great scientific minds whose discoveries have made the human race what it is. M. Comte has never presented it in any other light. But he has made the doctrine his own by his manner of treating it. To know rightly what a thing is, we require to know, with equal distinctness, what it is not. To enter into the real character of any mode of thought, we must understand what other modes of thought compete with it. M. Comte has taken care that we should do so. The modes of philosophizing which, according to him, dispute ascendancy with the Positive, are two in number, both of them anterior to it in date; the Theological, and the Metaphysical.

We use the words Theological, Metaphysical, and Positive, because they are chosen by M. Comte as a vehicle for M. Comte's ideas. Any philosopher whose thoughts another person undertakes to set forth, has a right to require that it should be done by means of his own nomenclature. They are not, however, the terms we should ourselves choose. In all languages, but especially in English, they excite ideas other than those intended. The words Positive and Positivism, in the meaning assigned to them, are ill fitted to take root in English soil; while Metaphysical suggests, and suggested even to

¹ See the Chapter on Efficient Causes in Reid's "Essays on the Active Powers," which is avowedly grounded on Newton's ideas.

M. Comte, much that in no way deserves to be included in his denunciation. The term Theological is less wide of the mark, though the use of it as a term of condemnation implies, as we shall see, a greater reach of negation than need be included in the Positive creed. Instead of the Theological we should prefer to speak of the Personal, or Volitional explanation of nature; instead of Metaphysical, the Abstractional or Ontological: and the meaning of Positive would be less ambiguously expressed in the objective aspect by Phaenomenal, in the subjective by Experiential. But M. Comte's opinions are best stated in his own phraseology; several of them, indeed, can scarcely be presented in some of their bearings without it.

The Theological, which is the original and spontaneous form of thought, regards the facts of the universe as governed not by invariable laws of sequence, but by single and direct volitions of beings, real or imaginary, possessed of life and intelligence. In the infantile state of reason and experience, individual objects are looked upon as animated. The next step is the conception of invisible beings, each of whom superintends and governs an entire class of objects or events. The last merges this multitude of divinities in a single God, who made the whole universe in the beginning, and guides and carries on its phaenomena by his continued action, or, as others think, only modifies them from time to time by special interferences.

The mode of thought which M. Comte terms Metaphysical, accounts for phaenomena by ascribing them, not to volitions either sublunary or celestial, but to realized abstractions. In this stage it is no longer a god that causes and directs each of the various agencies of nature: it is a power, or a force, or an occult quality, considered as real existences, inherent in but distinct from the concrete bodies in which they reside, and which they in a manner animate. Instead of Dryads presiding over trees, producing and regulating their phaenomena, every plant or animal has now a Vegetative Soul, the *θρεπτική ψυχή* of Aristotle. At a later period the Vegetative Soul has become a Plastic Force, and still later, a Vital Principle. Objects now do all that they do because it is their Essence to do so, or by reason of an inherent Virtue. Phaenomena are accounted for by supposed tendencies and propensities of the abstraction Nature; which, though regarded as impersonal, is figured as acting on a sort of motives, and in a manner more or less analogous to that of conscious beings. Aristotle affirms a tendency of nature towards the best, which helps him to a theory of many natural phaenomena. The rise of water in a pump is attributed to Nature's horror of a vacuum. The fall of heavy bodies, and the ascent of flame and smoke, are construed as attempts of each to get to its *natural* place. Many important consequences are deduced from the doctrine that Nature has no breaks (*non habet saltum*). In medicine the curative force (*vis medicatrix*) of Nature furnishes the explanation of the reparative processes which modern physiologists refer each to its own particular agencies and laws.

Examples are not necessary to prove to those who are acquainted with the past phases of human thought, how great a place both the theological and the metaphysical interpretations of phaenomena have historically occupied, as well in the speculations of thinkers as in the familiar conceptions of the multitude. Many had perceived before M. Comte that neither of these modes of explanation was final: the warfare against both of them could scarcely be carried on more vigorously than it already was, early in the seventeenth century, by Hobbes. Nor is it unknown to any one who has followed the history of the various physical sciences, that the positive explanation of facts has substituted itself, step by step, for the theological and metaphysical, as the progress of inquiry brought to light an increasing number of the invariable laws of phaenomena. In these respects M. Comte has not originated anything, but has taken his place in a fight long since engaged, and on the side already in the main victorious. The generalization which belongs to himself, and in which he had not, to the best of our knowledge, been at all anticipated, is, that every distinct class of human conceptions passes through all these stages, beginning with the theological, and proceeding through the metaphysical to the positive: the metaphysical being a mere state of transition, but an indispensable one, from the theological mode of thought to the positive, which is destined finally to prevail, by the universal recognition that all phaenomena without exception are governed by invariable laws, with which no

volitions, either natural or supernatural, interfere. This general theorem is completed by the addition, that the theological mode of thought has three stages, Fetichism, Polytheism, and Monotheism: the successive transitions being prepared, and indeed caused, by the gradual uprising of the two rival modes of thought, the metaphysical and the positive, and in their turn preparing the way for the ascendancy of these; first and temporarily of the metaphysical, finally of the positive.

This generalization is the most fundamental of the doctrines which originated with M. Comte; and the survey of history, which occupies the two largest volumes of the six composing his work, is a continuous exemplification and verification of the law. How well it accords with the facts, and how vast a number of the greater historical phaenomena it explains, is known only to those who have studied its exposition, where alone it can be found – in these most striking and instructive volumes. As this theory is the key to M. Comte's other generalizations, all of which are more or less dependent on it; as it forms the backbone, if we may so speak, of his philosophy, and, unless it be true, he has accomplished little; we cannot better employ part of our space than in clearing it from misconception, and giving the explanations necessary to remove the obstacles which prevent many competent persons from assenting to it.

It is proper to begin by relieving the doctrine from a religious prejudice. The doctrine condemns all theological explanations, and replaces them, or thinks them destined to be replaced, by theories which take no account of anything but an ascertained order of phaenomena. It is inferred that if this change were completely accomplished, mankind would cease to refer the constitution of Nature to an intelligent will or to believe at all in a Creator and supreme Governor of the world. This supposition is the more natural, as M. Comte was avowedly of that opinion. He indeed disclaimed, with some acrimony, dogmatic atheism, and even says (in a later work, but the earliest contains nothing at variance with it) that the hypothesis of design has much greater verisimilitude than that of a blind mechanism. But conjecture, founded on analogy, did not seem to him a basis to rest a theory on, in a mature state of human intelligence. He deemed all real knowledge of a commencement inaccessible to us, and the inquiry into it an overpassing of the essential limits of our mental faculties. To this point, however, those who accept his theory of the progressive stages of opinion are not obliged to follow him. The Positive mode of thought is not necessarily a denial of the supernatural; it merely throws back that question to the origin of all things. If the universe had a beginning, its beginning, by the very conditions of the case, was supernatural; the laws of nature cannot account for their own origin. The Positive philosopher is free to form his opinion on the subject, according to the weight he attaches to the analogies which are called marks of design, and to the general traditions of the human race. The value of these evidences is indeed a question for Positive philosophy, but it is not one upon which Positive philosophers must necessarily be agreed. It is one of M. Comte's mistakes that he never allows of open questions. Positive Philosophy maintains that within the existing order of the universe, or rather of the part of it known to us, the direct determining cause of every phaenomenon is not supernatural but natural. It is compatible with this to believe, that the universe was created, and even that it is continuously governed, by an Intelligence, provided we admit that the intelligent Governor adheres to fixed laws, which are only modified or counteracted by other laws of the same dispensation, and are never either capriciously or providentially departed from. Whoever regards all events as parts of a constant order, each one being the invariable consequent of some antecedent condition, or combination of conditions, accepts fully the Positive mode of thought: whether he acknowledges or not an universal antecedent on which the whole system of nature was originally consequent, and whether that universal antecedent is conceived as an Intelligence or not.

There is a corresponding misconception to be corrected respecting the Metaphysical mode of thought. In repudiating metaphysics, M. Comte did not interdict himself from analysing or criticising any of the abstract conceptions of the mind. He was not ignorant (though he sometimes seemed to forget) that such analysis and criticism are a necessary part of the scientific process, and accompany the scientific mind in all its operations. What he condemned was the habit of conceiving these mental

abstractions as real entities, which could exert power, produce phaenomena, and the enunciation of which could be regarded as a theory or explanation of facts. Men of the present day with difficulty believe that so absurd a notion was ever really entertained, so repugnant is it to the mental habits formed by long and assiduous cultivation of the positive sciences. But those sciences, however widely cultivated, have never formed the basis of intellectual education in any society. It is with philosophy as with religion: men marvel at the absurdity of other people's tenets, while exactly parallel absurdities remain in their own, and the same man is unaffectedly astonished that words can be mistaken for things, who is treating other words as if they were things every time he opens his mouth to discuss. No one, unless entirely ignorant of the history of thought, will deny that the mistaking of abstractions for realities pervaded speculation all through antiquity and the middle ages. The mistake was generalized and systematized in the famous Ideas of Plato. The Aristotelians carried it on. Essences, quiddities, virtues residing in things, were accepted as a *bonâ fide* explanation of phaenomena. Not only abstract qualities, but the concrete names of genera and species, were mistaken for objective existences. It was believed that there were General Substances corresponding to all the familiar classes of concrete things: a substance Man, a substance Tree, a substance Animal, which, and not the individual objects so called, were directly denoted by those names. The real existence of Universal Substances was the question at issue in the famous controversy of the later middle ages between Nominalism and Realism, which is one of the turning points in the history of thought, being its first struggle to emancipate itself from the dominion of verbal abstractions. The Realists were the stronger party, but though the Nominalists for a time succumbed, the doctrine they rebelled against fell, after a short interval, with the rest of the scholastic philosophy. But while universal substances and substantial forms, being the grossest kind of realized abstractions, were the soonest discarded, Essences, Virtues, and Occult Qualities long survived them, and were first completely extruded from real existence by the Cartesians. In Descartes' conception of science, all physical phaenomena were to be explained by matter and motion, that is, not by abstractions but by invariable physical laws: though his own explanations were many of them hypothetical, and turned out to be erroneous. Long after him, however, fictitious entities (as they are happily termed by Bentham) continued to be imagined as means of accounting for the more mysterious phaenomena; above all in physiology, where, under great varieties of phrase, mysterious *forces* and *principles* were the explanation, or substitute for explanation, of the phaenomena of organized beings. To modern philosophers these fictions are merely the abstract names of the classes of phaenomena which correspond to them; and it is one of the puzzles of philosophy, how mankind, after inventing a set of mere names to keep together certain combinations of ideas or images, could have so far forgotten their own act as to invest these creations of their will with objective reality, and mistake the name of a phaenomenon for its efficient cause. What was a mystery from the purely dogmatic point of view, is cleared up by the historical. These abstract words are indeed now mere names of phaenomena, but were not so in their origin. To us they denote only the phaenomena, because we have ceased to believe in what else they once designated; and the employment of them in explanation is to us evidently, as M. Comte says, the naïf reproduction of the phaenomenon as the reason for itself: but it was not so in the beginning. The metaphysical point of view was not a perversion of the positive, but a transformation of the theological. The human mind, in framing a class of objects, did not set out from the notion of a name, but from that of a divinity. The realization of abstractions was not the embodiment of a word, but the gradual disembodiment of a Fetish.

The primitive tendency or instinct of mankind is to assimilate all the agencies which they perceive in Nature, to the only one of which they are directly conscious, their own voluntary activity. Every object which seems to originate power, that is, to act without being first visibly acted upon, to communicate motion without having first received it, they suppose to possess life, consciousness, will. This first rude conception of nature can scarcely, however, have been at any time extended to all phaenomena. The simplest observation, without which the preservation of life would have been

impossible, must have pointed out many uniformities in nature, many objects which, under given circumstances, acted exactly like one another: and whenever this was observed, men's natural and untutored faculties led them to form the similar objects into a class, and to think of them together: of which it was a natural consequence to refer effects, which were exactly alike, to a single will, rather than to a number of wills precisely accordant. But this single will could not be the will of the objects themselves, since they were many: it must be the will of an invisible being, apart from the objects, and ruling them from an unknown distance. This is Polytheism. We are not aware that in any tribe of savages or negroes who have been observed, Fetichism has been found totally unmixed with Polytheism, and it is probable that the two coexisted from the earliest period at which the human mind was capable of forming objects into classes. Fetichism proper gradually becomes limited to objects possessing a marked individuality. A particular mountain or river is worshipped bodily (as it is even now by the Hindoos and the South Sea Islanders) as a divinity in itself, not the mere residence of one, long after invisible gods have been imagined as rulers of all the great classes of phaenomena, even intellectual and moral, as war, love, wisdom, beauty, &c. The worship of the earth (Tellus or Pales) and of the various heavenly bodies, was prolonged into the heart of Polytheism. Every scholar knows, though *littérateurs* and men of the world do not, that in the full vigour of the Greek religion, the Sun and Moon, not a god and goddess thereof, were sacrificed to as deities – older deities than Zeus and his descendants, belonging to the earlier dynasty of the Titans (which was the mythical version of the fact that their worship was older), and these deities had a distinct set of fables or legends connected with them. The father of Phaëthon and the lover of Endymion were not Apollo and Diana, whose identification with the Sungod and the Moongoddess was a late invention. Astrolatry, which, as M. Comte observes, is the last form of Fetichism, survived the other forms, partly because its objects, being inaccessible, were not so soon discovered to be in themselves inanimate, and partly because of the persistent spontaneousness of their apparent motions.

As far as Fetichism reached, and as long as it lasted, there was no abstraction, or classification of objects, and no room consequently for the metaphysical mode of thought. But as soon as the voluntary agent, whose will governed the phaenomenon, ceased to be the physical object itself, and was removed to an invisible position, from which he or she superintended an entire class of natural agencies, it began to seem impossible that this being should exert his powerful activity from a distance, unless through the medium of something present on the spot. Through the same Natural Prejudice which made Newton unable to conceive the possibility of his own law of gravitation without a subtle ether filling up the intervening space, and through which the attraction could be communicated – from this same natural infirmity of the human mind, it seemed indispensable that the god, at a distance from the object, must act through something residing in it, which was the immediate agent, the god having imparted to the intermediate something the power whereby it influenced and directed the object. When mankind felt a need for naming these imaginary entities, they called them the *nature* of the object, or its *essence*, or *virtues* residing in it, or by many other different names. These metaphysical conceptions were regarded as intensely real, and at first as mere instruments in the hands of the appropriate deities. But the habit being acquired of ascribing not only substantive existence, but real and efficacious agency, to the abstract entities, the consequence was that when belief in the deities declined and faded away, the entities were left standing, and a semblance of explanation of phaenomena, equal to what existed before, was furnished by the entities alone, without referring them to any volitions. When things had reached this point, the metaphysical mode of thought, had completely substituted itself for the theological.

Thus did the different successive states of the human intellect, even at an early stage of its progress, overlap one another, the Fetichistic, the Polytheistic, and the Metaphysical modes of thought coexisting even in the same minds, while the belief in invariable laws, which constitutes the Positive mode of thought, was slowly winning its way beneath them all, as observation and experience disclosed in one class of phaenomena after another the laws to which they are really subject. It was

this growth of positive knowledge which principally determined the next transition in the theological conception of the universe, from Polytheism to Monotheism.

It cannot be doubted that this transition took place very tardily. The conception of a unity in Nature, which would admit of attributing it to a single will, is far from being natural to man, and only finds admittance after a long period of discipline and preparation, the obvious appearances all pointing to the idea of a government by many conflicting principles. We know how high a degree both of material civilization and of moral and intellectual development preceded the conversion of the leading populations of the world to the belief in one God. The superficial observations by which Christian travellers have persuaded themselves that they found their own Monotheistic belief in some tribes of savages, have always been contradicted by more accurate knowledge: those who have read, for instance, Mr Kohl's *Kitchigami*, know what to think of the Great Spirit of the American Indians, who belongs to a well-defined system of Polytheism, interspersed with large remains of an original Fetichism. We have no wish to dispute the matter with those who believe that Monotheism was the primitive religion, transmitted to our race from its first parents in uninterrupted tradition. By their own acknowledgment, the tradition was lost by all the nations of the world except a small and peculiar people, in whom it was miraculously kept alive, but who were themselves continually lapsing from it, and in all the earlier parts of their history did not hold it at all in its full meaning, but admitted the real existence of other gods, though believing their own to be the most powerful, and to be the Creator of the world. A greater proof of the unnaturalness of Monotheism to the human mind before a certain period in its development, could not well be required. The highest form of Monotheism, Christianity, has persisted to the present time in giving partial satisfaction to the mental dispositions that lead to Polytheism, by admitting into its theology the thoroughly polytheistic conception of a devil. When Monotheism, after many centuries, made its way to the Greeks and Romans from the small corner of the world where it existed, we know how the notion of daemons facilitated its reception, by making it unnecessary for Christians to deny the existence of the gods previously believed in, it being sufficient to place them under the absolute power of the new God, as the gods of Olympus were already under that of Zeus, and as the local deities of all the subjugated nations had been subordinated by conquest to the divine patrons of the Roman State.

In whatever mode, natural or supernatural, we choose to account for the early Monotheism of the Hebrews, there can be no question that its reception by the Gentiles was only rendered possible by the slow preparation which the human mind had undergone from the philosophers. In the age of the Caesars nearly the whole educated and cultivated class had outgrown the polytheistic creed, and though individually liable to returns of the superstition of their childhood, were predisposed (such of them as did not reject all religion whatever) to the acknowledgment of one Supreme Providence. It is vain to object that Christianity did not find the majority of its early proselytes among the educated class: since, except in Palestine, its teachers and propagators were mainly of that class – many of them, like St Paul, well versed in the mental culture of their time; and they had evidently found no intellectual obstacle to the new doctrine in their own minds. We must not be deceived by the recrudescence, at a much later date, of a metaphysical Paganism in the Alexandrian and other philosophical schools, provoked not by attachment to Polytheism, but by distaste for the political and social ascendancy of the Christian teachers. The fact was, that Monotheism had become congenial to the cultivated mind: and a belief which has gained the cultivated minds of any society, unless put down by force, is certain, sooner or later, to reach the multitude. Indeed the multitude itself had been prepared for it, as already hinted, by the more and more complete subordination of all other deities to the supremacy of Zeus; from which the step to a single Deity, surrounded by a host of angels, and keeping in recalcitrant subjection an army of devils, was by no means difficult.

By what means, then, had the cultivated minds of the Roman Empire been educated for Monotheism? By the growth of a practical feeling of the invariability of natural laws. Monotheism had a natural adaptation to this belief, while Polytheism naturally and necessarily conflicted with it. As

men could not easily, and in fact never did, suppose that beings so powerful had their power absolutely restricted, each to its special department, the will of any divinity might always be frustrated by another: and unless all their wills were in complete harmony (which would itself be the most difficult to credit of all cases of invariability, and would require beyond anything else the ascendancy of a Supreme Deity) it was impossible that the course of any of the phaenomena under their government could be invariable. But if, on the contrary, all the phaenomena of the universe were under the exclusive and uncontrollable influence of a single will, it was an admissible supposition that this will might be always consistent with itself, and might choose to conduct each class of its operations in an invariable manner. In proportion, therefore, as the invariable laws of phaenomena revealed themselves to observers, the theory which ascribed them all to one will began to grow plausible; but must still have appeared improbable until it had come to seem likely that invariability was the common rule of all nature. The Greeks and Romans at the Christian era had reached a point of advancement at which this supposition had become probable. The admirable height to which geometry had already been carried, had familiarized the educated mind with the conception of laws absolutely invariable. The logical analysis of the intellectual processes by Aristotle had shown a similar uniformity of law in the realm of mind. In the concrete external world, the most imposing phaenomena, those of the heavenly bodies, which by their power over the imagination had done most to keep up the whole system of ideas connected with supernatural agency, had been ascertained to take place in so regular an order as to admit of being predicted with a precision which to the notions of those days must have appeared perfect. And though an equal degree of regularity had not been discerned in natural phaenomena generally, even the most empirical observation had ascertained so many cases of an uniformity *almost* complete, that inquiring minds were eagerly on the look-out for further indications pointing in the same direction; and vied with one another in the formation of theories which, though hypothetical and essentially premature, it was hoped would turn out to be correct representations of invariable laws governing large classes of phaenomena. When this hope and expectation became general, they were already a great encroachment on the original domain of the theological principle. Instead of the old conception, of events regulated from day to day by the unforeseen and changeable volitions of a legion of deities, it seemed more and more probable that all the phaenomena of the universe took place according to rules which must have been planned from the beginning; by which conception the function of the gods seemed to be limited to forming the plans, and setting the machinery in motion: their subsequent office appeared to be reduced to a sinecure, or if they continued to reign, it was in the manner of constitutional kings, bound by the laws to which they had previously given their assent. Accordingly, the pretension of philosophers to explain physical phaenomena by physical causes, or to predict their occurrence, was, up to a very late period of Polytheism, regarded as a sacrilegious insult to the gods. Anaxagoras was banished for it, Aristotle had to fly for his life, and the mere unfounded suspicion of it contributed greatly to the condemnation of Socrates. We are too well acquainted with this form of the religious sentiment even now, to have any difficulty in comprehending what must have been its violence then. It was inevitable that philosophers should be anxious to get rid of at least *these* gods, and so escape from the particular fables which stood immediately in their way; accepting a notion of divine government which harmonized better with the lessons they learnt from the study of nature, and a God concerning whom no mythos, as far as they knew, had yet been invented.

Again, when the idea became prevalent that the constitution of every part of Nature had been planned from the beginning, and continued to take place as it had been planned, this was itself a striking feature of resemblance extending through all Nature, and affording a presumption that the whole was the work, not of many, but of the same hand. It must have appeared vastly more probable that there should be one indefinitely foreseeing Intelligence and immovable Will, than hundreds and thousands of such. The philosophers had not at that time the arguments which might have been grounded on universal laws not yet suspected, such as the law of gravitation and the laws of heat; but there was a multitude, obvious even to them, of analogies and homologies in natural phaenomena,

which suggested unity of plan; and a still greater number were raised up by their active fancy, aided by their premature scientific theories, all of which aimed at interpreting some phaenomenon by the analogy of others supposed to be better known; assuming, indeed, a much greater similarity among the various processes of Nature, than ampler experience has since shown to exist. The theological mode of thought thus advanced from Polytheism to Monotheism through the direct influence of the Positive mode of thought, not yet aspiring to complete speculative ascendancy. But, inasmuch as the belief in the invariability of natural laws was still imperfect even in highly cultivated minds, and in the merest infancy in the uncultivated, it gave rise to the belief in one God, but not in an immovable one. For many centuries the God believed in was flexible by entreaty, was incessantly ordering the affairs of mankind by direct volitions, and continually reversing the course of nature by miraculous interpositions; and this is believed still, wherever the invariability of law has established itself in men's convictions as a general, but not as an universal truth.

In the change from Polytheism to Monotheism, the Metaphysical mode of thought contributed its part, affording great aid to the up-hill struggle which the Positive spirit had to maintain against the prevailing form, of the Theological. M. Comte, indeed, has considerably exaggerated the share of the Metaphysical spirit in this mental revolution, since by a lax use of terms he credits the Metaphysical mode of thought with all that is due to dialectics and negative criticism – to the exposure of inconsistencies and absurdities in the received religions. But this operation is quite independent of the Metaphysical mode of thought, and was no otherwise connected with it than in being very generally carried on by the same minds (Plato is a brilliant example), since the most eminent efficiency in it does not necessarily depend on the possession of positive scientific knowledge. But the Metaphysical spirit, strictly so called, did contribute largely to the advent of Monotheism. The conception of impersonal entities, interposed between the governing deity and the phaenomena, and forming the machinery through which these are immediately produced, is not repugnant, as the theory of direct supernatural volitions is, to the belief in invariable laws. The entities not being, like the gods, framed after the exemplar of men – being neither, like them, invested with human passions, nor supposed, like them, to have power beyond the phaenomena which are the special department of each, there was no fear of offending them by the attempt to foresee and define their action, or by the supposition that it took place according to fixed laws. The popular tribunal which condemned Anaxagoras had evidently not risen to the metaphysical point of view. Hippocrates, who was concerned only with a select and instructed class, could say with impunity, speaking of what were called the god-inflicted diseases, that to his mind they were neither more nor less god-inflicted than all others. The doctrine of abstract entities was a kind of instinctive conciliation between the observed uniformity of the facts of nature, and their dependence on arbitrary volition; since it was easier to conceive a single volition as setting a machinery to work, which afterwards went on of itself, than to suppose an inflexible constancy in so capricious and changeable a thing as volition must then have appeared. But though the régime of abstractions was in strictness compatible with Polytheism, it demanded Monotheism as the condition of its free development. The received Polytheism being only the first remove from Fetichism, its gods were too closely mixed up in the daily details of phaenomena, and the habit of propitiating them and ascertaining their will before any important action of life was too inveterate, to admit, without the strongest shock to the received system, the notion that they did not habitually rule by special interpositions, but left phaenomena in all ordinary cases to the operation of the essences or peculiar natures which they had first implanted in them. Any modification of Polytheism which would have made it fully compatible with the Metaphysical conception of the world, would have been more difficult to effect than the transition to Monotheism, as Monotheism was at first conceived.

We have given, in our own way, and at some length, this important portion of M. Comte's view of the evolution of human thought, as a sample of the manner in which his theory corresponds with and interprets historical facts, and also to obviate some objections to it, grounded on an imperfect comprehension, or rather on a mere first glance. Some, for example, think the doctrine of the three

successive stages of speculation and belief, inconsistent with the fact that they all three existed contemporaneously; much as if the natural succession of the hunting, the nomad, and the agricultural state could be refuted by the fact that there are still hunters and nomads. That the three states were contemporaneous, that they all began before authentic history, and still coexist, is M. Comte's express statement: as well as that the advent of the two later modes of thought was the very cause which disorganized and is gradually destroying the primitive one. The Theological mode of explaining phenomena was once universal, with the exception, doubtless, of the familiar facts which, being even then seen to be controllable by human will, belonged already to the positive mode of thought. The first and easiest generalizations of common observation, anterior to the first traces of the scientific spirit, determined the birth of the Metaphysical mode of thought; and every further advance in the observation of nature, gradually bringing to light its invariable laws, determined a further development of the Metaphysical spirit at the expense of the Theological, this being the only medium through which the conclusions of the Positive mode of thought and the premises of the Theological could be temporarily made compatible. At a later period, when the real character of the positive laws of nature had come to be in a certain degree understood, and the theological idea had assumed, in scientific minds, its final character, that of a God governing by general laws, the positive spirit, having now no longer need of the fictitious medium of imaginary entities, set itself to the easy task of demolishing the instrument by which it had risen. But though it destroyed the actual belief in the objective reality of these abstractions, that belief has left behind it vicious tendencies of the human mind, which are still far enough from being extinguished, and which we shall presently have occasion to characterize.

The next point on which we have to touch is one of greater importance than it seems. If all human speculation had to pass through the three stages, we may presume that its different branches, having always been very unequally advanced, could not pass from one stage to another at the same time. There must have been a certain order of succession in which the different sciences would enter, first into the metaphysical, and afterwards into the purely positive stage; and this order M. Comte proceeds to investigate. The result is his remarkable conception of a scale of subordination of the sciences, being the order of the logical dependence of those which follow on those which precede. It is not at first obvious how a mere classification of the sciences can be not merely a help to their study, but itself an important part of a body of doctrine; the classification, however, is a very important part of M. Comte's philosophy.

He first distinguishes between the abstract and the concrete sciences. The abstract sciences have to do with the laws which govern the elementary facts of Nature; laws on which all phenomena actually realized must of course depend, but which would have been equally compatible with many other combinations than those which actually come to pass. The concrete sciences, on the contrary, concern themselves only with the particular combinations of phenomena which are found in existence. For example; the minerals which compose our planet, or are found in it, have been produced and are held together by the laws of mechanical aggregation and by those of chemical union. It is the business of the abstract sciences, Physics and Chemistry, to ascertain these laws: to discover how and under what conditions bodies may become aggregated, and what are the possible modes and results of chemical combination. The great majority of these aggregations and combinations take place, so far as we are aware, only in our laboratories; with these the concrete science, Mineralogy, has nothing to do. Its business is with those aggregates, and those chemical compounds, which form themselves, or have at some period been formed, in the natural world. Again, Physiology, the abstract science, investigates, by such means as are available to it, the general laws of organization and life. Those laws determine what living beings are possible, and maintain the existence and determine the phenomena of those which actually exist: but they would be equally capable of maintaining in existence plants and animals very different from these. The concrete sciences, Zoology and Botany, confine themselves to species which really exist, or can be shown to have really existed: and do not concern themselves with the mode in which even these would comport themselves under all

circumstances, but only under those which really take place. They set forth the actual mode of existence of plants and animals, the phaenomena which they in fact present: but they set forth all of these, and take into simultaneous consideration the whole real existence of each species, however various the ultimate laws on which it depends, and to whatever number of different abstract sciences these laws may belong. The existence of a date tree, or of a lion, is a joint result of many natural laws, physical, chemical, biological, and even astronomical. Abstract science deals with these laws separately, but considers each of them in all its aspects, all its possibilities of operation: concrete science considers them only in combination, and so far as they exist and manifest themselves in the animals or plants of which we have experience. The distinctive attributes of the two are summed up by M. Comte in the expression, that concrete science relates to Beings, or Objects, abstract science to Events.²

The concrete sciences are inevitably later in their development than the abstract sciences on which they depend. Not that they begin later to be studied; on the contrary, they are the earliest cultivated, since in our abstract investigations we necessarily set out from spontaneous facts. But though we may make empirical generalizations, we can form no scientific theory of concrete phaenomena until the laws which govern and explain them are first known; and those laws are the subject of the abstract sciences. In consequence, there is not one of the concrete studies (unless we count astronomy among them) which has received, up to the present time, its final scientific constitution, or can be accounted a science, except in a very loose sense, but only materials for science: partly from insufficiency of facts, but more, because the abstract sciences, except those at the very beginning of the scale, have not attained the degree of perfection necessary to render real concrete sciences possible.

Postponing, therefore, the concrete sciences, as not yet formed, but only tending towards formation, the abstract sciences remain to be classed. These, as marked out by M. Comte, are six in number; and the principle which he proposes for their classification is admirably in accordance with the conditions of our study of Nature. It might have happened that the different classes of phaenomena had depended on laws altogether distinct; that in changing from one to another subject of scientific study, the student left behind all the laws he previously knew, and passed under the dominion of a totally new set of uniformities. The sciences would then have been wholly independent of one another; each would have rested entirely on its own inductions, and if deductive at all, would have drawn its deductions from premises exclusively furnished by itself. The fact, however, is otherwise. The relation which really subsists between different kinds of phaenomena, enables the sciences to be arranged in such an order, that in travelling through them we do not pass out of the sphere of any laws, but merely take up additional ones at each step. In this order M. Comte proposes to arrange them. He classes the sciences in an ascending series, according to the degree of complexity of their phaenomena; so

² Mr Herbert Spencer, who also distinguishes between abstract and concrete sciences, employs the terms in a different sense from that explained above. He calls a science abstract when its truths are merely ideal; when, like the truths of geometry, they are not exactly true of real things – or, like the so-called law of inertia (the persistence in direction and velocity of a motion once impressed) are "involved" in experience but never actually seen in it, being always more or less completely frustrated. Chemistry and biology he includes, on the contrary, among concrete sciences, because chemical combinations and decompositions, and the physiological action of tissues, do actually take place (as our senses testify) in the manner in which the scientific propositions state them to take place. We will not discuss the logical or philological propriety of either use of the terms abstract and concrete, in which twofold point of view very few of the numerous acceptations of these words are entirely defensible: but of the two distinctions M. Comte's answers to by far the deepest and most vital difference. Mr Spencer's is open to the radical objection, that it classifies truths not according to their subject-matter or their mutual relations, but according to an unimportant difference in the manner in which we come to know them. Of what consequence is it that the law of inertia (considered as an exact truth) is not generalized from our direct perceptions, but inferred by combining with the movements which we see, those which we should see if it were not for the disturbing causes? In either case we are equally certain that it is an exact truth: for every dynamical law is perfectly fulfilled even when it seems to be counteracted. There must, we should think, be many truths in physiology (for example) which are only known by a similar indirect process; and Mr Spencer would hardly detach these from the body of the science, and call them abstract and the remainder concrete.

that each science depends on the truths of all those which precede it, with the addition of peculiar truths of its own.

Thus, the truths of number are true of all things, and depend only on their own laws; the science, therefore, of Number, consisting of Arithmetic and Algebra, may be studied without reference to any other science. The truths of Geometry presuppose the laws of Number, and a more special class of laws peculiar to extended bodies, but require no others: Geometry, therefore, can be studied independently of all sciences except that of Number.

Rational Mechanics presupposes, and depends on, the laws of number and those of extension, and along with them another set of laws, those of Equilibrium and Motion. The truths of Algebra and Geometry nowise depend on these last, and would have been true if these had happened to be the reverse of what we find them: but the phaenomena of equilibrium and motion cannot be understood, nor even stated, without assuming the laws of number and extension, such as they actually are. The phaenomena of Astronomy depend on these three classes of laws, and on the law of gravitation besides; which last has no influence on the truths of number, geometry, or mechanics. Physics (badly named in common English parlance Natural Philosophy) presupposes the three mathematical sciences, and also astronomy; since all terrestrial phaenomena are affected by influences derived from the motions of the earth and of the heavenly bodies. Chemical phaenomena depend (besides their own laws) on all the preceding, those of physics among the rest, especially on the laws of heat and electricity; physiological phaenomena, on the laws of physics and chemistry, and their own laws in addition. The phaenomena of human society obey laws of their own, but do not depend solely upon these: they depend upon all the laws of organic and animal life, together with those of inorganic nature, these last influencing society not only through their influence on life, but by determining the physical conditions under which society has to be carried on. "Chacun de ces degré's successifs exige des inductions qui lui sont propres; mais elles ne peuvent jamais devenir systématiques que sous l'impulsion déductive résultée de tous les ordres moins compliqués."³

Thus arranged by M. Comte in a series, of which each term represents an advance in speciality beyond the term preceding it, and (what necessarily accompanies increased speciality) an increase of complexity – a set of phaenomena determined by a more numerous combination of laws; the sciences stand in the following order: 1st, Mathematics; its three branches following one another on the same principle, Number, Geometry, Mechanics. 2nd, Astronomy. 3rd, Physics. 4th, Chemistry. 5th, Biology. 6th, Sociology, or the Social Science, the phaenomena, of which depend on, and cannot be understood without, the principal truths of all the other sciences. The subject matter and contents of these various sciences are obvious of themselves, with the exception of Physics, which is a group of sciences rather than a single science, and is again divided by M. Comte into five departments: Barology, or the science of weight; Thermology, or that of heat; Acoustics, Optics, and Electrology. These he attempts to arrange on the same principle of increasing speciality and complexity, but they hardly admit of such a scale, and M. Comte's mode of placing them varied at different periods. All the five being essentially independent of one another, he attached little importance to their order, except that barology ought to come first, as the connecting link with astronomy, and electrology last, as the transition to chemistry.

If the best classification is that which is grounded on the properties most important for our purposes, this classification will stand the test. By placing the sciences in the order of the complexity of their subject matter, it presents them in the order of their difficulty. Each science proposes to itself a more arduous inquiry than those which precede it in the series; it is therefore likely to be susceptible, even finally, of a less degree of perfection, and will certainly arrive later at the degree attainable by it. In addition to this, each science, to establish its own truths, needs those of all the sciences anterior to it. The only means, for example, by which the physiological laws of life could

³ *Système de Politique Positive*, ii. 36.

have been ascertained, was by distinguishing, among the multifarious and complicated facts of life, the portion which physical and chemical laws cannot account for. Only by thus isolating the effects of the peculiar organic laws, did it become possible to discover what these are. It follows that the order in which the sciences succeed one another in the series, cannot but be, in the main, the historical order of their development; and is the only order in which they can rationally be studied. For this last there is an additional reason: since the more special and complete sciences require not only the truths of the simpler and more general ones, but still more their methods. The scientific intellect, both in the individual and in the race, must learn in the more elementary studies that art of investigation and those canons of proof which are to be put in practice in the more elevated. No intellect is properly qualified for the higher part of the scale, without due practice in the lower.

Mr Herbert Spencer, in his essay entitled "The Genesis of Science," and more recently in a pamphlet on "the Classification of the Sciences," has criticised and condemned M. Comte's classification, and proposed a more elaborate one of his own: and M. Littré, in his valuable biographical and philosophical work on M. Comte ("Auguste Comte et la Philosophie Positive"), has at some length criticised the criticism. Mr Spencer is one of the small number of persons who by the solidity and encyclopedical character of their knowledge, and their power of co-ordination and concatenation, may claim to be the peers of M. Comte, and entitled to a vote in the estimation of him. But after giving to his animadversions the respectful attention due to all that comes from Mr Spencer, we cannot find that he has made out any case. It is always easy to find fault with a classification. There are a hundred possible ways of arranging any set of objects, and something may almost always be said against the best, and in favour of the worst of them. But the merits of a classification depend on the purposes to which it is instrumental. We have shown the purposes for which M. Comte's classification is intended. Mr Spencer has not shown that it is ill adapted to those purposes: and we cannot perceive that his own answers any ends equally important. His chief objection is that if the more special sciences need the truths of the more general ones, the latter also need some of those of the former, and have at times been stopped in their progress by the imperfect state of sciences which follow long after them in M. Comte's scale; so that, the dependence being mutual, there is a *consensus*, but not an ascending scale or hierarchy of the sciences. That the earlier sciences derive help from the later is undoubtedly true; it is part of M. Comte's theory, and amply exemplified in the details of his work. When he affirms that one science historically precedes another, he does not mean that the perfection of the first precedes the humblest commencement of those which follow. Mr Spencer does not distinguish between the empirical stage of the cultivation of a branch of knowledge, and the scientific stage. The commencement of every study consists in gathering together unanalyzed facts, and treasuring up such spontaneous generalizations as present themselves to natural sagacity. In this stage any branch of inquiry can be carried on independently of every other; and it is one of M. Comte's own remarks that the most complex, in a scientific point of view, of all studies, the latest in his series, the study of man as a moral and social being, since from its absorbing interest it is cultivated more or less by every one, and pre-eminently by the great practical minds, acquired at an early period a greater stock of just though unscientific observations than the more elementary sciences. It is these empirical truths that the later and more special sciences lend to the earlier; or, at most, some extremely elementary scientific truth, which happening to be easily ascertainable by direct experiment, could be made available for carrying a previous science already founded, to a higher stage of development; a re-action of the later sciences on the earlier which M. Comte not only fully recognized, but attached great importance to systematizing.⁴

⁴ The strongest case which Mr Spencer produces of a scientifically ascertained law, which, though belonging to a later science, was necessary to the scientific formation of one occupying an earlier place in M. Comte's series, is the law of the accelerating force of gravity; which M. Comte places in Physics, but without which the Newtonian theory of the celestial motions could not have been discovered, nor could even now be proved. This fact, as is judiciously remarked by M. Littré, is not valid against the plan of M. Comte's classification, but discloses a slight error in the detail. M. Comte should not have placed the laws of terrestrial gravity under Physics.

But though detached truths relating to the more complex order of phaenomena may be empirically observed, and a few of them even scientifically established, contemporaneously with an early stage of some of the sciences anterior in the scale, such detached truths, as M. Littré justly remarks, do not constitute a science. What is known of a subject, only becomes a science when it is made a connected body of truth; in which the relation between the general principles and the details is definitely made out, and each particular truth can be recognized as a case of the operation of wider laws. This point of progress, at which the study passes from the preliminary state of mere preparation, into a science, cannot be reached by the more complex studies until it has been attained by the simpler ones. A certain regularity of recurrence in the celestial appearances was ascertained empirically before much progress had been made in geometry; but astronomy could no more be a science until geometry was a highly advanced one, than the rule of three could have been practised before addition and subtraction. The truths of the simpler sciences are a part of the laws to which the phaenomena of the more complex sciences conform: and are not only a necessary element in their explanation, but must be so well understood as to be traceable through complex combinations, before the special laws which co-exist and co-operate with them can be brought to light. This is all that M. Comte affirms, and enough for his purpose.⁵ He no doubt occasionally indulges in more unqualified expressions than can be completely justified, regarding the logical perfection of the construction of his series, and its exact correspondence with the historical evolution of the sciences; exaggerations confined to language, and which the details of his exposition often correct. But he is sufficiently near the truth, in both respects, for every practical purpose.⁶ Minor inaccuracies must often be forgiven even to great thinkers. Mr Spencer, in the very-writings in which he criticises M. Comte, affords signal instances of them.⁷

They are part of the general theory of gravitation, and belong to astronomy. Mr Spencer has hit one of the weak points in M. Comte's scientific scale; weak however only because left unguarded. Astronomy, the second of M. Comte's abstract sciences, answers to his own definition of a concrete science. M. Comte however was only wrong in overlooking a distinction. There is an abstract science of astronomy, namely, the theory of gravitation, which would equally agree with and explain the facts of a totally different solar system from the one of which our earth forms a part. The actual facts of our own system, the dimensions, distances, velocities, temperatures, physical constitution, &c., of the sun, earth, and planets, are properly the subject of a concrete science, similar to natural history; but the concrete is more inseparably united to the abstract science than in any other case, since the few celestial facts really accessible to us are nearly all required for discovering and proving the law of gravitation as an universal property of bodies, and have therefore an indispensable place in the abstract science as its fundamental data.

⁵ The only point at which the general principle of the series fails in its application, is the subdivision of Physics; and there, as the subordination of the different branches scarcely exists, their order is of little consequence. Thermology, indeed, is altogether an exception to the principle of decreasing generality, heat, as Mr Spencer truly says being as universal as gravitation. But the place of Thermology is marked out, within certain narrow limits, by the ends of the classification, though not by its principle. The desideratum is, that every science should precede those which cannot be scientifically constitute or rationally studied until it is known. It is as a means to this end, that the arrangement of the phaenomena in the order of their dependence on one another is important. Now, though heat is as universal a phaenomenon as any which external nature presents, its laws do not affect, in any manner important to us, the phaenomena of Astronomy, and operate in the other branches of Physics only as slight modifying agencies, the consideration of which may be postponed to a rather advanced stage. But the phaenomena of Chemistry and Biology depend on them often for their very existence. The ends of the classification require therefore that Thermology should precede Chemistry and Biology, but do not demand that it should be thrown farther back. On the other hand, those same ends, in another point of view, require that it should be subsequent to Astronomy, for reasons not of doctrine but of method: Astronomy being the best school of the true art of interpreting Nature, by which Thermology profits like other sciences, but which it was ill adapted to originate.

⁶ The philosophy of the subject is perhaps nowhere so well expressed as in the "Système de Politique Positive" (iii. 41). "Conçu logiquement, l'ordre suivant lequel nos principales théories accomplissent l'évolution fondamentale résulte nécessairement de leur dépendance mutuelle. Toutes les sciences peuvent, sans doute, être ébauchées à la fois: leur usage pratique exige même cette culture simultanée. Mais elle ne peut concerner que les inductions propres à chaque classe de spéculations. Or cet essor inductif ne saurait fournir des principes suffisants qu'envers les plus simples études. Partout ailleurs, ils ne peuvent être établis qu'en subordonnant chaque genre d'inductions scientifiques à l'ensemble des déductions émanées des domaines moins compliqués, et dès-lors moins dépendants. Ainsi nos diverses théories reposent dogmatiquement les unes sur les autres, suivant un ordre invariable, qui doit régler historiquement leur avènement décisif, les plus indépendantes ayant toujours dû se développer plus tôt."

⁷ "Science," says Mr Spencer in his "Genesis," "while purely inductive is purely qualitative... All quantitative prevision is reached deductively; induction can achieve only qualitative prevision." Now, if we remember that the very first accurate quantitative law of physical phaenomena ever established, the law of the accelerating force of gravity, was discovered and proved by Galileo partly at least by experiment; that the quantitative laws on which the whole theory of the celestial motions is grounded, were generalized by

Combining the doctrines, that every science is in a less advanced state as it occupies a higher place in the ascending scale, and that all the sciences pass through the three stages, theological, metaphysical, and positive, it follows that the more special a science is, the tardier is it in effecting each transition, so that a completely positive state of an earlier science has often coincided with the metaphysical state of the one next to it, and a purely theological state of those further on. This statement correctly represents the general course of the facts, though requiring allowances in the detail. Mathematics, for example, from the very beginning of its cultivation, can hardly at any time have been in the theological state, though exhibiting many traces of the metaphysical. No one, probably, ever believed that the will of a god kept parallel lines from meeting, or made two and two equal to four; or ever prayed to the gods to make the square of the hypothenuse equal to more or less than the sum of the squares of the sides. The most devout believers have recognized in propositions of this description a class of truths independent of the divine omnipotence. Even among the truths which popular philosophy calls by the misleading name of Contingent the few which are at once exact and obvious were probably, from the very first, excepted from the theological explanation. M. Comte observes, after Adam Smith, that we are not told in any age or country of a god of Weight. It was otherwise with Astronomy: the heavenly bodies were believed not merely to be moved by gods, but to be gods themselves: and when this theory was exploded, their movements were explained by metaphysical conceptions; such as a tendency of Nature to perfection, in virtue of which these sublime bodies, being left to themselves, move in the most perfect orbit, the circle. Even Kepler was full of fancies of this description, which only terminated when Newton, by unveiling the real physical laws of the celestial motions, closed the metaphysical period of astronomical science. As M. Comte remarks, our power of foreseeing phenomena, and our power of controlling them, are the two things which destroy the belief of their being governed by changeable wills. In the case of phenomena which science has not yet taught us either to foresee or to control, the theological mode of thought has not ceased to operate: men still pray for rain, or for success in war, or to avert a shipwreck or a pestilence, but not to put back the stars in their courses, to abridge the time necessary for a journey, or to arrest the tides. Such vestiges of the primitive mode of thought linger in the more intricate departments of sciences which have attained a high degree of positive development. The metaphysical mode of explanation, being less antagonistic than the theological to the idea of invariable laws, is still slower in being entirely discarded. M. Comte finds remains of it in the sciences which are the most completely positive, with the single exception of astronomy, mathematics itself not being, he thinks, altogether free from them: which is not wonderful, when we see at how very recent a date mathematicians have been able to give the really positive interpretation of their own symbols.⁸ We have already however had occasion to notice M. Comte's propensity to use the term metaphysical in cases containing nothing that truly answers to his definition of the word. For instance, he considers chemistry as tainted with

Kepler from direct comparison of observations; that the quantitative law of the condensation of gases by pressure, the law of Boyle and Mariotte, was arrived at by direct experiment; that the proportional quantities in which every known substance combines chemically with every other, were ascertained by innumerable experiments, from which the general law of chemical equivalents, now the ground of the most exact quantitative provisions, was an inductive generalization; we must conclude that Mr Spencer has committed himself to a general proposition, which a very slight consideration of truths perfectly known to him would have shown to be unsustainable. Again, in the very pamphlet in which Mr Spencer defends himself against the supposition of being a disciple of M. Comte ("The Classification of the Sciences," p. 37), he speaks of "M. Comte's adherent, Mr Buckle." Now, except in the opinion common to both, that history may be made a subject of science, the speculations of these two thinkers are not only different, but run in different channels, M. Comte applying himself principally to the laws of evolution common to all mankind, Mr Buckle almost exclusively to the diversities: and it may be affirmed without presumption, that they neither saw the same truths, nor fell into the same errors, nor defended their opinions, either true or erroneous, by the same arguments. Indeed, it is one of the surprising things in the case of Mr Buckle as of Mr Spencer, that being a man of kindred genius, of the same wide range of knowledge, and devoting himself to speculations of the same kind, he profited so little by M. Comte. These oversights prove nothing against the general accuracy of Mr Spencer's acquirements. They are mere lapses of inattention, such as thinkers who attempt speculations requiring that vast multitudes of facts should be kept in recollection at once, can scarcely hope always to avoid.

⁸ We refer particularly to the mystical metaphysics connected with the negative sign, imaginary quantities, infinity and infinitesimals, &c., all cleared up and put on a rational footing in the highly philosophical treatises of Professor De Morgan.

the metaphysical mode of thought by the notion of chemical affinity. He thinks that the chemists who said that bodies combine because they have an affinity for each other, believed in a mysterious entity residing in bodies and inducing them to combine. On any other supposition, he thinks the statement could only mean that bodies combine because they combine. But it really meant more. It was the abstract expression of the doctrine, that bodies have an invariable tendency to combine with one thing in preference to another: that the tendencies of different substances to combine are fixed quantities, of which the greater always prevails over the less, so that if A detaches B from C in one case it will do so in every other; which was called having a greater attraction, or, more technically, a greater affinity for it. This was not a metaphysical theory, but a positive generalization, which accounted for a great number of facts, and would have kept its place as a law of nature, had it not been disproved by the discovery of cases in which though A detached B from C in some circumstances, C detached it from A in others, showing the law of elective chemical combination to be a less simple one than had at first been supposed. In this case, therefore, M. Comte made a mistake: and he will be found to have made many similar ones. But in the science next after chemistry, biology, the empty mode of explanation by scholastic entities, such as a plastic force, a vital principle, and the like, has been kept up even to the present day. The German physiology of the school of Oken, notwithstanding his acknowledged genius, is almost as metaphysical as Hegel, and there is in France a quite recent revival of the Animism of Stahl. These metaphysical explanations, besides their inanity, did serious harm, by directing the course of positive scientific inquiry into wrong channels. There was indeed nothing to prevent investigating the mode of action of the supposed plastic or vital force by observation and experiment; but the phrases gave currency and coherence to a false abstraction and generalization, setting inquirers to look out for one cause of complex phaenomena which undoubtedly depended on many.

According to M. Comte, chemistry entered into the positive stage with Lavoisier, in the latter half of the last century (in a subsequent treatise he places the date a generation earlier); and biology at the beginning of the present, when Bichat drew the fundamental distinction between nutritive or vegetative and properly animal life, and referred the properties of organs to the general laws of the component tissues. The most complex of all sciences, the Social, had not, he maintained, become positive at all, but was the subject of an ever-renewed and barren contest between the theological and the metaphysical modes of thought. To make this highest of the sciences positive, and thereby complete the positive character of all human speculations, was the principal aim of his labours, and he believed himself to have accomplished it in the last three volumes of his Treatise. But the term Positive is not, any more than Metaphysical, always used by M. Comte in the same meaning. There never can have been a period in any science when it was not in some degree positive, since it always professed to draw conclusions from experience and observation. M. Comte would have been the last to deny that previous to his own speculations, the world possessed a multitude of truths, of greater or less certainty, on social subjects, the evidence of which was obtained by inductive or deductive processes from observed sequences of phaenomena. Nor could it be denied that the best writers on subjects upon which so many men of the highest mental capacity had employed their powers, had accepted as thoroughly the positive point of view, and rejected the theological and metaphysical as decidedly, as M. Comte himself. Montesquieu; even Macchiavelli; Adam Smith and the political economists universally, both in France and in England; Bentham, and all thinkers initiated by him, – had a full conviction that social phaenomena conform to invariable laws, the discovery and illustration of which was their great object as speculative thinkers. All that can be said is, that those philosophers did not get so far as M. Comte in discovering the methods best adapted to bring these laws to light. It was not, therefore, reserved for M. Comte to make sociological inquiries positive. But what he really meant by making a science positive, is what we will call, with M. Littré, giving it its final scientific constitution; in other words, discovering or proving, and pursuing to their consequences, those of its truths which are fit to form the connecting links among the rest: truths which are to it what the law

of gravitation is to astronomy, what the elementary properties of the tissues are to physiology, and we will add (though M. Comte did not) what the laws of association are to psychology. This is an operation which, when accomplished, puts an end to the empirical period, and enables the science to be conceived as a co-ordinated and coherent body of doctrine. This is what had not yet been done for sociology; and the hope of effecting it was, from his early years, the prompter and incentive of all M. Comte's philosophic labours.

It was with a view to this that he undertook that wonderful systematization of the philosophy of all the antecedent sciences, from mathematics to physiology, which, if he had done nothing else, would have stamped him, in all minds competent to appreciate it, as one of the principal thinkers of the age. To make its nature intelligible to those who are not acquainted with it, we must explain what we mean by the philosophy of a science, as distinguished from the science itself. The proper meaning of philosophy we take to be, what the ancients understood by it – the scientific knowledge of Man, as an intellectual, moral, and social being. Since his intellectual faculties include his knowing faculty, the science of Man includes everything that man can know, so far as regards his mode of knowing it: in other words, the whole doctrine of the conditions of human knowledge. The philosophy of a Science thus comes to mean the science itself, considered not as to its results, the truths which it ascertains, but as to the processes by which the mind attains them, the marks by which it recognises them, and the co-ordinating and methodizing of them with a view to the greatest clearness of conception and the fullest and readiest availability for use: in one word, the logic of the science. M. Comte has accomplished this for the first five of the fundamental sciences, with a success which can hardly be too much admired. We never reopen even the least admirable part of this survey, the volume on chemistry and biology (which was behind the actual state of those sciences when first written, and is far in the rear of them now), without a renewed sense of the great reach of its speculations, and a conviction that the way to a complete rationalizing of those sciences, still very imperfectly conceived by most who cultivate them, has been shown nowhere so successfully as there.

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