

Illustrations of Positivism

By J. H. Bridges, M.B., F.R.C.P.

THE reader will find in this volume of Essays a full exposition of the various aspects of Positivism, from the pen of one who may be fairly termed the English Laffitte. The book was first issued in 1907 by the late Professor Beesly, who arranged the papers in chronological order. In this second edition all the papers have been classified, while a number of posthumous papers, including the important series on "The Seven New Thoughts of the 'Positive Polity'" and the admirable address on "The Day of All the Dead," have now been added. In its new form the book constitutes the most complete Introduction to Positivism and the works of Comte in the English language.

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ILLUSTRATIONS OF POSITIVISM .

A SELECTION OF ARTICLES FROM THE "POSITIVIST
REVIEW" IN SCIENCE, PHILOSOPHY, RELIGION, AND
POLITICS

BY

JOHN HENRY BRIDGES, M.B., F.R.C.P.,

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WITH A PREFACE BY

EDWARD SPENCER BEESLY

A New Edition Enlarged and Classified

EDITED BY

H. GORDON JONES

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PREFACE TO THE FIRST EDITION

MOST of the numerous articles contributed by Dr. Bridges to the *Positivist Review* [1893-1906] were concerned not with the passing topics of the day, but with the fundamental principles of Positivism. Written in the last thirteen years of his life, they represent the maturest opinions of one to whom his co-religionists were always accustomed to look up for teaching and counsel. In these short Essays his aim was to set forth Positivist doctrines with a simplicity of language and a fullness of illustration which should make them easily intelligible even to the most unlearned. His qualifications for this task were a perfect mastery of his subject and a singularly impressive style that compels the attention of the reader.

Thinking that it would be deplorable if a series of papers of such unique and permanent value were to be left buried in the back numbers of a periodical, I suggested to Dr. Bridges, a few months before his death, that he should arrange the most important of them for republication. He had begun to do this, but had not carried the work far when he was overtaken by his last illness. I have therefore made a selection which probably includes all the articles that he would have most desired to preserve. I have availed myself of such alterations as he had made—they were few and unimportant—but, finding no indication as to a new grouping of the articles, I have left them in their chronological order. Thus placed they have not, indeed, the methodical arrangement and completeness of a text-book; but perhaps for that very reason the general reader may find them more attractive. Few, if any, of the

more important aspects of Positivism are, I think, left untouched; while, if some are more than once handled, such insistence is not without advantage.

I have only to add that I am in entire agreement with all the opinions expressed in these Essays. In republishing them I think I am rendering the greatest service to Positivism that lies in my power.

E. S. BEESLY.

21 West Hill, St. Leonards-on-Sea,
September, 1907.

NOTE TO THE SECOND EDITION

A NUMBER of posthumous papers by Dr. Bridges, many of which were originally delivered as addresses or lectures, have been added to this edition, which is issued by the English Positivist Committee. Particulars as to the origin of these papers, where known, are given in footnotes. They have all appeared in the *Positivist Review* since the death of Dr. Bridges in 1906, and none of them had the advantage of being revised for publication by the author himself.

Three papers that did not appear in the first edition are now included. The Address on the Day of All the Dead was first published in the *Positivist Review* of April, 1906, and reprinted in the volume of *Essays and Addresses*. The two other papers included are those entitled "The Darwinist Utopia" and "A Visit to Pierre Laffitte."

Numerous bibliographical and explanatory footnotes have been added to this edition, and an Index has been supplied in order to correlate the papers as much as possible, and so increase the utility of the book. The references in these notes are to the 2nd editions of the *Positivist Catechism* and the *General View of Positivism*, in the English translations. The *Cours de Philosophie Positive* (4th ed.) is denoted by the reference *Phil. Pos.*, and the *System of Positive Polity*, in the English translation, by the reference *Pos. Pol.*

I have also taken advantage of the opportunity afforded by the issue of a new edition to classify all the papers in accordance with the nature of their subject-matter. Such a classification as that adopted here has, I think, the great advantage of bringing out

the full value of these admirable Essays, and of exhibiting in greater prominence the synthetic quality which was such a marked and valuable feature of all Dr. Bridges' writings.

H. GORDON JONES.

September, 1915.

ADDENDUM

In the footnote on p. 80 it should have been stated that the list of books in the Positivist Library will also be found in *The Positivist Catechism* and *The Positivist Calendar and Other Tables*. For Comte's account of the Library see *Pos. Pol.*, vol. iv, pp. 351-53.

CONTENTS

PART I

SCIENCE

CHAPTER I

BIOLOGY

	PAGE
I. BICHAT - - - - -	3
II. LAMARCK - - - - -	9
III. THE DARWINIAN CONTROVERSY - - - - -	15
IV. LORD KELVIN ON THE MIRACLE OF LIFE - - - - -	20
V. THE USE AND ABUSE OF EXPERIMENTS ON ANIMALS - - - - -	27

CHAPTER II

PSYCHOLOGY

I. THOUGHT AND FEELING - - - - -	36
II. MENTAL HEALTH - - - - -	40
III. AIDS TO MENTAL HEALTH - - - - -	44
IV. COMTE'S PSYCHOLOGY - - - - -	51
V. FUNCTIONS OF THE BRAIN - - - - -	57
VI. MUTUAL AID - - - - -	76

CHAPTER III

SOCIOLOGY

I. THE SCIENCE OF SOCIOLOGY	
Introductory - - - - -	81
Comte's Predecessors - - - - -	87
Methods of Research - - - - -	92
Relation to Other Sciences - - - - -	98
II. A SOCIOLOGICAL SOCIETY - - - - -	104
III. COMTE AND SPENCER ON SOCIOLOGY - - - - -	108
IV. MR. HOBSON ON THE SOCIAL PROBLEM - - - - -	114

CONTENTS

CHAPTER IV

ETHICS

	PAGE
I. PHYSICAL, SOCIAL, AND MORAL PROGRESS - - - -	119
II. ALTRUISM - - - - -	122
III. MR. SPENCER'S THEORY OF BENEFICENCE - - - -	126
IV. RIGHT AND WRONG - - - - -	132
V. ORDER - - - - -	139
VI. PROGRESS - - - - -	144

PART II

PHILOSOPHY

CHAPTER I

SCIENCE AND PHILOSOPHY

I. FACT AND THOUGHT IN SCIENCE - - - - -	153
II. ORDER AND PROGRESS IN SCIENCE - - - - -	156
III. THE LADDER OF THE SCIENCES - - - - -	162
IV. LAWS OF NATURE - - - - -	166

CHAPTER II

COMTE AND SPENCER

I. MAN AND THE UNIVERSE - - - - -	172
II. MR. SPENCER'S THEORY OF EVOLUTION - - - - -	179
III. CLASSIFICATION OF THE SCIENCES - - - - -	186
IV. THE PHILOSOPHY OF COMTE - - - - -	192

CHAPTER III

THE POSITIVE PHILOSOPHY

I. THE MEANING OF THE WORD "POSITIVE" - - - - -	199
II. THE FIRST TWO CHAPTERS OF COMTE'S "POSITIVE PHILOSOPHY" - - - - -	210
III. COMTE'S "DISCOURSE ON THE POSITIVE SPIRIT" - - - - -	215
IV. HUMANITY AND SCIENCE - - - - -	222

PART III
RELIGION

CHAPTER I
CATHOLICISM

	PAGE
I. LAFFITTE ON CATHOLICISM - - - - -	231
II. RELIGION AND SOCIOLOGY - - - - -	237
III. MODERN CHRISTIANITY - - - - -	243
IV. CATHOLICISM AND SCIENCE - - - - -	249

CHAPTER II
THE ANGLICAN CHURCH

I. JOWETT - - - - -	256
II. A CHURCH WITHOUT A CREED - - - - -	261
III. THE LAMBETH CONFERENCE - - - - -	264
IV. THE CHURCH CONGRESS - - - - -	269

CHAPTER III
THE SPENCERIAN UNKNOWABLE

I. THE UNKNOWABLE - - - - -	273
II. POSITIVISM AND THE UNKNOWABLE - - - - -	277
III. COMTE AND SPENCER ON RELIGION - - - - -	282
IV. WORSHIP - - - - -	288
V. SACRAMENTS - - - - -	293

CHAPTER IV
THE RELIGION OF HUMANITY

I. THE MEANING OF PROGRESS - - - - -	295
II. FAITH IN HUMANITY - - - - -	297
III. THE FOUNDATIONS OF A UNIVERSAL CHURCH - - - - -	302
IV. THE SEVEN NEW THOUGHTS OF THE "POSITIVE POLITY"	
Introductory - - - - -	309
Humanity - - - - -	311
The Subjective Method - - - - -	315
The Theory of Human Nature - - - - -	317

CONTENTS

	PAGE
Ethics the Crowning Science - - - -	321
Sociocracy based on Separation of Church and State - -	323
Affinity of Fetishism and Positivism - - - -	325
Cult before Doctrine : Service weightier than Creed - -	327

CHAPTER V

THE RELIGION OF HUMANITY—*Continued*

V. SYMPATHY AND SYNTHESIS - - - - -	333
VI. THE POSITIVIST CATECHISM - - - - -	341
VII. IS POSITIVISM A SECT? - - - - -	347
VIII. FETISHISM AND POSITIVISM - - - - -	352
IX. THE DAY OF ALL THE DEAD - - - - -	358

PART IV

POLITICS

CHAPTER I

POLITICS AND THE DARWINIAN THEORY

I. DARWINISM IN POLITICS - - - - -	373
II. THE DARWINIST UTOPIA - - - - -	378
III. THE ASCENT OF MAN - - - - -	384

CHAPTER II

IMPERIALISM

I. IMPERIALISM AND PATRIOTISM - - - - -	389
II. ROMAN AND BRITISH IMPERIALISM - - - - -	393
III. THE SEA - - - - -	399

CHAPTER III

WAR AND PEACE

I. DEMOCRACY AND WAR - - - - -	404
II. CHRISTIANITY AND PEACE - - - - -	409
III. THE PEACE CONFERENCE - - - - -	413
IV. THE FUTURE - - - - -	417

PART V

MISCELLANEA

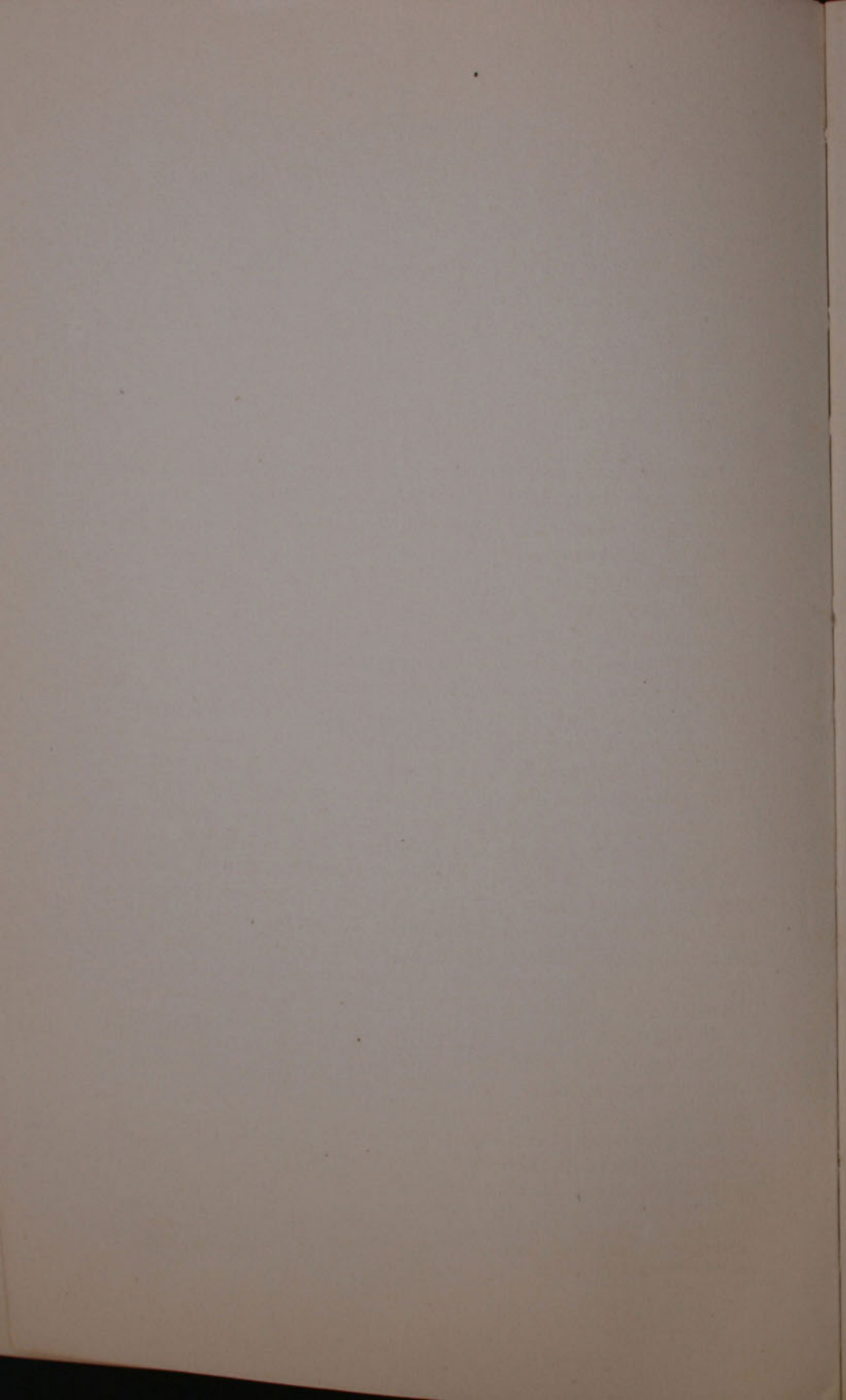
MISCELLANEOUS PAPERS

	PAGE
I. THE CORRESPONDENCE OF MILL WITH COMTE - - -	425
II. COMTE'S LETTERS TO DR. AUDIFFRENT - - -	431
III. A VISIT TO PIERRE LAFFITTE - - -	438
IV. PIERRE LAFFITTE'S TEACHING - - -	443
V. HUXLEY AND POSITIVISM - - -	449
VI. THE CENTENARY OF KANT - - -	453
VII. COMTE AND CARLYLE - - -	460
VIII. THE SERVICES OF ANCIENT ROME - - -	466
IX. THE BATHS OF CARACALLA - - -	470
—	
INDEX - - - - -	475



7

PART I
SCIENCE



CHAPTER I¹
BIOLOGY

I
BICHAT²

SIX months have passed since the centenary of the death of Bichat, which took place, in his thirty-first year, on July 22, 1802. It is too long an interval, yet not too long to make it inopportune to recall his great services to mankind.

The leading facts in Bichat's short life may be told in a few words. Born in 1771 at Thoirette, in the department of Ain (then in the province of Bresse), he was educated by his father, a physician of the Montpellier school, and afterwards at Lyons, under an eminent surgeon, Petit. He passed through the terrible siege of 1793, and then went to Paris, where he studied under the great master of surgical art, Desault. Desault appreciated his genius, and received him into his house more as an adopted son than as a secretary. After Desault's death in 1795 Bichat undertook to edit his works, and at the same time plunged into an arduous course of anatomical study. From this resulted, in 1800, his *Treatise on Membranes* and his *Physiological Researches on Life and Death*, and in the following year his *General Anatomy*. His health was undermined by strenuous and incessant work, and an accidental fall in the summer of 1802 on the steps of the Hôtel-Dieu brought about the illness from which he died a fortnight afterwards. He was buried in the cemetery of Clamart, but in 1845 the body was transferred to Père-la-Chaise.

Bichat dealt with one of the most difficult subjects that can be offered for man's consideration, the Theory of Life; and in his hands it may be said to have passed from the metaphysical to the positive stage. During the eighteenth century the facts of living bodies were studied by two opposing schools; by the first as a deduction from physical and mechanical discoveries, by the second as the procedure of a metaphysical entity, the vital principle.

¹ Any reader who is not familiar with Comte's classification of the sciences is advised to study the paper on "The Ladder of the Sciences" in Part II before reading Part I.—ED,

² January, 1903.

Boerhaave may be taken as the representative of the former school; Van Helmont, Stahl, and Barthez of the latter. To Boerhaave, eagerly availing himself of the physical attainments of his time, and more especially of Harvey's discovery of the circulation as resulting from the muscular forces of the heart, the human body presented itself as an engine working on mechanical principles. Animal heat, for instance, was caused and maintained by the friction of particles in the rapid movement of the blood. Again, towards the close of the seventeenth and during the beginning of the eighteenth centuries, chemistry began to emerge as a distinct science. Its discoveries, imperfect as they were, attracted another school of physicians, who used them as a mode of explaining vital action by ferments and by conflicting action of salts. Against these crude attempts to reduce life to a play of physical and chemical forces a memorable and persistent protest was raised by Stahl, and after Stahl by Barthez. Stahl put forward the conception of an *Arché* pervading the organism, relaxing this part, bracing that, and thus regulating their supply of blood or the activity of their secretion. It was in many respects analogous to the *Psyché* of Aristotle. Barthez, in the latter half of the eighteenth century, was far better equipped than Stahl with philosophical principles and scientific knowledge. But the Vital Principle by which he accounted for the unity of the organism, for the *consensus* of its functions and the regulation of molecular change, was essentially identical with the *arché* of Stahl. Both thinkers were at one in their conviction that the organic world exhibited phenomena for which mathematical, physical, and chemical sciences could not account.

In equal contrast with these opposing schools, the one crude, mechanical, and incomplete, the other nebulous and incomprehensible, Bichat endeavoured to present the laws of phenomena characteristic of living things, without attempting to penetrate their primal cause.

Most physicians [he says] have begun by looking for this primal principle; they have tried to descend from the study of the nature of life to that of its phenomena, instead of rising from observation of these to the formation of their theory. The *psyché* of Stahl, the *arché* of Van Helmont, the vital principle of Barthez, looked at as the central source of vital action, have been the foundations on which all physiological discussion has rested. But each of these foundations has given way in turn, and of their ruins nothing has been left except facts of sensibility and mobility tested by rigorous experiment. The narrow limits of man's understanding almost always debar

his access to first causes. A veil wraps them in innumerable folds which prove to be impenetrable.

In the study of nature our guiding principles consist of certain general results of first causes. From these we derive numberless secondary results. It is the act of connecting the latter of these with the former that is the note of intellectual capacity. But to inquire into the connection of our general principles with their first causes is like the march of blind men on a road where the chances of error are infinite. Nor is the knowledge of these first causes needful. We can study the phenomena of light, of heat, of oxygen, without knowledge of what the essential nature of each of these things may be. And so in the study of life we can study the properties of organs animated by life without knowing what may be their vital principle. Leaving, then, those first causes unexamined, let us concentrate our attention on their great results.¹

Pursuing this method, and abandoning all attempts to discuss the origin or the essential meaning of life, Bichat surveyed the facts of living bodies, and reached many of the great generalizations on which biological science is founded. It is true that, so far from being always successful, this treatise on *Life and Death* opens with an error, or at least with an unguarded statement that may easily be mistaken for an error; the proposition that "Life is the sum of the functions that resist Death." "All that environs living bodies," he continues, "tends to destroy them." That is to say, as he goes on to explain,

it would destroy them if they were not living. But they contain a principle of reaction against external forces which constitutes their life. Of this principle we know nothing in itself; we know it only through its phenomena, and the most general of these phenomena is the perpetual alternation of action and reaction between living bodies and the world without them.

We see from this that Bichat had grasped the conception of the environment (*milieu ambiant*, as Blainville and Lamarek called it), which is so essential to the conception of life. If with this he had combined the thought of Individuation, to use the pregnant expression of Coleridge, the process of integrating heterogeneous elements into a definite whole, his description of life would have left little to desire.

Following on this general conception of life comes the analysis of the two kinds of life found throughout the animal kingdom; the

¹ *Recherches sur la vie et la mort*, pt. i, art. 7.—ED.

life of nutrition common to animals and plants, and the life peculiar to animals of sensation and motion, the life of relation, as it may be called, bringing the organism into contact with distant objects in the world around it. This analysis is conducted with extreme precision and admirable breadth of view. It is pointed out that the organs of sensation and of voluntary motion are double, and are disposed symmetrically with regard to the axis of the body, strikingly contrasted in this respect with the organs of nutritive life, such as liver, bowels, heart, spleen, etc., which are for the most part single and unsymmetrically arranged. Connected with this difference in form is a difference in action. Vegetal organs act continuously, animal organs with alternating intermittence. Those who are familiar with Comte's theory of the brain will remember the use made of this principle in throwing light on the continuity of moral functions as opposed to the alternating action of intellectual and active functions. Bichat was in error as to the seat of the passions. His life was too short and too absorbingly occupied to allow him time for examining Gall's anatomical investigations of the brain, and the hypothesis founded on them. He misinterpreted the disturbing effect of passions upon nutritive organs as implying that these organs were their seat. None the less is it the case that they are intimately associated with the affective functions of the brain, and that the action and reaction of the physical and moral sides of our nature cannot be understood until this association has been more accurately examined.

Bichat concludes this part of his treatise with some striking observations on the contrast between the two kinds of life with regard to education. At birth the functions of organic life, some of which have been already brought into exercise, attain perfection at a single step. The heart beats as well as it will ever beat. The lungs, liver, digestive organs, are in full working order, and will attain no further progress. But the brain, the nerves, the muscles, have a long process of education before them. The law of Habit comes into play. Life in the social state will ultimately develop all these organs of animal life to unimagined degrees of perfection. We are led here to the point of contact between the two sciences of biology and sociology.

From the study of life Bichat proceeds to that of death. His work on this branch, as on the other, is a signal illustration of the definite precision and certainty that mark the positive spirit. Death, regarded as a failure of vital power, as a disappearance of the vital principle, is a vague metaphysical conception that tells us

nothing. What Bichat does is to take the organs of the three functions most essential to life—circulation, respiration, and innervation—and to show us in detail and with certainty how an injury to one of these organs affects each of the others, and how it acts on the other organs and tissues of the body. Beginning with the death of the heart, he inquires successively its results on the brain, on the lungs, and on the body as a whole. He is careful to point out that in the higher vertebrates there are practically two hearts communicating only through the capillary systems of the lungs and of the bodily tissues, the right heart transmitting black blood, the left heart transmitting red blood. The death of the heart has no immediate effect on the brain except the cessation of the mechanical impulse caused during life by the heart's contraction. But in the lungs the stoppage of the right heart involves the arrest of chemical change in the blood, and consequent arrest of supply of aerated blood to the brain and to other organs of the body.

Fatal injury to the lungs, involving stoppage of chemical change in that organ, involves transmission of black blood through the coronary arteries to the muscular tissues of the heart, and similarly of black blood to the brain, thus paralysing the nerves that act on the muscles of respiration.

Fatal injury to the brain does not act directly and immediately on the heart. On the lungs, however, its effect is immediate. The intercostal muscles and the diaphragm being paralysed, air ceases to enter the lungs, aeration of the blood ceases, and black blood is transmitted to the fibres of the heart and to the other organs of the body.

All these results are not merely stated as probable conjectures; they are rigidly demonstrated by vivisectional experiment. Comte has spoken strongly of the futility of the experimental method in the majority of physiological researches. It is usually the case that sudden injury to one organ produces disturbing effects on the action of all the rest, which render it impossible to draw any valid conclusion from the experiment. Especially is this true of vivisectional experiments on the nervous system, and above all on the brain, as is sufficiently proved by the barren results of brain vivisection during the nineteenth century. Nevertheless, Comte did not strain this view so far as to maintain that experimental research had been without result in every instance. He distinguished certain cases where it was possible to isolate the action of one organ from that of the rest, and among these exceptions he specifies the experiments of Bichat. It needs only to supply a note of warning. Once made

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nothing. What Bichat does is to take the organs of the three functions most essential to life—circulation, respiration, and innervation—and to show us in detail and with certainty how an injury to one of these organs affects each of the others, and how it acts on the other organs and tissues of the body. Beginning with the death of the heart, he inquires successively its results on the brain, on the lungs, and on the body as a whole. He is careful to point out that in the higher vertebrates there are practically two hearts communicating only through the capillary systems of the lungs and of the bodily tissues, the right heart transmitting black blood, the left heart transmitting red blood. The death of the heart has no immediate effect on the brain except the cessation of the mechanical impulse caused during life by the heart's contraction. But in the lungs the stoppage of the right heart involves the arrest of chemical change in the blood, and consequent arrest of supply of aerated blood to the brain and to other organs of the body.

Fatal injury to the lungs, involving stoppage of chemical change in that organ, involves transmission of black blood through the coronary arteries to the muscular tissues of the heart, and similarly of black blood to the brain, thus paralysing the nerves that act on the muscles of respiration.

Fatal injury to the brain does not act directly and immediately on the heart. On the lungs, however, its effect is immediate. The intercostal muscles and the diaphragm being paralysed, air ceases to enter the lungs, aeration of the blood ceases, and black blood is transmitted to the fibres of the heart and to the other organs of the body.

All these results are not merely stated as probable conjectures; they are rigidly demonstrated by vivisectional experiment. Comte has spoken strongly of the futility of the experimental method in the majority of physiological researches. It is usually the case that sudden injury to one organ produces disturbing effects on the action of all the rest, which render it impossible to draw any valid conclusion from the experiment. Especially is this true of vivisectional experiments on the nervous system, and above all on the brain, as is sufficiently proved by the barren results of brain vivisection during the nineteenth century. Nevertheless, Comte did not strain this view so far as to maintain that experimental research had been without result in every instance. He distinguished certain cases where it was possible to isolate the action of one organ from that of the rest, and among these exceptions he specifies the experiments of Bichat. It needs only to supply a note of warning. Once made

by a master-hand and controlled by competent observers, such experiments do not need repeating. They were made on weighty grounds for the purpose of discovery. They are not to be repeated for the purposes of education.

In 1801 Bichat published the most important and influential of his works—the *Anatomie Générale*. The central conception of this treatise, universally acknowledged to have made an epoch in the science of life, is the analysis of organs into their component tissues, and the attribution to each of these of its appropriate degree of vitality. Hitherto the organs of the body had been regarded simply as mechanisms adapted to the performance of a particular function, but otherwise as having little or nothing in common with each other. From this standpoint it was difficult to form synthetic views of the facts of life, to regard the organism as acting as a whole. A complete change resulted from Bichat's conception. It may be illustrated by a familiar example. Many old people now living will remember to have heard in their youth that a friend or neighbour was suffering from what was called "white swelling" of the knee-joint. Regarded as a disease special to the joint, and affecting all its parts, it was treated empirically, and with nugatory—often with bad—results. Bichat's conception altered the whole way of looking at the matter. The joint was now seen to be a complex organ, into the formation of which many distinct tissues entered: connective tissue, bone, cartilage, vascular tissue, sinew, muscle, nerve, integument; it was, in fact, made up of eight or nine different materials moulded into a special form for the purposes of the joint, each of these materials entering into the formation of numberless other organs. Each of these tissues was examined by Bichat not merely in reference to any special organ, but as found throughout the body. Each was seen to have its own special degree of vitality, its own forms of disease. It is easy to conceive the flood of light shed upon the medical treatment of any diseased organ by this way of regarding the matter. Remedial measures were henceforth adapted, not to the whole organ indiscriminately, but to the one or more tissues affected, whether in that organ or elsewhere. The effect on the science of life was to regard life, not as an abstract impalpable entity pervading the organism, but as a series of phenomena varying with each tissue. Bichat thus created the branch of biological science known as histology, the scientific study of tissues—a study which, in the course of a century, has grown through unenlightened specialism to cumbrous dimensions which have often proved obstructive to scientific progress. In estimating his work we must remember that it was

done without the aid of the compound microscope; that the chemistry of organic substances was in its infancy; and that comparative embryology hardly existed. The way in which all tissues were differentiated out of pre-existing cellular structures was left to be opened thirty years afterwards by Schwann and Schleiden, and has been followed out more recently with remarkable results by Virchow and others.

Thus it was that in the last year of the eighteenth century, and in the first year of the nineteenth, Bichat inaugurated the positive theory of life. Much doubtless remained to be done by others. Lamarck at this time was engaged in tracing the evolution of life from its lowest to its highest forms, and was followed in this by such men as Blainville, Oken, and Goethe. Gall, meanwhile, was investigating in the higher vertebrates and in man those functions of the nervous system which lie at the foundation of the social state. A generation had hardly passed before Comte, on these foundations, had instituted the science of sociology.

II

LAMARCK

DURING the half-century that preceded the publication of Darwin's *Origin of Species* the name of Lamarck was but little known to the European public, and was imperfectly recognized even by men of science. Goethe, who devoted such deep attention to the philosophy of Evolution, seems never to have heard of his name. Darwin himself, as his correspondence shows, had a very imperfect apprehension of his speculations. Though Lamarck is now admitted to have been the founder of Invertebrate Zoology, he spent the last twelve years of his life in poverty and blindness, consoled only by the persistent and heroic devotion of his daughter, Cornelia. The very place of his burial in the cemetery of Mont Parnasse is forgotten.

One exception there was to this discreditable neglect of a thinker and explorer who is at length admitted to hold the foremost place in the theory of Evolution. Auguste Comte, who was far from accepting his speculative conclusions, recognized from the first his transcendent services to biological science. He saw the light which Lamarck had thrown on the fundamental fact of life—the action and reaction, tending continuously to adjustment, between organism

and environment. He placed his *Philosophy of Zoology* in the short list of works occupying the scientific division of his Positivist Library. It is not the only instance in which Comte thus anticipated the verdict of history. His judgment of the great mathematical physicist Fourier, and of Leroy, the pioneer of comparative psychology, have been in the same way accepted by later generations.

Dr. A. S. Packard, professor of Zoology in Brown's University, U.S.A., has recently published a volume on *Lamarck, the Founder of Evolution: His Life and Work*,¹ which supplies adequate information for those who may wish to know more about this remarkable man. He was born, August 1st, 1744, at Bazentin-le-Petit, in Picardy [Somme], the youngest of eleven children, descended on the father's side from an ancient family of Béarn, near Lourdes. He was brought up, like so many illustrious Frenchmen of the seventeenth and eighteenth centuries, by the Jesuits; but at his father's death, in 1760, he joined the army, where, in the following year, he so distinguished himself at the battle of Vellinghausen as to be promoted on the field by his General, Marshal Broglie. An accidental injury forced him to leave the army. He betook himself to Paris, and studied botany and medicine. He published an important work on the Plants of France; and through the powerful patronage of Buffon became Professor of Botany at the Academy of Sciences. In the years that followed he travelled in pursuit of his science in various parts of Europe, and in 1789 he was made keeper of the Herbarium in the Royal Garden. In 1790 he brought before the Legislative Assembly his scheme for the organization of the Museum of Natural History, which was carried into effect three years afterwards, during the fiercest throes of the Revolution, by the National Convention. The sphere assigned to Lamarck was that of Invertebrate Zoology, a department of science which he had not previously studied, but which may be said to owe its existence, or, at any rate, its entire reconstruction, to his labours. As conceived by Linnæus, Invertebrates had been classified under the two divisions of Insects and Worms. In Lamarck's hands a new world was revealed to the student, leading to wholly new conceptions of life. The two classes of Linnæus were developed into ten. For the first time, Crustaceans, Arachnids, Cirrhipedes, Annelids, and Infusoria were recognized as distinct classes. The generalizations which he was led to form by his studies of these forms of life were

¹ Longmans, Green, and Co.; 1901.

given to the world in a series of discourses delivered annually in the opening years of the nineteenth century, and they were summed up in 1809 in his *Philosophie Zoologique*.

Lamarck made no attempt to account for the Origin of Life. He contented himself with saying that the simplest forms of life were those from which all the rest had gradually issued. In giving rise to her varied productions, two conditions were made use of by Nature: time, and favourable surroundings. Time she has always at her disposal. As to modifying circumstances, they are inexhaustible. The essentials of these consist in the influence of all the environing media (*milieux ambiants*), in the diversity of local causes (*diversité des lieux*), in habits, in actions, in movements; finally, in means of living, of self-preservation, of self-multiplication. Moreover, as the result of these different influences, the faculties developed and strengthened by use (*usage*) became diversified by the new habits maintained for long ages; and by slow degrees the structure, the consistence, in a word, the nature and condition, of the parts and organs participating in all these influences became permanent, and were propagated by generation (*hérédité*).

It is important to note that Lamarck never put forward the view that the Evolution of Life took place in a linear series, of which each term exhibited a higher grade of development than the one preceding. His conception was rather that of a tree sending out in the course of its upward growth many lateral branches, each of which in turn ramified into smaller branches till the final twigs were reached. He made not the slightest attempt to range the infinite host of species in subordination one to another. But the great groups did, as he conceived, form such a series, and might be lineally arranged. And, in any case, when we pass from the highest forms of life to the lowest, or inversely, as from man to the protozoon, neglecting the divergent branches, we follow necessarily, as in the case of a pedigree, a line of direct descent.

How did Lamarck regard the question of *Species*? We call *species*, he says, "every collection of individuals which are alike, or almost so, and we remark that the regeneration of these individuals conserves the species and propagates it by continuing successively to reproduce similar individuals.....This idea was quite simple, easy to grasp, and seemed confirmed by the constancy in similar form of the individuals which reproduction or generation perpetuated. But the farther we advance in the knowledge of the different organized bodies with which almost every part of the surface of the globe is covered, the more does our embarrassment increase in

determining what should be regarded as species, and the greater is the reason for limiting and distinguishing the genera. As we gradually gather the productions of nature, as our collections gradually grow richer, we see almost all the gaps filled up, and our lines of demarcation effaced. We find ourselves compelled to make an arbitrary determination, which sometimes leads us to seize upon the slightest differences between varieties to form of them the character of what we call a species; and sometimes one person calls a species what another calls a variety."¹

"For a long time," he observes, "I thought all species were constant in nature, and that they were constituted by the individuals which belong to each of them. I am now convinced that I was in error, and that only individuals exist in nature. The origin of this error, which I shared with other naturalists, lay in the long duration, relatively to us, of the same state of external circumstances in each place which a given organism inhabits." A great impression was produced about this time by the results of the examinations, in the hands of Cuvier and Geoffroy Saint-Hilaire, of mummified animals brought by French explorers from Egypt. Specimens of cats, crocodiles, and other animals, known to be many thousands of years old, were found to be exactly similar to animals existing there at the present day. This was taken as a sufficient proof that species were permanent. But to this Lamarck's reply was that 4,000 years, though a long period in reference to human history, was an extremely short one in reference to the history of the earth. Mankind is apt to judge of dimensions relatively to itself. During those few thousand years the changes of environment in Egypt have been quite inconsiderable; consequently, there was no reason why organisms acted on by that environment should have changed. The great physical changes in our planet have required an incomparably longer period to produce.

But we are often in a position to watch changes in the environment; and there we see the organism undergoing modification. If we look at the facts of life as it exists around us, we see that in all the animals and plants which man cultivates and breeds for his own use—horses, dogs, cattle, poultry, wheat, vegetables, and fruits innumerable—marvellous changes have taken place; varieties have been produced, exhibiting divergences from their original state far greater than the naturalist requires in distinguishing one species from another. The original form of *Triticum sativum* has

¹ *Philosophie Zoologique*, vol. i, ch. 3.—ED.

disappeared, or, at least, cannot be indicated with certainty. Mark the changes which take place in the leaves of so familiar a plant as *Ranunculus aquatilis*, if some of them are allowed to grow above and apart from the water. Take a grass from a damp, low-lying field; let it live for many generations on a hillside in good soil; then transplant it for a further series of generations to a barren mountain. Its transformed condition would undoubtedly be described by botanists as a distinct species.

Lamarck's hypothesis was that the simplest forms of life—microscopical specks of amorphous protoplasm—were continually, in some unexplained manner, being produced by nature, and that deviations from this original form were produced by interaction with surrounding circumstances. New modes of action stimulated by these circumstances, when continued through a sufficiently long series of generations, gradually resulted in the formation of new organs. Hence the gradual growth of new species. The habit of exercising an organ increases it; and these increments, summed up after repeated reproductions, modify it more and more, so that at length it no longer seems the same organ.

Lamarck has been misrepresented as saying that the organs of an animal were created by its desires; that an animal wishing to modify any organ ultimately succeeded in doing so. What Lamarck really says is that, owing to changes in the environment, an animal was exposed to new *wants*, from which resulted certain actions; and that these actions, repeated for a sufficient course of time, led to a modification of organs. The giraffe, finding itself in need of leafy food, continually strained upwards to reach it, with the result that in the course of generations the neck and forelimbs were elongated. The Darwinian hypothesis is that, somehow or other, among giraffes a variety occurred with longer neck and forelimbs, and that this variety, being better adapted to its surroundings, survived. Either hypothesis is possible; perhaps both may have contributed to the result. Meantime, it is important to remark that evidence of either one or the other is wanting.

Similar remarks apply to Lamarck's way of accounting for the tentacles of the snail. "I conceive," he says,

that a gasteropod mollusc which, as it crawls along, finds the need of feeling the bodies in front of it, and makes efforts to touch these bodies with some of the foremost parts of its head—sending to these every time supplies of nervous and other fluids—I conceive, I say, that it must result from this reiterated afflux towards the points in question that the nerves which

abut on these points will, by slow degrees, be extended. Now, as in the same circumstances other fluids of the animal flow also to the same places, and especially nourishing fluids, it must follow that two or more tentacles will appear and develop insensibly under those circumstances on the points referred to.

Since the time of Darwin a new theory of evolution has been put forward by Weismann and his school, in which use-inheritance—*i.e.*, the transmission of habits acquired during the lifetime of an individual—is declared to be impossible. From generation to generation, according to this view, the germ-plasm is passed on intact, embedded in the tissues of the body, but wholly immune to their influence. So far as climatic agencies may operate directly on this germinal plasm, so far only may it be regarded as modifiable. Otherwise the sole cause of variation is the mixture of plasms resulting from the union of sperm- and germ-cell. It follows on this theory that modifications of tissues caused by exercise and habit during the lifetime of an individual leave the germ-plasm unaffected, and are not transmissible to progeny. Weismann's hypothesis has been worked out in marvellous detail. The germ-plasm has, according to him, an elaborate architectural structure, containing, in subordination to each other, idants, ids, determinants, and biophors, each coming into operation at the appointed time, and regulating the successive formation of organs and tissues. So elaborate, indeed, is this explanation of development that it is hardly easier of comprehension than the facts which it proposes to explain. And during the whole process we are asked to believe that the tissues of the body (somatic cells) are debarred from exercising any reacting influence on the germ-cells which are embedded in them. It may be noted that it is only in rare instances that these cells can be traced by actual inspection during the whole course of growth. In the vast majority of cases these "germ-tracks" are invisible, and their existence is a matter of inference.

On the whole, it may be said that the demands made on scientific imagination by this hypothesis have been seldom exceeded in the history of science. It is no matter of surprise to find that a strong tendency has shown itself in the rising generation of biologists to revert to Lamarck's theory of inherited habit, and to regard it, side by side with Darwin's and Wallace's theory of the survival of the fittest, as an important factor in the evolution of life upon the globe.

III

THE DARWINIAN CONTROVERSY¹

DARWIN, in England, is popularly identified with the belief in Evolution as opposed to Special Creation. In this country Science was later in shaking off theological trammels than elsewhere. In France or Germany such a book as Paley's *Natural Theology* would have been utterly disregarded by men of average education. It will be remembered that Paley imagines a savage to have picked up a watch, and to infer from its movements that it must have been made by some intelligence greater than his own. His inference, as will now be admitted, would really be that the watch was itself the intelligence. Paley, however, went on to argue that because the first and second vertebræ, known as atlas and axis, fitted one another like two pieces in a machine, or because the structure of the knee-joint displayed arrangements for various motions useful in walking, therefore the human body must have been made by some intelligence vastly superior to that of man. On the Continent, where scientific men were less fettered by religious prejudices, naturalists were struck not so much by the ingenuity of these and other devices as by their imperfection. They were less impressed by the fact that the eye was so formed as to allow rays of light to converge on the retina than by the fact that it was a very defective optical instrument, in which the plans for avoiding spherical and chromatic aberration were extremely inadequate. In different animals there were various degrees of adaptation: the eye of the eagle, for instance, was seen to be incomparably superior as an organ of vision to that of man.

Ranging animal structures of all sorts in a series according to the degree of adaptation to their purpose, the best being far short of perfection, the worst showing a very imperfect degree of attainment, biologists were speedily disabused of the idea that the Providence superintending the phenomena of life was of infinite wisdom. Wisdom of some kind there was, but not infinite. The prevailing tendency among philosophic minds at the beginning of the nineteenth century was towards belief in a *nisus formativus*—a force of a progressive kind innate in animal structures, and moulding them by slow degrees into more and more perfect correspondence

with their environment. It is probable that no naturalist of repute during the nineteenth century seriously believed that lions and tigers, birds and fishes, oak-trees and cedars, rose suddenly from the ground on a given day as Milton describes. Either they dismissed the question from their minds as insoluble, or they framed for themselves some such scheme of evolution as may be found in the writings of Buffon, Lamarck, Oken, or Goethe.

Indeed, if we go much farther back we find that Evolution commended itself to the untaught mind of primitive nations far more readily than abrupt Creation. It was easier in the earlier days of Hindoo religion to conceive of the universe as growing from an egg than to imagine it created suddenly from nothing by the fiat of an invisible will. The sublime abstraction of the Mosaic story has been taught to Christian and Mohammedan children for so many centuries that the stupendous difficulties involved in it have faded from view; or, rather, the social value of belief in the government of the world by a despotic benevolence has, till lately, been so overwhelmingly great as to blind men to the problems which that creed left unsolved. During the nineteenth century Monotheism as a system dominating the actions of statesmen has lost its power. Retaining much of its hold over private life, intimately bound up still with our conceptions of right and wrong, of conscience and of duty, it no longer exists as a controlling force in politics. And as one among many consequences of this stupendous change, evolutionary theories of nature are again in the ascendant, as they were in the days of the Ionian philosophers five or six centuries before Christ.

Among such theories, that which bears the name of Darwin holds for the time the foremost place. Two causes explain this prominence—the enormous wealth of knowledge which this great naturalist grouped round his theory, and the undoubted reality of the three fundamental facts on which the theory is founded. These facts are—(1) that in every new generation of each species there are variations; (2) that more individuals are born than can possibly find subsistence; (3) that those are most likely to survive whose variations best adapt them for the competitive struggle. Of these three facts there can be no doubt whatever. It is certain, therefore, that Darwin has brought to light one very powerful factor in organic evolution. The grave discussions that have arisen since his death turn on the question whether, in addition to this factor, there are also others. Darwin himself admitted the existence of others, notably of the factor on which Lamarck insisted earlier in the century—the

inheritance of characters acquired by each individual during its brief period of existence. Habitual exertion of any muscles will cause these muscles to grow. Lamarck maintained that the increased size was transmitted to descendants, and that here lay a source of evolutionary change. By many students of evolution, notably by Mr. Spencer, such transmission is accepted; by others, and foremost among them by Weismann, it is not merely denied, but asserted to be impossible.

The grounds of Weismann's denial are to be looked for in his *Theory of Heredity*. The germ-plasm of each fertilized ovum consists, in his view, of two distinct portions, one of which, by a series of successive divisions, differentiates into various tissues and organs of which the body of the mature animal or plant is composed, while the other is transmitted unchanged to form the germ-cell of the succeeding generation. While so transmitted, Weismann maintains that it is entirely cut off from all connection with the tissues of the body containing it. Those tissues, therefore, can exercise no influence upon it. Ultimately this germ-plasm is mixed with that of another individual of the same species. In the offspring that ensues variations from the parental forms arise, and from these variations those which make for success in the struggle for existence survive and are perpetuated. This selection of favourable variations is, in Weismann's opinion, the sole source of organic evolution.

On this the first remark to be made is that the foundation of Weismann's theory—the doctrine, namely, that the germ-plasm of a species is handed on from one generation to another unmodified by the tissues of the body containing it—is a pure supposition, resting on but few facts, and against the probability of which there is much to be urged. The cells of an organism are not so cut off from one another as this theory would imply. "It is becoming more and more clear," says Mr. Adam Sedgwick, "that the cells composing the tissues of an organism are not isolated units, but that they are connected with one another." "The protoplasm of the whole body being continuous, change in the molecular constitution of any part of it would naturally be expected to spread in time through the whole mass."¹

In the second place, it is most important to recognize the fallacy that so often arises in comparing natural selection with the artificial selection practised by the breeder and the florist. These persons fix on any variation whatever that strikes their fancy in an animal or

¹ Quoted from Spencer's *Inadequacy of Natural Selection*, p. 40.

plant, and by breeding from this individual can intensify the variation to almost any degree of prominence desired. But nothing of this kind takes place in nature. Only those variations are perpetuated which give their possessor an advantage in the struggle for life. The advantage must be of a marked kind, and must be transmitted to a very large offspring. Slight variations disappear, on account of the constant intercrossing that occurs in the natural state. The breeder can perpetuate the slightest variation by keeping the breed pure. There is no provision for this in nature. By far the greater number of variations that occur neutralize one another when the next brood arises. It is strange how many readers of Wallace and Darwin fail to appreciate this fundamental distinction between the selective art of the breeder operating with conscious intelligence and the mechanical sifting process resulting from natural competition. Unconsciously, the old habit of endowing nature with personality crops up; natural selection is looked at as an intelligent agency. This tendency has been followed to strange lengths, which reach their maximum in Weismann's recent attempt to attribute sex itself to natural selection. Sex, according to him, makes variation possible; variation makes selection possible; therefore, sex is the result of selection! Truly Natural Selection, thus interpreted, is but the old metaphysical entity of Nature writ large.

Mr. Spencer has given strong reasons in support of Lamarck's theory of the inheritance of acquired characters as one of the factors of evolution acting conjointly with natural selection. He points out that a variation in any one direction, to be effective, implies other concomitant variations. An elk born with stronger and heavier antlers than his fellows can make little use of this advantage until the muscles of the neck and limbs have been strengthened in several rather complicated ways. To some extent this may be effected during the animal's life by increased use of the muscles concerned; and if this muscular improvement be inherited, a more powerful breed arises which will survive. Weismann's disbelief in such inheritance reduces him to the alternative of supposing that by fortuitous variation all these concomitant advantages arise simultaneously—an hypothesis of singular difficulty when account is taken of the number and complexity of the muscular and osseous changes, without which a mere increase in the size of the antlers would be useless.

Attention is called by Mr. Spencer to many structures and functions which seem easily accounted for on this supposition of inheritance of acquired characters, but which are hard to explain on any other

theory. The skin, for instance, varies extremely throughout its surface in sensibility to tactile impressions. In the middle of the back the pressure of two points when two and a half inches apart is felt as one point. The tip of the fore-finger will discriminate them as two when the interval between them is but the twelfth of an inch; the tip of the tongue when it is the twenty-fourth of an inch. Other parts of the body exhibit intermediate degrees of sensitiveness, these being nearly constant for each part. Admitting that in some of these cases an advantage may have been gained promoting survival, it is difficult to see this in others. For instance, the extremity of the nose has three times the tactual sensibility of the lower part of the forehead; the thigh, near the knee, has less than its middle portion; and so on. It is not easy to explain such differences by supposing them to have conferred such advantages on their first possessor as would lead to his survival in the competitive struggle, whereas it is easy to understand them on the view that they were acquired by use and so transmitted. On the whole, it would seem that Weismann's denial of the inheritance of acquired characters rests on an insufficient basis of fact, and that it makes evolution unintelligible by deducing it from a fortuitous combination of variations so improbable that, were it the only scientific hypothesis available, men of ordinary understanding would resort to the intervention of creative intelligence as the easier alternative.

Admitting inheritance of acquired characters and natural selection to be conjoint factors in evolution, it does not follow that they are the sole factors. A rising school of naturalists is disposed to dwell on certain internal factors directing the course of evolution in predefined channels. Of these sex is the most potent. A comprehensive survey of the phenomena of sex throughout the whole range of the metazoa shows the two opposing tendencies of activity—expenditure of energy, rapid chemical change, on the male side; and on the female, of passivity, receptivity, storage of energy and material. It would seem that many of the facts adduced by Darwin in support of his theory of sexual selection may be more suitably interpreted as following from the chemical structure of male and female protoplasm.

A review of the present state of scientific opinion may well inspire extreme caution in accepting any hypothesis professing to account for the various forms of life which have appeared upon the earth. Possibly the evidence may never be such as to enable us to form a dogmatic decision.

IV

LORD KELVIN ON THE MIRACLE OF LIFE

ON May 1¹ the first of five lectures on "Christian Apologetics" was delivered at University College, Gower Street, by Professor Henslow. Lord Kelvin, who was present, moved a vote of thanks to the lecturer; but remarked (I copy from the *Times* of May 2) that he

was unable to agree with him in maintaining that, with regard to the origin of life, science neither affirmed nor denied creative power.....They were absolutely forced by science to admit and to believe with absolute confidence in a directive power, in an influence other than physical, dynamical, electric forces. Cicero had denied that they could have come into existence by a fortuitous concourse of atoms. There was nothing between absolute scientific belief in creative power and the acceptance of the theory of a fortuitous concourse of atoms. 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?

In the *Times* of May 4 Lord Kelvin admits the correctness of the report, but adds that he wishes

to delete the word *crystal*. "I desired," he said, "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 bodies of living things. Here scientific thought is compelled to accept the idea of creative power. Forty years ago I asked Liebig, when walking somewhere in the country, if he believed that the grass and flowers around us grew by mere chemical forces. He answered, 'No! no more than I could believe that a book of botany describing them could grow by mere chemical forces.' Every action of human free will is a miracle to physical, and chemical, and mathematical science."

On May 7 a letter appeared from Sir W. T. Thiselton-Dyer, the Director of Kew Gardens. Lord Kelvin was, doubtless, the writer said, "an eminent man in physics, but for dogmatic utterance on biological questions there is no reason to suppose that he is better equipped than any person of average intelligence." Lord Kelvin, "in effect, wipes out by a stroke of the pen the whole position won

for us by Darwin." It was illogical, the writer continued, to distinguish between fortuitous concourse of atoms in the case of a crystal and in the case of a living plant. "The argument from design applies for what it is worth as much to a diamond as to a caterpillar." Finally, he referred to words used by Lord Kelvin in Edinburgh in 1871: "If a probable solution consistent with the ordinary course of nature can be found, we must not invoke an abnormal use of creative power."

On May 7 Professor Burdon-Sanderson intervened, to state what he considered "the orthodox biological doctrine."¹ This is that

all processes observed in living organisms are of such a kind as to admit of being investigated by the same methods as are used in the investigation of the phenomena of non-living matter—i.e., by measurement of their time and space relations under varying conditions; in other words, by the method of experiment. But, beyond the limit thus stated, we have to do with processes which cannot be directly measured or observed. There are, first, the mental processes, whether of men or animals, in respect of which the experimental psychologist is unable to go beyond the estimation of condition and effects; and, secondly, the processes of organic evolution, by which the organism grows from small beginnings to such form and structure as best fit it for its place in nature.

Professor Burdon-Sanderson remarked in the course of his letter that Lord Kelvin, "as a man of transcendent ability," was capable of discussing biological problems, though himself a physicist. This, however, was vehemently denied on May 13 by Sir W. T. Thiselton-Dyer. "Transcendent ability will not enable a man, without previous training, either to paint an Academy picture or read the Hebrew Bible." In a subsequent letter (May 15) he reiterates that "directive power" is "the stroke of the pen by which Lord Kelvin wipes out.....the whole position won for us by Darwin." He adds: "What the Darwinian theory did was to complete a mechanical theory of the universe by including in it the organic world." "If, with Asa Gray and Cope in America, and Nageli in Germany, we set up 'a phyletic vital force,' we at once, as Weismann says, cut ourselves off from all possible mechanical explanation of organic nature."

A further contribution to the debate was made on May 19 by Professor Ray Lankester, from which two important sentences may be extracted:—

¹ The italics in what follows are the present writer's.

There is no relation [he says], in the sense of connection or influence, between science and religion.....Science proceeds on its path without any contact with religion.

Again:—

The whole order of nature, including living or lifeless matter—man, animal, and gas—is a network of mechanism, *the main features* and many details of which have been made more or less obvious to the wondering intelligence of mankind by the labour and ingenuity of scientific investigators.

If the words italicized (by the present writer) were omitted, and if in the first sentence "theology" were substituted for "religion," Professor Lankester's letter would read more plausibly. As it stands it suggests more doubts than one. If religion has to do with man's moral and intellectual life, and if the facts of man's life, no less than those of animals and gases, are due to "a network of mechanism," how can it be said that science can proceed on its own path without any contact with religion? And, again, assuming this mechanism to embrace the whole order of nature, it is a bold assumption (and the more it is looked at the bolder it will seem) that scientific men have revealed "its main features." Some of the ancients, dimly anticipating the reign of law, were wont to say *God geometrizes*. And, in truth, theologians who meditate on the existence and attributes of an omniscient God have no choice but to believe that all that has existed, or will exist, is for him matter of calculation, or rather of direct intuition. But we are men and not gods. We have to look at these things from the human point of view, not from the divine. And taking that humbler standpoint, we ask, has the "network of mechanism embracing the whole order of nature" been sufficiently studied to account for the muscular contractions, following on the mutual action of many millions of brain-cells, from which resulted the manuscript of *Hamlet*?

On the whole it will be admitted that this correspondence raises an unusual number of interesting questions. That the writers are distinguished, though in various degrees, might imply presumption when an obscure person ventures to criticize them. Only, since they cannot possibly be all of them right, it is permissible to ask, What in each case is the omitted half, or other fraction, of the truth? Without pretending to answer such a question, I subjoin a few remarks that may possibly suggest an answer.

Beginning with the speech which started the discussion, it is hard to repress surprise that a man whose contributions to physical science have been so great as those of Lord Kelvin should take so

limited a view of the scope and the methods of science. His strange observation that "fortuitous concourse of atoms" might account for a crystal, but would not account for a plant, would, if literally interpreted, cut at the root of physics, no less than of biology. His apologists say that they should not be taken literally, and that all that he meant was to draw a sharp line between the domain of physics and chemistry and the domain of living things; and to deny that the latter was amenable to scientific treatment in the same sense as the former. But this apology is hardly sufficient. The words were deliberately repeated in his second statement, addressed to the *Times* of May 4. And we have, further, to take into account his remarkable utterance in the same letter that "every action of human free will is a miracle to physical, and chemical, and mathematical science." From a great scientific authority, addressing a popular audience, a higher standard of precision is rightly demanded than from ordinary men; yet it is in precision that both these remarks are so curiously wanting.

To the student of Comte's *Philosophy of the Sciences*, of which, after sixty years of neglect, the cultivated intellect of France and Germany is at length beginning to appreciate the true import, the right way of stating the question is not doubtful. Arranging the abstract sciences in the order of the increasing complexity, and the diminishing generality, of the phenomena with which they deal, we find each term in the series depending on the preceding, while each adds separate inductions of its own. Thus, for instance, the science of chemistry, dealing with a more complex order of facts than the group of sciences known to us as physics, while depending on the laws which mechanics and physics supply—laws of momentum, temperature, radiation, electricity, etc.—furnishes its own mass of inductions, derived from observation of the properties of each chemical element, and of their modes of combination. Equations of motion, mutual action of "vortex-atoms," successive evolution of the elements, in some pre-terrestrial epoch, from an imagined "protyle," will not dispense with direct observation and experiment on oxygen, carbon, gold, and radium. The laws of chemical science cannot be treated as deductions from physics. They must be studied by the humble and patient process of induction from observed facts. We may admit that deductions from hypotheses, even when these are very hazardous, are often the channels through which new questionings of nature are suggested. But, except so far as such questions are verified afterwards by observation, they are of secondary value.

Very similar is the case when we pass from the study of chemical and physical facts to the study of living things. Here we find all the forces with which mechanics, physics, and chemistry have made us familiar in full working, only combined and co-operating in special and more complex ways. As far back as 1838, Auguste Comte, in the fortieth and forty-third chapters of his *Philosophie Positive*,¹ indicated the way in which the various forces of the inorganic world, gravitation, astronomical position, heat, light, electricity, chemical affinity, acted on the living organism; these actions, taken in connection with the corresponding reactions, constituting in fact the very process known to us as Life. *La notion systématique de la vie consiste dans une intime conciliation permanente entre la spontanéité intérieure et la fatalité extérieure.*²

Taking the simplest organisms known to us, we find their substance to consist of molecules formed from a very limited number of elements, but of a highly composite and unstable kind, undergoing processes of incessant building-up and unbuilding. They pass through a process, first of growth, then of decay, as the building process first exceeds, and afterwards falls short of, the unbuilding. They bring forth after their kind, either disappearing in this process, as in the case of *protozoa*, or in other cases undergoing, after a longer or shorter interval, the dissolution known as death. Further, the lower organisms display throughout their substance, and the higher organisms in special tissues, the remarkable phenomenon of contracting in response to certain stimuli, the stimulus to which response is given having some relation, vague or precise as it may be, to the needs of the organism. This capacity of being aroused or irritated, and of reacting—in ways which even in the humblest cases seem not quite machine-like, in response to the irritation—constitute in the higher animals the functions known as Innervation and Musculation.

Now, that this series of events is something quite unlike anything observed in inorganic nature is obvious. True that every act of a living thing involves chemical change, and that each one of these chemical changes has been imitated, or may conceivably be imitated, in the laboratory. True that a crystal exhibits growth, and, after attaining certain dimensions, gives rise to other crystals. True that close inspection of living substance reveals conditions—*e.g.*, relations of crystalloids and colloids, molecules of very high

¹ Cf. especially vol. iii, pp. 433-48.

² See *Politique Positive*, vol. i, p. 413; or vol. i, p. 335, Eng. tr.

complexity, etc.—which render the incessant sequences of chemical changes more intelligible. True again that a chemical change accompanies every contraction of every muscle—in other words, that work is impossible without food. Nevertheless, none of these truths, important as they are, avail to account for the fact which we call feeling, or for the discriminative selection proved by Darwin and others to be shown, in response to incident forces, by insectivorous plants, as well as by animals endowed with a nervous system.¹

Including, as we must, in our idea of life the rudiments of sensation, thought, and feeling, we are unable to form any full explanation of it as derived from the play of physical and chemical forces. "Under its subjective aspect," says Mr. Spencer, "Psychology is a totally unique science, independent of, and antithetically opposed to, all other sciences whatever. The thoughts and feelings which constitute a consciousness.....form an existence that has no place among the existences with which the rest of the sciences deal."² A Positivist would, perhaps, state the case somewhat differently. But Mr. Spencer's words serve to show the impossibility of supplying a complete correlation of life with the laws revealed by the inorganic sciences. And it is just this impossibility which has given rise to the belief, to which Lord Kelvin and others have given expression, that Life in some of its manifestations is miraculous.

It is miraculous only for those who fail to see that every other ultimate fact in Nature may be called a miracle with equal justice. Who can tell us why Newton's apple fell to the ground? Endless conjectures as to the cause of gravitation (pressure of extra-mundane atoms, shrinkage of vortex-atoms in the ether, and many others) have been made during the last two hundred, or, indeed, two thousand years, and we are no nearer a solution than in the days of Lucretius. The time came when Galileo asked the question, not why bodies fell, but how they fell, and then, indeed, a scientific revolution began. Newton carried on the work in the same spirit as his predecessor. He studied the laws of gravitating matter, but not the cause of gravitation. He believed, indeed, as Descartes, Roger Bacon, and many of the ancients had believed, in the existence of an ether pervading space, and that with the actions of this ether gravitation, and, indeed, all other phenomena, organic and inorganic, might somehow be connected. But he refused to make conjectures

¹ Cf. Romanes, *Mental Evolution in Animals*, pp. 49-51.

² *Psychology*, 2nd ed., vol. i, p. 140.

in regions where he had no means of verification. *Hypotheses non finxit*. Had he taken a different course, the *Principia* would not have been written.

So it is with Life. The cause, the ultimate origin, of life is beyond our ken. But its modes of manifestation lie open to our view; and these are subject to fixed laws, some of which we know already—more we hope to know.

Sir W. T. Thiselton-Dyer assures us that "directive power" is the "stroke of the pen by which Lord Kelvin wipes out the whole position won for us by Darwin," and adds that the Darwinian theory "completed a mechanical theory of the universe by including in it the organic world."

We may leave Lord Kelvin to fight it out with his opponents. The Positivist position in this matter is perfectly clear. We disbelieve utterly in the possibility of constructing any theory of the universe, theological or mechanical, which can stand discussion. Aiming at a theory, not of the universe, but of man's nature, which shall throw light on the problems of his conduct, we find it impossible to form such a theory without sufficient knowledge of the laws of Life, social and physical. Sociology and biology demand study of the laws of the planet on which Man lives and works, and of the solar system of which that planet is a part. The sum of scientific knowledge, thus colligated by the effort to know and to serve Humanity, we speak of as a subjective synthesis, and no other synthesis seems to us to be possible.

Given a free hand in the construction of hypotheses of Space and Ether, regardless of their verification, explanations of the universe can, no doubt, be supplied. But see the first obstacle that has to be overcome. If the universe is to be explained, it can no longer be supposed infinite; it must become again finite, as in the Middle Ages. There are mathematicians of eminence—Lobachevsky and Kingdon Clifford among others—who do not shrink from this. To this end it is necessary to suppose space to be "curved": and to maintain that the discovery of Thales, that the three angles of a triangle are equal to two right angles, is an imperfect approximation to the truth. This meets us at the outset. With further obstacles involved in contradictory conceptions of the ether I cannot deal here.

Great discoverers have often found their researches helped by working hypotheses which admit of no verification, and which are in the course of time replaced by others. Newton, for instance, made many discoveries in optics with an hypothesis as to the nature

of light which has long ago been discarded. To the worker in physical, biological, or sociological science such aids to thought are often as useful as diagrams and symbols are to the mathematician. Against such procedure it would be absurd to cavil. But it has too often been the case, especially in recent years, that these unverified and unverifiable hypotheses have been paraded before the world as momentous scientific discoveries. So far as this is done, the public is deceived, and is indeed being educated downwards. False conceit of knowledge, as Roger Bacon said long ago, and Socrates before him, is the worst of intellectual diseases. Feelings are touched by it, not thoughts only.

V

THE USE AND ABUSE OF EXPERIMENTS ON ANIMALS¹

1

No one can have been satisfied, not even the speakers themselves, with the recent discussion on Vivisection at the Church Congress. But the froth and foam of that unhappy quarrel having floated away, it may be useful to ask, What precisely are the contending forces? Is there any way of reconciling them?

Something will be gained at the outset if we realize that the question is not an easy one. Achieving this small step, we shall at least rise out of the fogs of commonplace controversy, the characteristic of which is that each party thinks the other to be mentally infirm, wilfully blind, or morally degraded. Lively epigram, brilliant sarcasm, passionate invective—all this small musketry of debate will avail us little in the solution of as difficult a problem as the nineteenth century has ever had to deal with. The present writer puts forward no claim to have reached a precise and definite solution: he aims merely at pointing out the temper and the point of view that will be found most helpful in dealing with it.

The principal difficulty, which, however, will not be dealt with on this occasion, is this: Assuming that experiments on living animals can be shown to have been fruitful of result in biological discovery and in the cure of disease, should any limits to such experiments be laid down? If so, of what kind should they be, and how should they be enforced?

But this question must be reserved for a subsequent paper. It involves an assumption which most of the opponents of vivisection will regard as unwarrantable. Mr. Lawson Tait, an operating surgeon of undisputed eminence, denies it absolutely. The late Sir William Ferguson, an operator of extraordinary distinction, gave evidence before the Royal Commission in 1875 to the same effect, though with some qualifications. (See his evidence, 1015-1148.) His view was that a great deal had been done by experiment in regard to physiology and human knowledge, but that it had not been of that immense value to human nature that some claim for it. He doubted whether experiments had led to the mitigation of pain in the human subject. He quotes with approbation the Report of the Court of Examiners for Scotland of the College of Veterinary Surgeons in 1867, signed by James Syme, one of the most distinguished surgeons of the nineteenth century, containing the words: "We desire to express our opinion that the performance of operations on living animals is altogether unnecessary and useless for the purpose of education."

These are weighty authorities; but I think that those who read the evidence taken before the Commission in 1876 with a sincere desire to form an honest judgment on the point now before us—whether experiments on animals have or have not resulted in useful discovery—must feel that the testimony on the other side raised questions which these witnesses did not touch. The art of medicine, as distinct from that of operative surgery, deals with disturbances of vital processes. During the present century it has come to be felt more and more clearly that the disturbance cannot be understood until the ordinary condition of the process has been investigated. In other words, medicine must rest on the science of life, commonly known as biology.

We are thus led to the question, What part does experiment play in biological research? Its extreme advocates claim that almost every important discovery is due to it. I refer again to the Blue book of 1876. I do so because it is the only occasion on which the extreme partisans on either side have been fairly confronted before a mixed jury of experts and laymen, the jury itself containing extremists as well as moderates. It will remain, therefore, for many years to come an extremely valuable document for the discussion of the subject.

It was maintained before this Commission, repeatedly and with undeniable force, that useful results might follow from investigations that had no immediate curative object in view. Professor Burdon-

Sanderson's words may be quoted as perhaps the ablest exponent of this part of the subject. "The utility," he observes, in reply to Qn. 2296, "of physiological study ought to be judged of not so much by its direct applicability to disease as by the certainty that exists in our minds that eventually it will be the guide of practice in medicine." "The reason why medicine fails is that we do not know the nature of the diseases, and that we do not know the mode of action of the remedies which we use in many cases." He proceeds to illustrate this position by reference to experiments, avowedly involving pain, made with the view of explaining the complex process known as inflammation. This particular illustration cannot be properly discussed on the present occasion. But the general proposition, that the discovery of any law of nature will probably lead to practical applications beyond those that are contemplated by the discoverer, seems to me entirely unassailable. No one denies that Harvey's discovery of the circulation of the blood, and Bell's discovery of the sensory and motor functions of the two roots of the spinal nerves, have led to important practical results in the treatment of disease that were not thought of by the great men who conducted these researches.

Assuming biology to be the foundation of scientific medicine, what part has experiment played in biological discovery? It has done everything, is the cry from one side; It has done nothing, retorts the other. Truth, as usual, lies between the two extremes, but, as usual, is not equidistant from them. Experimentation on animals has achieved much. "Strong indeed," says Comte, "must be the mental bias of those who cannot recognize the profound value and the scientific importance of Harvey's simple experiments on the circulation, of the luminous series of investigations made by Haller on irritability, of a part of Spallanzani's remarkable experiments on digestion and generation, of Bichat's striking combination of experimental researches on the triple harmony between the heart, the brain, and the lungs, in the higher animals; of Legallois's admirable experiments on animal heat, and of several other analogous efforts, which, taking into account the immense difficulty of the subject, may almost be compared with the most perfect experiments that have been made in physics."¹ This comes from a thinker, capable of seeing two sides of a question, who, in the previous seven pages, had been maintaining that experimentation had done in the past much less for biology, and was likely to do much less in the

¹ *Phil. Pos.*, vol. iii, ch. 40, pp. 229-230.

future, than comparative physiology or than pathology. Those who are beginning to be a little sceptical of Professor Huxley's well-known dictum that incompetence in philosophy is the mental characteristic of the founder of Positivism may consult these pages with advantage. The condition of satisfactory and decisive experiment is to be able to arrange and compare two sets of facts that shall be exactly alike in every respect except in that point which is the object of the experiment. How difficult it is to realize this condition, even when dealing with inorganic matter, very few medical students are taught to understand. Their knowledge of physics is limited for the most part to the results contained in text-books. Of the mental process by which these results are obtained it is extremely seldom that they have learnt anything, either by conducting researches in a physical laboratory, or by studying the original memoirs of the principal investigators. If every student of medicine who desires to engage in original research were compelled to study some of the masterpieces of experimental logic—such, for instance, as the first volume of Faraday's collected memoirs, and notably the "Memoir on Induction" of November, 1837—he would be better able to appreciate the difficulties which surround scientific experimentation, even where the matter operated upon is homogeneous and stable. He would feel much greater hesitation than at present as to conclusions reached where the substance on which experiment is being made is not merely heterogeneous and unstable in the highest degree, but of which also the differentiated parts are knit together by ties so subtle, and so obscure, that the difficulty of limiting the area of disturbance is, in a very large number of cases, insuperable.

Of these obvious truths the history of vivisectional operations on the brain during the last half-century offers many striking examples. In opposition to Gall, Flourens maintained, as the result of his very painful experiments, that the functions of the cerebral hemispheres were not multiple, but single, and the scientific world of that time agreed with him. Recently, as everyone knows, vivisection claims to have shown the exact reverse—namely, that these functions are not single, but multiple. I cannot discuss here the value of these later experiments, which were to some extent anticipated by pathological research. I wish to speak with all due respect of the eminent men who conducted them. But the conclusion forces itself upon the mind that the conditions of really scientific experimentation were not observed, for the reason that they were not attainable. That the conclusions reached are without value it would be very rash to

assert. But the triumphant tone in which it is habitual for writers in the *Times* or for lecturers before popular audiences to speak of them is assuredly not justifiable. Our knowledge of the minute anatomy of the brain is as yet, and for a long time is likely to remain, far too imperfect to define the precise paths of nervous action between its various parts, and thus to limit, with any approach to exactness, the area of disturbance caused by such experiments as these. A further difficulty in right interpretation of the facts observed is to eliminate the separate and distinct perturbations due to anæsthetics and to pain, since these sometimes occur consecutively in the course of one and the same experiment. (See report already cited, Qn. 3365.)

Doubtless there have been many experiments on the nervous system to which the foregoing criticism does not apply, or applies with diminished force, because the anatomical relations of the parts had been clearly defined beforehand. Bell's researches, and many others of our own time on the nerves that control the circulation, might be named as instances. Nor, again, does it apply to many of the investigations, carried on by men of such intellectual competence and knowledge as Koch and others that might be named, of the minute organisms that are now recognized as agents in the production of infective poisons. But to many of Koch's imitators the objection applies in full force. The observations made during these experiments, though apparently easy, need something more than a practised hand and eye. Without a mind well protected by native vigour, as well as by training, against the fallacies of interpretation they are worse than useless. Recent discussions at medical congresses have supplied abundant examples.

It will be seen that the foregoing remarks do not point towards a sweeping condemnation of experimentation on living animals. But they do distinctly tend towards a limitation of such experiments in the interest of scientific progress to that comparatively small number of investigators who in each generation are mentally qualified to perform and to interpret them.

The intellectual aspect of the question has been here considered. It remains to regard it from the ethical standpoint.

It was pointed out that purely scientific considerations indicated the expediency, not indeed of total abstinence from experiments on animals, but of restricting the practice to the comparatively small

number of persons qualified to set about such experiments with proper safeguards against wrong conclusions from the facts observed. The ground taken was in many respects identical with that maintained before the Royal Commission by Mr. George Lewes (see Qn. 6325-6417), himself a keen biologist and experimenter. "A great deal of experiment," says Mr. Lewes, "is quite useless; useless because it very often could not prove what is attempted to be proved. The organism is so complex that when you produce even a slight disturbance you are seldom certain of what other disturbances you produce, so that an experiment which seems quite decisive by the phenomena it presents will turn out to be totally indecisive, because the same results may be obtained by a totally different experiment." The illustration given by Mr. Lewes in support of this view is particularly instructive, though a hundred others equally telling might have been quoted. Two physiologists of high repute experimented successively on the cray-fish. The first destroyed certain ganglia, and, from the phenomena observed, he drew dogmatic inferences as to their function. The second, without touching these ganglia, cut off the large nippers of the animal. The phenomena observed in the second case were identical with those observed in the first. Mr. Lewes believed "that a considerable amount of experiment might be got rid of if the students were early impressed with the belief of the excessive difficulty of getting at any result—a belief which would prevent any experiment being lightly undertaken." (6330) "I think," he went on to say, "that for the sake of science experiment ought to be restricted; but I think it must come from the professors themselves inculcating a sense partly of responsibility to the animals and partly of responsibility to science, not to encumber science with useless lumber, which the mass of it is." These are the words, be it remembered, of a man of keen intellectual activity who had studied for many years in the physiological laboratories of the Continent, and who believed vivisection as a portion of experimental science to be a necessity, though a very painful necessity.

So much for experimentation on animals, looked at from the intellectual side. The more difficult and complex question remains of regarding it from the ethical standpoint. It is from this quarter that the recent onslaught on the practice has chiefly been directed—much of it sincere but blind, much of it perversely exaggerated, and some of it inspired by an underlying dislike of scientific progress. Due allowance being made for all these motives, which, by provoking angry reprisals, have seriously delayed the solution of the question,

there remains, I cannot but think, ample ground for maintaining a due degree of moral pressure on this subject from a public which cannot do without doctors and men of science, and very sincerely wishes to be able to respect them.

Certain misconceptions which have befogged the discussion may be cleared away at starting. It is often said that experiments are either made under anæsthetics, or that where they are not—as in the bacteriological experiments now being conducted on so large a scale—the operation of introducing poisonous matter into the circulation is as trifling as a pin-prick. Both these statements are true, but they do not dispose of the matter. In the first class of experiments, that to which the word “vivisectional” is properly applied, there arises the question, What becomes of the animal when the effects of the anæsthetic have passed away?—and the answers to this question are not always reassuring. In the second class, which at the present time is far the more numerous, what has to be thought about is not the operation, but the inevitable discomfort and distress of death by poisoning.

But again it is claimed that medical men and men of science are for the most part humane men, and that humane men will not do or sanction inhumane things. The first of these propositions may be freely granted by those who demur to the second; and the only remark that need be made upon it is that laws, and the moral censures that have the force of law, are intended not for the majority who do right, but for the minority who do wrong.

But the second proposition is far more doubtful. If any one lesson is taught more clearly than another by the history of civilization, it is that humane men have not seldom done, and much more frequently connived at the doing of, extremely cruel things. Those who think that the officials of the Spanish Inquisition were all of them, or even most of them, men of cruel disposition have read their history to little purpose. The most eloquent among the denouncers of slavery, the authoress of *Uncle Tom's Cabin*, freely acknowledges many of the owners of slaves to have been kind and generous. A hundred years hence it will be surprising to Englishmen of the upper classes to read that their grandfathers and grandmothers rode after wild animals, the breeding of which had been carefully encouraged, and which were destined to be torn in pieces by dogs. But what a libel it would be on English country gentlemen of the present day to stigmatize them as cruel men! The attitude of Yorkshire and Lancashire manufacturers fifty years ago when the horrors of the factory system were first revealed, the attitude of kind-hearted

clergymen at the present moment who look with equanimity at the transmission of Maxim guns to Uganda, are analogous cases. In none of these instances can we infer the humanity of the things done from the humanity of those who do them.

The amazing inconsistency of opinion in this matter might lead us to despair of finding a definite standard of right and wrong. But ethic, the science that guides individual conduct, presupposes a broader and less complex science—that of the social organism. The social state into which each one of us is born governs our judgments, and leaves the strongest but a limited margin of independence. It follows that, as the social state develops, our ethical judgments will be changed also; not capriciously, but in accordance with definite though obscure laws. It follows also that, as the ties that bind together each part of the social organism are even more subtle and far-reaching than those that correlate the organs of any plant or animal, no special profession or guild in a community is entitled to look upon its own actions as things apart. Their effect on the whole must be taken into account by those who wish to act rightly. Men of science, who exercise already considerable influence on society, and who some day, when their conception of science has become wider, will exercise much more, are responsible like other citizens, and even more than they, for the influence of their actions on the general standard of ethical practice. To be conscious of pure motives in themselves is not quite enough. They have to think whether what they do is likely to "cause their brother to offend." The standard of humanity to animals in England, though possibly higher than in some southern countries, is confessedly far lower than it should be. It is for the leading spirits of each generation to see that, so far as they are concerned, it is made higher. That scandalous atrocities have been perpetrated in certain physiological laboratories of the Continent few will be so bold as to deny. Why is it less important or less reasonable to guard against the importation of cruelty than against the importation of cholera?

That the views here expressed, if generally adopted, would be restrictive, though by no means absolutely prohibitive, of experiments on living animals is, of course, obvious. Those who share them will do well to admit frankly that some loss to biological science may result from the restriction, even though the loss may be more than compensated in other ways. In the medical schools of Alexandria of the third century B.C. it was the practice to experiment on living criminals. The higher ethic introduced by the Roman Stoics had made this procedure impossible by the time of

Galen. Henceforth experiment was restricted to animals lower than man, and was loaded with all the scientific disadvantages arising from their lower nervous organization. It is impossible to say that the altered standard may not have retarded discovery. But who has dared to doubt as to the balance of loss and gain?

In the case before us it seems highly probable that what loss there may be in one direction will be made up for by gain in other ways, biological as well as ethical. A wide field, for instance, lies open for scientific research in the psychological study of living animals as throwing light upon the functions of the brain in man. Georges Leroy in the last century, Gall, Comte, Darwin, Romanes, in the present century, have sufficiently worked this field to show the rich harvest of discovery that awaits future explorers. But the first condition of discovery is the loving sympathy with animals which alone can sustain the higher faculties, whether of the observed or of the observer, in continuous action.

It has been said already that no pretence is made, either in this or the foregoing paper, of offering a final or complete solution of a very difficult question. The general consensus of educated opinion that the difficulty exists would be of itself an important step in advance. The two combatant parties, to each of whom the other seems hopelessly in the wrong, are not likely to listen very patiently. But there is an increasing number who see that there are two sides to the question; and it is these, and not those, who will decide the issue. That there should be a strong check, moral if not legal, on physiological experiments made by unqualified persons will be generally agreed. This is already a recognition that the biological and the physical laboratory are two widely different things; since most people would follow Faraday in encouraging a boy who had a bent that way to experiment on inorganic matter, however ignorantly.

Here, then, is a point of departure; and though, in discussing the nature and degree of the checks to be imposed, there will for a long time to come be divergence, yet practical concurrence on many points may be reasonably looked for. It is much that a Report should have been signed by men so far apart as Professor Huxley and Mr. Richard Hutton, recommending the "legal recognition of the claims of the lower animals to be treated with humanity, and the right of the community to be assured that this claim shall not be forgotten."

CHAPTER II
PSYCHOLOGY¹

I
THOUGHT AND FEELING²

SIR ISAAC NEWTON'S words have been very often quoted that in our search for knowledge we were like little children picking up a few shells upon the seashore. Well, it seems clear that we have something else to do than to pick up shells upon the shore. We have to build a house somewhere with firm foundations: we have to till the land, and sow it, and gather in the harvest; we have to navigate the sea, and seek for merchandise on the other side. If the mathematics and mechanics of Leibnitz and Newton had been a mere intellectual amusement like chess playing, it would not have brought immortality to their names. As it was, their discoveries were felt by the authors of them, and by those who followed and accepted them, to be connected with a vast revolution in the history of mankind. We who look back upon them after two hundred years can see how intimately they are bound up with the vast change that is bringing mankind from the state of war to the state of peaceful industry, from the conceptions of theology to those of science.

Newton, Kepler, Copernicus, like the Greek geometers, whose work they continued and carried forward, were driven by a force greater than themselves to concentrate their thoughts on certain problems to the rejection of others. They were not working for any object of immediate utility, but they were endeavouring to make the world of man, that infinitely small part of the universe which surrounds man, more intelligible to him, so that he might the better act upon it. They were not working for their own

¹ It will be noticed that the psychological papers in Part I have been placed under the separate heading of "Psychology." This has been done mainly for the reader's convenience, the grouping adopted here not being intended as a facsimile of Comte's classification of the higher sciences.—ED.

² A posthumous paper.—ED.

generation. But they were serving the permanent interests of Humanity.

Now what is true of philosophers and men of science, that, under pain of utter failure and waste of effort, they must have some compass to guide their thoughts, some principle of choice, is equally true of every grown-up man and woman each in his or her own sphere. It is one of the elementary laws of mental health that we should attend to one thing at a time. Of the myriad impressions that are rushing in vast streams through the floodgates of the senses, any one of which may reproduce itself at any moment in the memory, there must be some one which at any given time is dominant, and to which all the others are subordinate. We see the need of this by what happens when our mind is relaxed without being utterly passive, as in the case of dreaming. Crowds of impressions pass fortuitously through the mind, joining themselves to one another in an utterly haphazard and fantastic way. In inflammation of the brain, in the temporary insanity following on poisoning with alcohol, we see the same thing. Impressions register themselves in confused crowds, no one of them being central and dominant. They are not brought to a focus at any one point. These facts of disease illustrate the state of health. It is a law of mental health that one impression should dominate over the rest at each particular moment, and should be dwelt upon to the exclusion of the rest. We may call this the Law of Attention.

What brings about this dominance of one impression over the rest?

This law brings us to another part of the subject. Man's reason, mind, intellect, thinking faculty, is not a thing by itself; it has no independent existence. Philosophers for many centuries have talked and disputed as though what they call *Mind*, the rational or thinking functions, were something that could be separated from the man and looked at apart. But this way of looking at the matter becomes impossible under the light thrown on it by the science of biology. The process of observing and thinking is now recognized as one of the functions of the brain; not of the whole brain, but of one of the group of organs of which the brain consists, and which, while distinct, are intimately bound up with one another. Supposing, what at present seems the likeliest supposition, that the intellectual functions of the brain reside in the convolutions of what is called its frontal lobe, we may say then that these functions cannot go on harmoniously and healthily

except under the influence of some strong stimulus from that part of the brain appropriated to emotion and desire.

Agir par affection, et penser pour agir.¹

We act under impulse: between impulse and act comes thought. Here we have the whole process of brain action set before us in seven words. They contain more truth than seven hundred volumes of philosophical discussion on the attributes of the human mind.

Take the teaching of comparative biology, and glance for a moment at the mental working of any animal familiar to us—a cat or a dog, for instance. In the cat watching for hours till the bird or mouse comes near enough for her silent spring—in the dog's persevering search for some object of his master that has been lost—we have instances of perfectly healthy working of the animal's mind. Sounds, sights, odours innumerable pass over the senses of the animal utterly unheeded. One idea, one impression reproduced in memory is absolutely despotic over all the rest; the idea of the prey to be caught, or of the object to be found. Animals of every species display perfect sanity in doing the particular kind of work that belongs to them. The higher animals show intellectual capacity of a very high order. A fox maintaining himself and his family in a settled country has to pit his wits against those of man, to steer his course amidst rocks and quicksands of every possible kind. His brain is a rich storehouse of impressions of odours and sounds and visions, each of which has its meaning for him; one image, that of the desired prey, dominating all the rest and keeping them in perfect subordination.

In the animal and in the primitive savage the Intellect is the slave of the Emotions. Every sensation, every thought is wholly subservient to the desire of obtaining food for the family or tribe. As the social state grows, as wealth becomes stored up, there are hours in the day or week not wholly taken up with the satisfaction of animal desires: there are sports, dances, ceremonies, rituals, religions. A priestly class arises wholly absorbed in the collective life of the tribe, in the service of the tribal gods; that is, in ideal conceptions of the life of the tribe in the Past and in the Future. These priests lay down precepts and rituals, and establish a discipline of life. So that this higher life of leisure, the thoughts that are not wholly absorbed in getting food and drink, are kept

¹ Comte, *Catéchisme Positiviste*. "Act from affection, and think in order to act."—ED.

in check by a dominant purpose. There is a ruling image, that of the god to be appeased, or of the ancestor to be worshipped. There is mental health, because the thoughts of the tribe are all concentrated on a common object of worship. They bow down before a higher Power which sways their whole lives. The caprices of lust and desire are kept in stern check. There is a discipline of life, and therefore a control of the mind's wanderings. Still, the mental health is imperfect, because the intellect is in bondage to the heart, rather than doing free service.

I will not follow out the history of religion, with its long series of changes; times of growth alternating with times of decay. But it is needful to see that health of mind cannot be looked at apart from health of character and health of the whole social environment. The mind, the reason, the speculative function is not something that can be isolated from the rest of life. On this point there are curious illusions. Pure speculation, pursued by itself and for itself, can only land us in utter scepticism or in utter incoherence. Imagine that one half the world good-naturedly consented to maintain the other while it was investigating what are called the laws of the universe. Suppose each observer set to watch a single star. But there are more stars in the sky than there are human beings on this planet. And when all of them were watched and chronicled the word *all* would still mean that tiny fragment of the whole which our senses fortified by telescopes and photographic machinery can reach. The universe remains outside. Wearied with thus draining the ocean with a sieve, we may well revert to those who ask us, Does the universe exist at all? I venture to assert that if the question much agitated by metaphysicians, What is the foundation of belief? be probed to the bottom it will be found that we must take refuge in the first clause of our triple formula.¹ Love is the principle. Thought is governed and controlled by desire; desire which at first is fixed on the narrowest interests of self, and which, growing as we grow, gradually reaches to the widest interests of Humanity. Apart from those interests in the past, present, and future we are floating on a shoreless sea. We have no anchorage for belief.

¹ *I.e.*, Comte's religious formula: Love for Principle; Order for Basis; Progress for End.—ED.

II

MENTAL HEALTH¹

I MEAN by mental health the state of mind in which we are most likely to see the truth and to catch hold of it. It is surely not needful to spend words in proving that this is a weighty and important matter. It may be thought perhaps that seeking the truth forms for most of us a very small part of our lives. Most men spend the greater part of each four and twenty hours in eating, drinking, sleeping, and in earning food for the morrow by hard work. So that some may suppose that search for truth is the occupation of a few philosophers whose parents or ancestors have left them money enough to dispense them from the trouble of working for a livelihood.

But let us begin farther back and lower down. To eat, to drink, to sleep may not need any effort of the wits. The most helpless idiots can swallow food if food be placed in their mouths. Perfectly idle rich people are in this condition; and they, too, tend to become witless if they go on in the same way for generations, like certain species of ants described by Lubbock who need another species of ants to do every office of life for them, and who starve without their help. But most men, like most animals, have to work hard for their food. This hard work implies two things: the wolf or fox must run hard and far to overtake his prey, must strike hard to kill it when overtaken; this is one thing. But also the animal must hear and smell with exquisite delicacy in order to find it. So the workman must see straight and aim right. The sailor must see land very far off. The signalman must know the colour of lamps. In other words, they must be sensitive to visual, auditory, olfactory appearances. And this depends on physical and mental health.

Observe the rarity of perfect health. If all marksmen had perfect health of brain and muscle, all would hit their mark. Yet one in a thousand wins the prize after years of struggling for it. Therefore, in this most rudimentary form of perfect health, seeing straight, most men fall far below the standard of health. Are they better in hearing? Take an instance. A child of precocious musical talent of seven years old was taken by his father to play in a friend's house. He had left his own violin at home, and at

¹ A posthumous paper.—ED.

the first bar he played on the one given to him he said, "Father, this fiddle is tuned a quarter of a tone higher than mine at home." His father and friend were astonished. They were accomplished musicians, one of them a celebrated composer; and they were wholly incapable themselves of appreciating by mere memory the distinction between the two violins, both, of course, perfectly tuned, but one tuned a quarter of a tone higher than the other. On sending for the instrument, however, it turned out that the child was right. That child was Mozart, compared with whom probably every other human being then in the world had an imperfect ear for tune. Yet observe, even for Mozart there are ranges of vibrations, perceptible possibly by bird or insect, to which he would be deaf.

Take, again, the sense of smell. Compare the poor, blunted olfactory sense of civilized man with that of a trained retriever or of a Red Indian. Let us see, then, where we are landed. It would seem that in this humblest department of mental health the whole human race is in the condition of partial paralysis—all of us belong to the halt, the maimed, the cripples. Note also that the very fact of our being able to point to such wonderful distinctions in the fineness of sense between one being and another carries us on a great way farther. It enables us to imagine the possibility of vast regions, undiscovered worlds of sensations of which we poor mortals remain, and must ever remain, as utterly ignorant as the inhabitants of a planet in which everyone was blind would be ignorant that there were any stars in the sky.

Yet, hopelessly imperfect as our senses are, it is on them that we depend for such knowledge as we have. It was long ago said by old Greek thinkers, and it was repeated by the philosophers of the Middle Ages: There is nothing to be found in the mind which is not first found in the senses. The senses, it was long ago seen, supply the raw material of all knowledge. Leibnitz, and Kant after him, have something more to say on this matter. But it needs no metaphysician to tell us that the senses are the gateways of knowledge. John Bunyan, in his admirable allegory of the Town of Mansoul, describes the five gates of that town, Eye gate, Ear gate, Nose gate, and the rest. One of these gates may be blocked, and provisions may enter in through another, and may work round by tortuous streets and lanes of that town to the same central market-place. Nay, two senses may be destroyed. A child may be born deaf and born blind also, as Laura Bridgman, and yet through the sense of touch and the sense of muscular resistance

such material of knowledge may flow in as shall issue in perfect fellowship with the human race in thoughts and feelings. But imagine a child born blind, deaf, without the sense of smell or taste or touch or of muscular resistance, such a child must remain with any mental capacities it may have as hopelessly dormant as a seed buried with an Egyptian mummy thousands of years ago.

You find nothing in the mind which you do not first find in the sense. This was the old saying, to which Leibnitz replied, "*Except the mind itself.*" And some half-century after Leibnitz the second of the great German thinkers, Kant, made his celebrated attempt to ascertain what it was which the mind itself contributed, apart from the mass of material coming in through the gates of the senses.

This is not the place to speak of Kant's philosophy, even in the most cursory and superficial outline. But so much at least has become common property of all people who think at all about the matter since his time. What we call knowledge is a compound in which we have to distinguish two factors: the raw material supplied through the senses, the appearances, visual, auditory, muscular, etc., or, to use the Greek word, now quite naturalized in modern speech, the phenomena, which the eye, the ear, the touch, and the sense of muscular effort supply; and, on the other hand, the building up of this material by the mind itself. Kant went so far as to say that the necessity of conceiving that things take place at a particular time or in a particular place was due to the structure of the mind; that time and space were forms of the mind. Be this as it may, the essential point for us to realize is the two-fold aspect of every judgment or act of knowing performed by man; the *objective* element coming from the senses, the *subjective* due to the mind itself. Suppose two persons coming into a room the temperature of which is at sixty degrees Fahrenheit. One of the two comes from an overheated inner chamber, and says this room is cold; the other, entering from frosty air outside, says this room is hot. In each case the subjective condition of the observer modified the judgment. In this particular instance the sense of sight, being afterwards appealed to, gave information from the thermometer correcting the very imperfect sense of heat-perception, so that a better judgment was soon formed. But it may serve as an illustration of the two aspects, subjective and objective, in every fact of knowledge.

Comte has thrown a flood of light upon Kant's great discovery by pointing out that knowing is like every other fact of life; it depends on action and reaction between the organism and the

environment. And here we are brought at once to our special subject. As bodily health consists in the due adjustment of organism to environment, the healthy lungs breathing pure air, healthy digestive organs assimilating wholesome food, sound limbs doing work hard enough and not too hard for them, so should it be with mental health. The appearances, phenomena, of the outer world must be truly presented through the channel of the senses; the mind must react on these appearances soundly, and build them up into the perception of an object on which judgment can be formed. There goes a great deal of mental work to the perception of any object in the world around us. It seems a simple thing when one is walking in a field to say, I see a tree or a house. But let the environment be changed, let the clear air become semi-opaque fog, and the complexity of the process becomes evident. Colour is gone; there are certain darker tints in the universal grey around us; there is nothing to measure distance by; we have to walk to the object to know how many of our paces must be measured till we can touch it. We may make conjecture after conjecture as we go on, always following the universal law that governs our mental workings, that we make the simplest hypothesis that serves to put together all the facts we have got. We find out at last whether what is before us is a house, a tree, a rock, or a haystack; but it often takes a long time. In clear daylight we go through the same processes; but we go through them with such rapidity, owing to long experience, that we are not conscious of them. In the case of men who have been born blind and who have gained the power of sight after they have grown up, the process of interpreting the sensations of sight, of reconciling them with those of touch and of muscular resistance, and of building them up into the perception of an object, is a long and troublesome one.

Now this adjustment of the inner to the outer, of organism to environment, is just what is disturbed in disease. Disease of mind, like disease of body, is nothing but the ordinary healthy process carried on with too great, or with too little, intensity. When Don Quixote saw a large, lofty object with long appendages waving swiftly through the air, the impressions made on his retina were just the same as those made on any other passer-by; but the mode of building them up by the mind, of piecing them together, of interpreting their meaning as a whole, was different. What others recognized as a windmill he interpreted as a giant madly whirling his arms through the air. Each new phenomenon was twisted into agreement with the pre-existing hypothesis. So

again, when the wine-skins were recognized as slumbering giants, and attacked with his good sword, the red gush of wine that issued was fresh proof to him of their giant-nature. And if the truth was forced upon him by the passive brain and shrewd perceptions of Sancho, still the preconceived view was further complicated to meet the new facts. Thus, when he was forced to recognize Mambrino's helmet to be a barber's basin, it was a malignant magician who had thus transformed it, to bring ridicule upon his profession of knight-errantry. By the machinery of magicians he was thus always able to make any sort of facts whatever square with his preconceived theory.

With Don Quixote's morbidly active brain contrast the morbidly passive intelligence of Sancho. Eyes, ears, senses of touch and taste—these were keen enough. But his ideas he is perfectly satisfied to take on trust from those about him. That Don Quixote is a knight-errant, that his business is to go about the world redressing grievances and saving distressed maidens—all this he accepts quite readily. But nothing can make him take a barber's basin for a helmet, or a flock of sheep for an army of infidels, or a wine-skin or a windmill for a giant. When put on his judge's bench in Barataria he will give many a shrewd judgment as to what passes under his eye. But he is perfectly satisfied to believe on hearsay that Barataria is an island, and that he is the Governor of it.

It was Comte, I believe, who first pointed out that in the mental states of these two men we have the two factors of mental health presented in this isolated, one-sided way, with all the life-giving, dramatizing power of Cervantes' genius.¹ The two together make up a sane man.

III

AIDS TO MENTAL HEALTH²

How are we to attain mental health and to preserve it? How are we to get what the French call *justesse d'esprit*, the power of seeing

¹ The same contrast is brought out, without ever passing the limits of sanity, in Fielding's *Tom Jones*, between Squire Western and his sister. "The brother never foresaw anything at a distance, but was most sagacious in immediately seeing everything the moment it had happened; (so) the sister eternally foresaw at a distance, but was not so quick-sighted to objects before her eyes."

² A posthumous paper.—ED.

straight, of looking the difficult problems of life fairly in the face, and of forming sound judgments on them? We are helped in this by some of the great thinkers in the world, who have put forward what may be fairly called Manuals of Mental Hygiene.

The first of these is Bacon: and the manual I speak of is to be found in the opening pages of his *Novum Organum*. He describes there four different kinds of bias which are likely to lead the mind astray. He calls them idols, fictitious likenesses of Truth, which lead men aside from the worship of the Truth itself. These false gods are as follows:—

1. *Idols of the tribe*: false tendencies belonging to the whole race of mankind: as when we are apt to take man's thinking and seeing faculty as the measure of truth: imagining we know something of the universe because we know something of the way in which the universe acts upon ourselves.

2. *Idols of the den*. Each one of us has his own separate twist impelling him to take too sanguine or too depressed a view of the matter in hand; to make bold conjectures, or to make no conjectures at all.

3. *Idols of the market*. We are the slaves of words; we take the common coinage by which ideas are passed from man to man for the ideas themselves. They are often but paper money. It needs but a short glance at the history of our race to tell us what havoc the worship of words has wrought. Take as an instance the glib way in which men talk of "Laws of Nature" as of something really existing outside us and independently of us; instead of taking them for what they are, perceptions of general facts, modified and limited by the imperfections of our thinking faculty. Every leading article, every political speech, is full of these idols. "Rights of Man," "Freedom," "Progress," all of these are coins in common circulation containing a good deal of base metal, and furnishing us with very good reasons for doing the thing we happen to wish to do at the time. Probably no one idol of the market has received so much of this mistaken homage as the word *Religion*. That word, which should mean the state of readiness to devote every faculty to the highest good known to us, has been twisted and distorted to mean adherence to this or that doctrine or symbol of Mohammed, or Jesus, or Auguste Comte, and has become not seldom the source of bitter hatred and strife, instead of union.

4. Lastly, there are the *idols of the theatre*: the fallacies

flowing from an elaborate system of thought which hangs together well, and of which we are apt to think that it embraces and explains all truth, and that outside of it is no salvation. It is thus that in Bacon's time everything was thought to be explained by the principles of Aristotle's philosophy. Because Aristotle had said that the most perfect kind of motion was motion in a circle, therefore Kepler was not likely to be right when he maintained that the planets moved in ellipses. Some of us Positivists have erred in the same way.

From all these *Idols* Bacon urged men to turn away, and look steadily and patiently at the facts themselves. Of course this is a Utopia of his. We cannot each one of us rebuild philosophy from the foundations: we must accept systems, we must take much on trust, we must use the words of our mother-tongue to interchange our thoughts. Still we may profit by the vigorous warning he has given us to look straight at the facts, to get our knowledge as far as we can fresh from the fountain-head. These few pages of Bacon's book are a Manual of Mental Hygiene.

I will now speak of another such manual, written rather for his own use than for the world, by a still greater thinker than Bacon—Descartes. His *Discourse on the Method of Guiding Reason in the Search for Truth* tells a very clear and distinct story of the sort of gymnastic training through which he made his mind pass before undertaking the gigantic work which he set himself to do, that of building up from the foundations a system of Philosophy based on Science. His first process was to go through a long period of close intercourse with practical men of the world: soldiers, statesmen, men of business and others. He had found that in the metaphysical discussions of the schools men allowed their reason to wander here and there in the most fantastic way; but on matters where their personal interests were concerned, on things which they had at heart, he saw that men observed accurately and reasoned soundly. Therefore he spent several years in travel, following the armies on either side in the Thirty Years' War that was then waging, watching the way in which men thought and acted in critical moments of life, and thus living in an atmosphere of mental soundness.

I pass over the special precepts as to reasoning which he laid down for his own guidance, namely:—

1. To insist that every proposition which he accepted should be conceived with perfect clearness, so that there could be no mistake as to its falsity or truth.

2. To divide every problem into as many parts as possible, taking up each distinctly.

3. To maintain orderly arrangement of thoughts, beginning with the simplest and passing to the more complex.

4. Carefully to review all the divisions of the problem, so as to make sure that none was omitted.

I pass to the rules of practical conduct to which he bound himself. He was reconstructing the whole theory of life, divesting himself as far as possible of every preconceived opinion. While the old edifice was being demolished it was needful, he says, to build himself some temporary shelter, like the sheds builders use when a great building is in progress.

His first rule was to conform to the religious and social beliefs of his country, following the views of the most sensible and moderate men among his acquaintance.

His second was to be firm and resolute in action; and, having once decided which among many doubtful judgments was the least doubtful and uncertain, to follow it and act on it steadily as though it were perfectly established. When lost in a wood follow one straight path, he says; it may not take you the way you wish to go, but at last it will take you out of the wood, whereas vacillation will keep you circling about there eternally.

His third rule was the rule of renouncement: never to wish for things that were not within his power. Thoughts were within his power, things for the most part were not. The first were to be governed, the second let alone.

Now, in all this mental hygiene two things seem especially noteworthy. First, the sense of fellowship with men, the respect for that sense which all men have in common, and which men act on unconsciously everywhere; and the dependence of mental health on a calm, collected, strenuous condition of character. Very far from Descartes was that conception of mind as something solitary, disconnected, which could work by itself apart from the rest of our nature. And if the sense of fellowship with men was necessary for him, how much more for the mass of mankind, for whom the attempt to pull down the structure of belief in which they found themselves, and build another in its place, would have been the wildest delirium!

I come lastly to a third Manual of Mental Hygiene, left unfortunately by its author in such a condensed form as to need careful deciphering; I mean the *First Philosophy* of Auguste Comte.¹

¹ See the *Pos. Pol.*, vol. iv, pp. 154-65; also Laffitte's *Cours de Philosophie Première*, 2 vols., 1839-94.—ED.

The first law is that of forming the simplest hypothesis. Our knowledge is not absolute, but conjectured. We form, when in a state of mental health, the simplest hypothesis that the facts at our disposal admit of. When diseased either by selfish passion, or any other disturbance of reason, we twist the facts into accordance with prejudice, explaining, for instance, our friend's actions by all kinds of crooked and malicious motives, instead of by the simplest, which commonly are the most favourable.

Secondly, our judgments are compound results in which the two factors are impressions from without, and our own mental structure reacting on those impressions. Mental health consists in the right adjustment of these two factors. But the right adjustment is not the same in all ages of the world. In the earlier ages of mankind the inner working of mental organizations is more capricious, arbitrary, fantastic. In the later and adult stage of man it becomes gradually subordinate to a third law, which is that all the facts of life tend to arrange themselves in a definite way, and to follow in orderly sequence. This great fact of the universal prevalence of law we only discover after many centuries of difficult search, and till it has been universally grasped, the right degree of adjustment of the inner to the outer, the subordination of our thoughts to the order of the world is not possible. A temporary adjustment is made by subordination to imaginary beings of like passions with ourselves, but more potent.

Now, in devising practical rules for mental health it is evident that, like all other rules of practical medicine, they must vary with the varieties of individual temperament. In a previous paper¹ I have spoken of the two great types of mental unsoundness: that in which the mind is unnaturally active, in a state of morbid excitement; and that in which it is abnormally inert and sluggish, swayed helplessly by the impressions of sense. We may call the first the insanity of excitement; the second the insanity of stupidity. Don Quixote typifies the first; Sancho Panza the second. Bear in mind the great law which Comte attributed to Broussais—namely, that states of disease are simply states of health improperly intensified or improperly relaxed. Preventive mental medicine, the hygiene of mind, will devote itself, therefore, to these two tendencies, the degree of which differs in each individual.

Mental hygiene is then practically education of the mind. There are two agencies of which it disposes: art and science. Broadly

¹ The preceding paper on "Mental Health."—ED.

speaking, art stirs up the inner workings of the mind, science promotes the subordination of the mind to the outward order. It would seem, therefore, that both agencies are needed. Art acts by increasing our power of calling up and arranging images under the influence of emotions. A child has a confused memory of some favourite animal or house or tree—the draftsman or modeller teaches him how to render that confused image definite and distinct by the use of line and shade and colour, by carved wood or moulded clay. The musician calls up a definite train of emotion by a succession of harmonies following in proper rhythm. The poet combines images of eye and ear by calling up visions of men and deeds of long ago in words musically chosen. So that the immediate operation of all effective art is to set men free from the flood of impressions streaming in through the senses, and to lift them into a world of memories and of ideals. Man is a creature of large discourse looking before and after. Art enlarges the discourse and intensifies the vision. Science, on the other hand, inspires resignation, and gives confidence and precision to action. Whirled helplessly onwards in the machinery of the solar system, our days and nights and years are appointed for us. We cannot leap from off our shadow, we cannot by taking thought add one cubit to our stature. All we can do is wisely to guide our action in accordance with these resistless laws. Resignation brings resolution. We steer fearlessly across the ocean, believing in the laws of astronomy; we work onwards for the Religion of Humanity, believing in the laws of social evolution.

Now, it is to be noted that in the scheme of life and education put forward by Comte, art and science are carefully and elaborately intertwined. From seven to fourteen the child's teaching is almost entirely artistic and poetic. Manual dexterity, the fine sense of touch and muscular adjustment, is to be encouraged in every way both by games and school-work. Of music and singing I need not speak. Comte's prophecy that singing and drawing would soon become as natural and common as reading and writing, utterly visionary as it seemed in Comte's time, is steadily approaching fulfilment. With all this the imagination is to be vigorously trained. Fables, ballads of the home, ballads of the nation, ballads of the noblest sons and daughters of Humanity in every nation, and in more languages than one—such will be the child's mental nourishment.

Then, and not till then, in later youth, comes the stern mental training that is to fit the young man and the young woman for firm

and serious handling of the problems of life. Mathematics, implanting the senses of clearness, of certainty, of resignation to irresistible destiny. Physics, training the powers of observation and induction and mapping out for us the future field of practical work. And, finally, ethics, the science of human nature and conduct; beginning with man the first of the animals, and closing with man the creature and the servant of Humanity.

In this scheme of mental hygiene the study of man is the centre and the summit of the whole; the study of the calculus and of external nature serving simply as the preamble. There will always be all kinds of special scientific studies just as there are now, connected with the various pursuits of life; researches connected with engineering, with telegraphy, with chemical work, and so on. But these will be for special classes of men and special occupations. In the scheme which is to call out the full powers of the citizen the study of man's nature and man's duty must hold the central place.

I defined mental health as the state in which we were likeliest to see the truth and lay hold of it. Waiving all sentiment, and looking simply to the actual facts of the case, I believe that the last word of philosophy upon the matter is this, that without human fellowship there can be no real certainty at all. Isolate me in thought, word, and deed from my fellow men, and why should I believe any single proposition whatsoever? The objects round me—men, animals, houses, trees; what are they but phantasms, groups of appearances, some more fleeting, some more constant? My own existence—why should I believe in that? It may be a dream like the rest. "Pure reason" leads not where Kant thought, but where Hume thought it led—to pure scepticism. Doubt of everything; doubt far transcending the doubt of Descartes or of Kant; doubt of all existence, whether of mind or matter. Hume the sceptic was also Hume the builder. He laid the two foundation-stones on which Comte built afterwards: the fact of belief, the fact of love. We believe, said Hume; whether with or without ground, the fact is that *we believe*. And the fact is also that *we love*, without hope of reward. Hume did not put these two facts together. But Comte did.

Love, said Comte, is the principle; this is no mere gush of amiable sentiment; but when we probe the matter deeply we shall find there is really no meaning, no coherence in philosophy, otherwise. For if not, then see the consequence. Assume for a moment the standpoint of one of the ordinary scientists of our time. To him there is no hierarchy of the sciences, no subordination of one

to another. Scientific pursuits stand precisely on the same level. Whether we count the loose stones on the moon's surface, or work out the velocity of every asteroid, or the spectroscopic facts of every one of the million stars known to us, or solve every problem in the theory of numbers, it is all science, therefore all alike valuable. Say rather as Solomon said of old, or as Faust says to us now, all alike valueless, vanity of vanities. It is sublime to stand isolated in the universe and speculate? For a being within finite power this would mean mere idiocy, as though a child stood gazing at a toy of his own creation. For a being with finite powers it is a thing miserably futile, since the whole sphere of his thought, be it wide as Newton's or narrow as an Australian Black's, when compared with infinity is infinitely small. Intellect without love is therefore void of meaning. But intellect in the service of Humanity—whether it be Archimedes measuring the sphere or a mother nursing her sick child, matters not—is ennobled and redeemed.

IV

COMTE'S PSYCHOLOGY

WE are told that the Education Department are propounding psychology as a subject with which teachers in elementary schools should be conversant. On this subject a remarkable letter appeared in the *Times* of May 26¹ from Mr. Thomas Case, a well-known Oxford professor, to the effect that, having himself studied this subject and lectured upon it for thirty years, he was unable to indicate any tangible results that would be of the slightest use to Board-school teachers. Whatever may be thought of Mr. Case's view, it serves as a fresh and forcible illustration of the danger of entrusting important educational problems to a Government department. Government, in the ordinary official sense of the word, is wholly incompetent to deal with questions of this kind. They belong to the spiritual, not the temporal sphere, and separation of these spheres is of the very essence of sound politics. Under the spiritual sphere are included not merely, not even principally, theological and ecclesiastical affairs, but all that relates to the guidance of man's spirit, whether in religion, in philosophy, in science, or in art. With such a question as the expediency of

¹ 1899

teaching psychology to children or the teachers of children the State has, in any healthy condition of society, nothing whatever to do, any more than it has to do with the question whether Weismann's theory of evolution is superior to Darwin's or to Spencer's, or whether Catholics or Positivists have the sounder social and ethical system.

On the subject of psychology it is thought by many that the Positive Philosophy breaks down. In Comte's classification of the sciences he leaves, it is said, no place for it. He fails, say his opponents, to deal with the structure and functions of the human mind. Now, if this charge were true, it would be fatal. A philosophy of any kind in which the highest functions of man were not considered would be the play of *Hamlet* with the part of the Prince left out. And especially would this be true of the Positive Philosophy, the fundamental principle of which is that man is the central object of study, the final goal of research. That man is mankind's proper study is the chief distinction of that philosophy, on the one hand, from theological philosophy as represented by Aquinas, in which the central object of study is God; and, on the other, from the Cosmic evolutionists, who attempt to show how the universe came into being.

If psychology be defined, as its etymology would lead us to define it, as the scientific study of the *psyché*—that is to say, of the moral and mental activities of man, and of the animals more or less resembling man—it is the central field of Positive research. But the word is often understood in a more restricted sense than this; and also the methods of study are, in many cases, of a kind not likely to lead to any definite issue. The restriction consists in concentrating attention on the intellectual activities of man, to the complete exclusion in some cases, and in other cases to the entire subordination, of his moral or emotional activities. And, secondly, the method upon which reliance is principally based is that of "interrogating consciousness." The investigator is supposed to observe the phenomena of consciousness while they are going on. To the validity of this method Comte raised strong objections. As Mr. Spencer remarks: "The mere act of observing the current phenomena of consciousness introduces a new element into consciousness which tends to disturb the processes going on. The observations should be oblique rather than direct; should be made not during, but immediately after, the appropriate experiences."¹

¹ *Psychology*, vol. ii, p. 249.

Comte maintained that an experience of many centuries had shown this method to be barren of result. He thought that there were more direct and fruitful ways of studying the laws of mind. But of this afterwards.

Let us return to the point first mentioned—the relative importance in man's life of thought and of emotion. Wise and practical observers of man's life and character from the earliest ages have always been aware that passions, good or bad, generous or ignoble, have always played a predominant part in determining his actions. This is one of those truths so universally familiar that its very uniformity and universality often induce us to forget it. Yet in any systematic survey of the *psyché*, of the living principle of man, this "subordination of the intellect to the heart," to use Comte's name for it, must be taken as the starting-point. Among truthful observers of man's nature, few will deny that the great poets stand foremost. Take, then, the large assemblage of human lives represented in Homer's two epics and in Shakespeare's dramas. How many of these are stirred by motives of speculative research? Once, and no more, each of these poets has told us of such a man. In Homer's *Odyssey* we have the passion of knowledge for its own sake, which in Dante's version of the story is described as overriding the most sacred ties of duty. The tragedy of *Hamlet* turns on the dislocation of intellect from its normal relation to character. These two instances apart, what of the other thousand and one? Passions, impulses, loves, hatreds, jealousies, heroisms, treacheries, customs, habits, traditions, make up the tissue of their lives. That a speculative principle, a theory, a development of reason, is at work among them always and everywhere, may be quite true; is, indeed, a truth which it is essential to recognize. The part which reason plays in human life is of vast and far-reaching consequence. But in the great majority of cases the individual man or woman has known nothing of it; and hitherto the few who have known have not been always the wiser or the happier for the knowledge. It will be otherwise, we may hope, in the future.

In the *psyché* of the higher vertebrates it is easy to see that what intellectual life they have is wholly subordinate to their emotional life. Desire for food, sexual impulses, devotion to offspring, accesses of destructive fury, are the governing forces in most of them, and stimulate the senses and the rudimentary powers of thought in ways that have been often described by naturalists, but by none so vividly as by Leroy in the admirable *Letters on*

Animals,¹ of which Comte was the first to appreciate the importance. Added to these very elementary instincts are others of a less personal kind, especially in those of the vertebrates that make some approach to the social state; such instincts as the love of power and of praise, and even the purely altruistic instinct of attachment. The two conclusions—(1) that the higher animals reason; (2) that they reason in strict subordination to emotions and desires of the kind here stated—have been long accepted by those who look straight at the facts, and who are not in bondage to the pedantry of the schools. And among those who have established them three names stand prominently forward—Leroy, Gall, and Auguste Comte. The evidence on which they rest has been gathered together in our own time by Romanes,² but, so far as I can see, no new principle has been added, though many new facts have been brought forward in support of them. Of Gall's contribution to the result much is said in the correspondence of Comte with Mill already spoken of in this *Review*.³ Comte, dissociating himself absolutely from Gall's premature attempts to localize propensities and affections in particular parts of the brain, and entirely repudiating his analysis of intellectual functions, thought nevertheless that he had rendered an immense service to the scientific study of human nature (1) by showing anatomically that the brain was not a single organ, but a congeries of organs, each with definite functions; (2) by appropriating certain regions of the brain (the cerebral hemispheres) to the higher moral and mental functions; (3) by distinguishing with a high degree of probability a large number of the elementary propensities or instincts of which human nature consists; and especially in showing that some of these instincts were not self-regarding, but altruistic. His demonstration that the impulse of unselfish love was innate in the structure of man was looked on by Comte as a discovery of equal moment with the hypothesis of the earth's double motion put forward in the sixteenth century, in spite of much evidence to the contrary, by Copernicus. As to Gall's attempt to localize these functions, it can only be regarded as one of the hypothetical devices of which the history of science is full, and which, by making it possible to think with clearness and precision about the facts under discussion, have often promoted scientific discovery.

¹ *Lettres sur les Animaux* (1762-1781). Eng. tr. in 1870. The work was placed by Comte in the last section of his Positivist Library.—ED.

² In his *Animal Intelligence and Mental Evolution in Animals*.—ED.

³ The paper alluded to will be found in Part V of this volume.—ED.

In his letters to Mill, and elsewhere, Comte speaks of the exaggerated number of elementary organs and functions defined by Gall, and of the irrational manner in which many of them were arranged. His own view at that time was that they were reducible to twelve. But in the systematic review of the subject contained in the *Positive Polity*¹ the number stands at eighteen. The distinction from Gall and Spurzheim's phrenological system lies not merely in the diminished number of cerebral organs, but in their philosophical arrangement, and in the attempt made to depict the relations of the brain with the other organs of the body. As a subjective aid to the study of human nature—in other words, as a working hypothesis—it has never been surpassed; and though it may be modified in detail as new light arises, it is not likely to be soon replaced.

In defining the elementary emotions and propensities of man help is obtained from the study of other animals. But though it is evident that they share our passions, it is less evident that they share our reason; indeed, many thinkers of all schools, from Aristotle downwards, have denied it. Even those who, like Roger Bacon, were sufficiently superior to current prejudice to assert that animals stored up experience, generalized it, and drew inferences from it, have felt, as every sane man must feel, that the intellectual gulf between the highest animals and man is enormous. Here is the region in which metaphysical imagination delights to roam. Here it is that analysis of consciousness by introspective methods, carried on by thinkers who prefer the title of psychologist to that of metaphysician, has led them on such divergent paths. "Psychology," says Mr. Case in the letter above quoted, "is a science full of unsolved problems, and of questions waiting for answers." He gives a long list of such questions: "What is mind? What is its relation to body?.....What is the origin of knowledge?" and so on, which have been discussed for tens of centuries. "There are many psychological opinions," he tells us, "with hardly any psychological knowledge."

In discussing the problem of human reason Comte followed a wholly different method. Man, he observed, alone of the higher vertebrates, has lived continuously in the social state. Reason, so far as it is peculiar to man, is the result of accumulated inheritance, not necessarily of biological inheritance—though this is highly probable—but in the first place and mainly of sociological—that

¹ Vol. i, pp. 540-93.

is to say, of historical—inheritance. The connection of reason with articulate speech has been a familiar fact since the days when Homer spoke of men as the “voice-dividers.” Italians, like the Greeks of old, use the same word for speech and reason. Now, articulate language is essentially a sociological fact, as the great Italian thinker Vico was among the first to show. Its first beginnings arise from men working together. From their collective cries arose, it is probable, the earliest names, if not for feelings yet for things, and above all for actions. The first steps in this course are all-important. These once taken, the machinery for handing down intellectual results from one generation to another grows rapidly more effective. In this way we have at a very early stage of human development the great characteristic which distinguishes human from animal intelligence, the power of recalling a feeling, a thought, or an action, and of dwelling upon it as an object of thought. Our conclusion, therefore, is that human reason, and human language its embodiment, are sociological facts, and must be studied by sociological methods.

Every organism, says Comte in the opening chapter of his *Positive Philosophy*, and every organic structure may be looked at under two aspects—statically, as fit to do certain work; dynamically, as actually working. Sometimes the one aspect is more accessible to research, and sometimes the other; both in the end must be brought into unison. Statical research, in the case of intellectual functions, consists in examination of the brain-structure with which they are connected; it is a branch of biological science. Their dynamical study consists in analysing the results of the work done. To the question, What is the origin of mind? *Positive Philosophy* returns no answer. To the question, What are the laws of mind? that philosophy answers by investigating the ways in which mind has worked. One way of approaching the investigation will be through the science of philology, when studied in the comprehensive way which Comte projected, as a branch of sociology. Another way will be by an equally comprehensive grasp of the history of science.

Let us study [Comte said] the actual path followed by the human mind when at work. Let us see what has been the procedure followed in establishing the various branches of exact knowledge which we already possess. Now this is precisely what “*Positive Philosophy*,” as conceived in this work, proposes to do. In a word, looking upon scientific theories as so many great logical facts, the thorough examination of these

facts must be our principal resource in ultimately attaining a knowledge of the laws of reason.¹

A short paper of this kind can but touch the fringe of a vast region of thought. Enough has been said to show that Comte did not neglect the subjects commonly treated of by psychologists, though he approached them by ways widely different from those that are usually followed.

V

FUNCTIONS OF THE BRAIN

1

ON this subject a book has been recently published by Dr. Bernard Hollander, who gives as his alternative title *The Revival of Phrenology*.² He claims to have established not merely that Gall was the initiator of rational exploration of the brain from the anatomical point of view, but that most, if not all, of his localizations of intellectual and moral functions are correct. In support of this last assertion he brings forward a large mass of pathological evidence; that is to say, of cases of injury or disease of the brain, observed during life and examined after death. Recent experimental researches on the brain he conceives to be in some cases valueless, in others misinterpreted. A chapter is devoted to Comte's modifications of Gall's views. These Dr. Hollander does not accept.

Those who accept Comte as their master, as the present writer does thankfully, though no blind disciple, can only rejoice at any sincere effort to restore Gall to his true position, as a discoverer in that most essential department of biology which deals with the higher functions of the animal organism. To no great name in the history of science has such systematic injustice been done, not merely during his own lifetime, but throughout nearly the whole of the nineteenth century. Perhaps his friends have injured him as much as his foes by adopting and perpetuating his mistakes. Be this as it may, Dr. Hollander has done good service by urging all who are interested in the subject—a subject embracing the whole

¹ *Phil. Pos.*, vol. i, ch. i, p. 30.

² *The Mental Functions of the Brain*, by B. Hollander, M.D. (Grant Richards; 1901.)—ED.

range of man's thoughts and emotions—to study Gall in Gall's own writings, and to leave off judging him by the misrepresentation of opponents or by the travesties of itinerant charlatans.

A few words as to Gall's position as an anatomist and as a philosophical thinker. As Dr. Hollander rightly remarks, it is very commonly misunderstood. He began life as a physician practising in Vienna, at that time the first medical school in Europe, and enjoying general esteem from the Court downwards. When the French Revolution broke out he was in the prime of early manhood. About 1794 his lectures on the brain began to alarm the clerical authorities. He left Vienna, and for the next ten or twelve years prosecuted his researches into the nervous system in Berlin and many other centres of medical study in northern Germany, in Holland, and in Switzerland, accumulating large masses of observations both on structure and on function, losing no opportunity of visiting prisons and asylums, and spending much time in studying the brains of animals. A memoir founded upon these researches was presented to the Academy of Sciences in Paris in 1808, a year after his permanent settlement in that city. In the twelve following years he was engaged in preparing and publishing his great work, entitled *Anatomy and Physiology of the Nervous System Generally, and More Especially of the Brain, with Observations as to the Possibility of Recognizing Many of the Intellectual and Moral Dispositions of Man and of Animals by the Form of their Heads*. This work was in four folio volumes, with an additional volume containing 100 engraved plates. Three years afterwards, in 1825, appeared his final work on the *Functions of the Brain*. This at least is the "running title," common to all the six volumes. But it is worth while to note that each volume has a distinct title. Thus, vol. i is entitled "On the Origin of the Moral Qualities and the Intellectual Faculties of Man, and the Conditions of their Manifestation"; vol. ii, "On the Organ of Moral Qualities and Intellectual Faculties, and on the Plurality of Cerebral Organs"; vol. iii, "Influence of the Brain on the Shape of the Skull: Difficulties and Methods of Determining the Fundamental Qualities and Faculties, and of Discovering the Position of their Organs"; vols. iv and v, "Organology, Setting Forth in Detail the Instincts, Propensities, Sentiments, and Talents; in other words, the Fundamental Moral Qualities and Intellectual Faculties of Man and Other Animals, and the Position of their Organs"; vol. vi, "Critical Review of Certain Works on the Anatomy and Physiology of the Nervous System, and Restatement of the New Theory."

With regard to this final work of Gall, it may be noted that it is in great part a restatement of what has been already said in the larger work. References are continually made to the plates of the folio edition. Having, however, had the earlier work, as well as the later, for many years in my possession, I may observe that there is very much in the later work that is new. And, as it is more accessible than the folio edition, I shall continue to refer to it. Undoubtedly the plates of the atlas should also be examined. They exhibit Gall's strength and originality as an anatomist. But his pictures of the convolutions, in which he localized moral and intellectual functions, must not be taken as scientific evidence, though Dr. Hollander often appears to accept them as such. Gall was not helped and controlled by the art of photography.

It will be seen that, of the six volumes on the *Functions of the Brain* only two are occupied with what is commonly understood by phrenology; the allocation of special instincts and faculties to special portions of the cerebral hemispheres, with the corollary that examination of the skull becomes a mode of discerning character. It cannot be too often repeated that Gall never used the word *phrenology*. The word, as used by many of the disciples who have obscured his name, implied a boast of finality which was quite alien to him. "How far I am," he wrote in the preface to his sixth volume, "from supposing the structure to be finished! I have but laid the foundations. It needs more than one man's life or one man's wealth to carry this vast work to its conclusion.....What we need is a complete collection of animal skulls, not merely of animals of different species, but also of individuals of the same species, in whom special faculties or qualities have been peculiarly prominent. We want a complete collection of animal brains, modelled in wax after nature. We want a large collection of skulls, or at least of plaster busts, of men and women distinguished for some special quality or faculty. Finally, we want far more extensive knowledge than we at present possess of the instincts, industrial aptitudes, qualities, and faculties of animals."

By far the greater part of Gall's work is devoted to the discussion of the general principles on which a truly scientific physiology of the brain should rest. He had to contend, in the first place, with metaphysical thinkers who denied the existence of distinct moral and intellectual tendencies innate in man and the higher vertebrates; who talked vaguely of the *I* or the *Me* as a mysterious impalpable entity, diffused in some unknown manner through the body, an abstraction that it was impossible to locate or attach

to any definite part—a function, or assemblage of functions, without an organ. He had, in the second place, to argue with thinkers like Condillac, who looked on the infant mind as a *tabula rasa*, formed and differentiated by impressions received through the senses of the outer world. Finally, he had to argue with anatomists whose knowledge of the structure of the brain was not much greater than that possessed by Galen, certainly very slightly superior to that of the Italian anatomists of the sixteenth century. It may be said without fear of contradiction that Gall was the first to dissect the brain rightly—that is to say, from the base upwards, and not from the upper surface of the brain downwards. Gall's method led him by a direct path to the discovery of the mode in which the grey substance of the convolutions was connected with those nervous structures at the base of the brain in which there is the least difference between man and other vertebrates. The detailed list given by Dr. Hollander of Gall's special discoveries in this department, though perhaps slightly exaggerated, is of great interest and value.

It would be wrong, however, to represent anatomical research as Gall's principal method of discovery. In the science of life we have to correlate structure with activity. Given the function, we have to find the organ, or inversely. Generally, though not always, the study of function comes first. And at any rate this was the case with Gall. In the introduction to his final work¹ he tells us that he was impressed from childhood by the diversity of character in members of his own family, all brought up under the same circumstances. Passing from home to school, he remarked that schoolfellows of the same age and size, of similar social position, and undergoing the same mental discipline, differed widely in intellect and character. There were brave boys and cowards, false and true, studious and indolent. Some learnt their school tasks well and easily; others hated books, but had a keen eye for the ways of birds and insects. He saw, further, that these characteristics did not change easily or often. The generous, open-hearted boy of one year was generous and open-hearted in the year following. And so with other qualities, bad or good. Exceptions there might be, but on the whole the clever lad and the stupid were clever or dull to the end. Now, these observations were not very remarkable or original, it may be thought. They were not. Very many people had seen an apple fall to the ground before Newton. But Newton,

¹ Vol. i, pp. 1-20.

supposing the legend to be true, profited by his observation, and so did Gall. Gall followed his observations up with obstinate continuous questioning, carried on for a long time silently. What lies at the back of all these differences? One point had struck him very early in his career. He had remarked that boys with prominent eye-balls were very commonly distinguished for powers of verbal memory. From this remark he drew at the time no further conclusion than the surmise that other distinctive characteristics might also have some external sign connected with them. It suggested questions to be asked of Nature when the opportunity of answering them should arise.

The opportunity came when his medical studies began. His professors taught him what they knew of the structure of the nervous system. It was not much. Bell's discoveries as to the motor and sensory functions of the spinal nerves had not yet been made. Bichat's great generalizations as to the distinction between the life of nutrition and the life of relation, and as to the tissues appropriated to each, were still recent when Gall settled in Paris; as his first volume shows, he eagerly assimilated them. Of his researches into the nervous system, something has been already said. But neither from Bichat nor from anyone else could he obtain an answer to the question: What is the function of that part of the nervous system—the cerebral hemispheres—in which man most conspicuously differs from the other vertebrates? At most he could get the vague answer: The brain is the organ of mental operations. As to feelings, affections, propensities, desires, all that goes to make up the character of a man as distinct from his mental capacity, the inquirer was told to seek for the source of such things in the heart, in the lungs, in the liver, in the bowels, anywhere but in the brain. Gall's meditations on the facts he had gathered together in early youth as to the innate differences, moral no less than intellectual, between one human being and another, between one and another animal of the same species, led him to his great hypothesis that the brain was the organ of moral propensities as well as of intellectual operations, and that, as both one and the other were diverse, so distinct organs must exist for each. With the discussion of these two principles his first two volumes are occupied.

In the third volume he attacks the problem: In what way may we hope to arrive at the allocation of distinct functions to definite portions of the brain? It is commonly assumed, and Gall himself sometimes gave colour to the assumption, that he arrived at his results by the purely empirical process of inquiring whether in men

distinguished for some special tendency of mind or character any part of the cranium was prominent. But Gall was well aware of the necessity of beginning in quite a different way from this. He is most emphatic in asserting that in this inquiry the study of function must precede the study of organ. "I owe," he says, "nearly all my anatomical discoveries to my physiological and pathological conceptions."¹ Undoubtedly, he went on to say,² the study of brain structure, pursued on the comparative method—comparing, that is to say, other vertebrates with man, the infant brain with the adult, the brain of man with that of woman, the healthy brain with the diseased—might have put inquirers on the right track, if they had not been blinded by the nebulous metaphysics of the time. But though it might have suggested the true path of inquiry, there was another and a more important question which had to be answered first. It is well here to use Gall's own words³—

From the moment that I had obtained certain indications of elementary forces, moral and intellectual, other than those spoken of by philosophers, I felt the need of concentrating all my researches on the discovery and determination of those instincts, propensities, and talents that were definite in character. I was convinced that for these alone could separate organs exist, of which the position could be assigned. I was continually repeating to my friends: Point out to me the fundamental forces of the soul, and then I will undertake to find the organ of each and its position. I found the first problem surrounded by far more difficulties than the second.

How far Gall solved the second is a question reserved for another paper. What is here insisted on is that he gave precedence to the first.

Here is the field in which Gall and Comte come into contact. How greatly Comte admired Gall's work is well known to students of the *Philosophie Positive*,⁴ of the *Positive Polity*,⁵ and of the *Positivist Catechism*. A further reference may be made to the Introductory Chapter in Dr. Ingram's most valuable work, *Human Nature and Morals*, published in 1901.⁶ In Comte's *Historic Calendar* the final name commemorated is that of Gall.⁷ None the less did Comte feel that Gall's work, not on the anatomical or

¹ *Fonctions du Cerveau*, vol. iii, p. 145.

² *Ibid.*, pp. 166-67.

³ Vol. i, pp. 540-93.

⁴ For brief biographies of the 558 persons commemorated in this *Calendar* see *The New Calendar of Great Men*, edited by Frederic Harrison. (Macmillan and Co.; 1892.)—ED.

⁵ *Ibid.*, pp. 146-50.

⁶ 45th chapter.

⁷ See p. 71 (note).

objective side merely, but also on the physiological or subjective side, stood in need of entire revision. He devoted much thought, through many years, to the work of this revision. He did more; he brought a new method.

The faults in Gall's demarcation of "fundamental" or elementary functions were due to the imperfection of his philosophy. His biological studies had been profound and original. He had studied animals, he had studied individual human beings with wonderful independence and breadth of view, with audacious freedom from theological and metaphysical prejudice, and with splendid mastery of the comparative method. But of the social organism, and of the laws that govern its growth, he had no knowledge. Comte's discoveries in this region from 1822 to 1826 came too late for him. Nor does he show any knowledge of the remarkable work of Comte's immediate predecessor, Condorcet, on the *Progress of the Human Mind*.¹ In the growth of man and the growth of Humanity there is a parallel, of which Pascal more than two centuries ago was dimly aware, and which Comte was the first to bring into full light.

In defining the elementary functions of the brain Comte defines his method thus: Sociological suggestion controlled by zoological verification. Sociology operates in two ways on the solution of the problem. First, it magnifies facts which, in the microcosm of the individual, would be hardly perceptible, as the poet says:—

In the legend of man I see
Writ large what small I saw
In my life's tale; both agree.

If Gall could have more closely studied that "legend writ large," he would have avoided many mistakes. But, secondly, sociology complicates the solution by presenting many feelings and instincts which have all the force, and often more than the force, of the elementary affections shared by man with the higher vertebrates, or with animals still lower in the scale. Such, for instance, are love of country, the sense of honour, of justice, of modesty, and numberless others, which are obviously bound up with long continuance in the social state. We have here to make use of the second clause of Comte's criterion: zoological verification. Thus, to take a simple instance, the instinct of compassion, being common to many of the higher animals with man, would be regarded as elementary. The sense of justice, examined by the same test, would

be looked upon as compound. Further explanations of Comte's survey of the elementary functions of the brain will be found very clearly and simply stated in Dr. Ingram's book above mentioned. That survey, as set forth in tabular form, owes obviously very much to Gall's admirable labours. But what is new in it brings it into closer accordance with fact, and renders it far fitter for the social and moral purposes which Gall and Comte alike held always in view.

2

In biology, as was said before, the twofold problem is to discover the organ of each function, and the function of each organ, while never losing sight of the fundamental fact of life, the adaptation of organism to environment; and remembering always that, in the case of brain functions, environment includes all that is meant by the word *education*. It usually happens, but not always, that the function attracts attention first. Respiration, digestion, circulation, excretion were studied by Hippocrates and other physicians of the Græco-Roman world, and studied often to good purpose, though their knowledge of the organs performing these functions was extremely limited. On the other hand, the spleen and the liver supply instances where the structure of the organ has been minutely studied, though the purpose served by it is still most imperfectly understood. How do we stand in this respect with regard to the brain? That the brain was a receptacle of sensations and a source of motion was well known to the later Greek anatomists. In the Middle Ages knowledge had gone farther, thanks in great part to Arabian naturalists. Roger Bacon allocated in the brain of animals, no less than in that of man, memory, perception, and a mental process (*virtus cogitativa*), which he found it hard to distinguish from reasoning.¹ Descartes's amazing theory of animal automatism discouraged speculations of this kind. But they were revived and placed on a far sounder and broader basis by philosophic naturalists in the eighteenth century, notably by Georges Leroy in his celebrated *Letters upon Animals*. It was seen at length that the psychical life of man, no less than of other animals, was made up in far larger measure of emotions, feelings, propensities, affections, volitions, than of intellectual processes. And when Gall added his own observations of animal and human life to those of Leroy, he was brought to the conclusion that affections and propensities, no less

¹ *Opus Majus*, ed. Bridges, vol. ii, pp. 7-12.

than argumentative processes, had their centre in the brain; that the brain was the organ, not merely of mind as commonly understood, but of those innate affections and dispositions which count for so much in the character of every man and woman born into the world. Gall brought a large mass of evidence pointing to the conclusion that the brain was not an organ, but rather an assemblage of organs. This was denied by his contemporaries; and even in recent years there have been some (the late G. H. Lewes was among them) who maintained that the brain was a single organ, and that every part of it acted uniformly and simultaneously. But the evidence that has accumulated during the last forty years that different parts of the brain differ in structure and in function is entirely conclusive. The grey matter of the convolutions, consisting as it does of myriads of cells of different shape and size, arranged in layers which the microscopist can distinguish, is not the same in the front regions of the brain as in the middle region, this again differing from the hindermost region. The precise meaning of these facts we do not know as yet, and it may be very long before we know it. "The great bulk," says Dr. Ferrier,¹ "of minute cerebrospinal anatomy is in the most unsatisfactory state." But, interpret the facts as we may, a glance at any series of magnified sections of the grey matter of the convolutions taken in different parts of the brain (such, for instance, as may be seen in pp. 141-42 of Ferrier's work) is enough to show the striking difference of the size, shape, and arrangement of the brain cells in different regions.

Evidence of a more significant kind, and bearing more directly upon Gall's system of localization, was given by Broca's discovery, forty years ago, that the singular affection called *aphasia*, in which the patient understands the meaning of words spoken to him, but cannot speak or write the words himself, was connected with disease in a particular part of the brain; the position (posterior extremity of the third frontal convolution) being very nearly that which Gall had marked as the organ of language. It should be added that the disease is usually limited to the left side of the brain. It is worth noting that this remarkable discovery was the result, not of experimentation on living animals, but of pathological observation. Dr. Bernard Hollander's contributions to our knowledge of brain functions rest in like manner upon pathological rather than vivisectional operations. Before discussing them, however, it is well to consider what vivisection has done in this matter, and this without

¹ *Functions of the Brain*, 2nd ed., p. 2.

entering on the present occasion into the moral aspects of this question, further than to refer to the papers on "The Use and Abuse of Experiments on Animals."

Gall himself considered the subject very carefully, and some of his remarks are worth quoting, for they have by no means lost their force. In vol. iii, pp. 156 ff., after a few general remarks on the prevailing tendency of physiologists to resort to operative methods rather than to accumulate physiological and pathological observation, he goes on to observe, with regard to mutilations of the brain in living animals:—

What we constantly find is that all that seems proved to demonstration by the mutilator A either does not occur in the mutilation practised by B, or else that B finds that his identical experiments prove exactly the contrary of what had been alleged by his predecessor.....Further, these cruel experiments on the brain, when made on animals low down in the scale, are very rarely conclusive for man. In fowls, pigeons, rabbits, and in the young of animals higher in the scale, animal life is very far from being under the complete domination of the brain. I admit that certain results have been obtained, though these are often extremely doubtful, with such facts as irritability, sensibility, the functions of viscera, voluntary motion, respiration, etc. But never can I admit that lesion and mutilation of the brain, whether produced by operation or by accident, is the right and sole method for revealing the functions of its constituent parts.

For such experiments to be successful a combination of conditions is needed with which it is impossible to comply. First of all, we must be able to limit the entire effect of the lesion to the special region of the brain on which the experiment is made. For if the shock of the operation, the hæmorrhage, the inflammation, extend to other parts, what conclusion can be drawn? And how prevent such extension? Then, again, in order to be sure that any organ has been entirely destroyed, we ought to be able to define precisely the extent of this organ and its origin. But who, before our researches, had the slightest acquaintance with the bundles of nerve-fibres which go to form the convolutions of the brain? The ordinary method has been to slice the brain horizontally, but the nerve-fibrils connected with the convolutions are not spread out horizontally. On the contrary, they pass down either diagonally, or vertically, or circuitously, towards the parts where they are reinforced, or towards their first origin. How, then, destroy any cerebral organ without injury to those which are contiguous with it, or without penetrating to the base of the brain, and thus causing the death of the animal?

Apart from this, it would be necessary to ascertain whether

an animal whose brain is wounded and mutilated, an animal agonized by pain and fear, were in a condition to exhibit those propensities, instincts, or faculties connected with the portions of the brain that were left uninjured. Captivity alone is enough to silence the instincts of most animals. The elephant will not pair in captivity; the nightingale's song ceases.....Lastly, what is more important than all, the inquirer should have a clearly defined conception of what he is to look for. He should be free from metaphysical prejudices; he should know what are the fundamental elements of human nature. Where do we find physiologists and anatomists who fulfil this condition?

Gall's criticism of vivisectional methods, as applied to the brain, was aimed at such experimenters as Flourens and Longet. It is impossible to deny its efficacy so far as their researches are concerned. But very much of it applies with equal force to far later researches than these. In 1870 Fritsch and Hitzig discovered that the grey matter of the brain, which till then had been regarded as insensitive, was excitable by weak electric currents. A fresh impetus was thus given to cerebral researches. Their work is best known in England through the repetition of their experiments by Dr. Ferrier, with certain modifications of his own. Dr. Ferrier admits Gall's main contention as to the difficulty of isolating any one part of the brain from the rest.

The functions of the whole nervous system [he says], the different portions of which form a complex solidarity, may be deranged by a lesion at any part; and, even if this should not be the case, there is at least great risk that the parts more immediately in relation with the lesion may be damaged temporarily or permanently.

And again:—

Unless the primary lesions are established in such a manner as to prevent their becoming the foci of secondary inflammatory processes, more or less diffuse, no certainty can be arrived at in respect to the direct effect of the lesions, however well circumscribed in the first instance; and thus errors of the most grievous description are apt to arise in reference to the delimitation of the respective cortical centres. The vast majority of the experiments made on this head by many physiologists, such as Munk, are vitiated by the almost universal occurrence of secondary encephalitis, with indefinite extension of the primary lesions.¹

What a comment is all this on the remarks of Gall above quoted,

¹ Ferrier, p. 269.

and on the thousands of brain vivisections that were carried on in the interval between his time and ours! Dr. Ferrier conceives that he has effectively stopped this extension of the lesions by antiseptic methods. What antiseptic surgery can do in ordinary flesh wounds is matter of common knowledge. But would he maintain that, in such a tissue as the retina, a single cell, or a single layer of cells, could be operated on, antiseptically or otherwise, without interference with adjoining cells? The cortex of the brain is not less delicate, not less intricately involved, than the retina, even to our present most imperfect knowledge; probably, as our pathological knowledge extends, it may be found a thousand times more delicate and more intricate. The present writer is no expert in this matter. He claims merely to be a patient student of other men's work. But it will be found that experts of at least equal authority in this matter with Dr. Ferrier—such, for instance, as Goltz—draw totally different conclusions from the facts that Dr. Ferrier describes, and believe that the muscular movements resulting from, or paralysed by, stimulation or destruction of special portions of the cortex are due to secondary irritations of other and "lower" parts of the brain. And, whether this be so or not, it obviously does not follow, because certain parts of the cortex of the brain are connected with the muscular system, and certain other parts with the organs of sense, that therefore these regions have none of the emotional or intellectual functions which Gall and others have assigned to them. To say that these functions are in no sense innate, but result from the social environment—in other words, from "education"—is to beg the whole point at issue. It might conceivably be tested by some one who removed the wounded animal from the laboratory, and nursed it with affectionate and sympathetic care, but not by the vivisector. I leave the ethical side of vivisection for the moment entirely apart, having dealt with it elsewhere.¹ It is only needful to say that, never having joined any organized agitation against experiments on animals, and being distinctly in favour of such experiments as have been directly and wisely aimed at the extinction of infectious diseases, I may claim to speak with some degree of independence. I speak assuredly in entire freedom from that "hatred of science" which the late Professor Huxley, in the blindness of his combative zeal, attributed to Positivists.

Dr. Hollander's book will, I hope, have the effect of directing students of this very important biological problem into sounder and

¹ In the 2nd paper on "The Use and Abuse of Experiments on Animals."—ED.

worthier methods of research. He has accumulated a large mass of pathological evidence which, in his opinion, goes to show that Gall's localization was justified, even in many of its minuter details. After careful study of this evidence I am driven to the conclusion that the greater part of it falls very far short of scientific proof. Dr. Hollander is perfectly right in saying, as Gall and others had said before him, that the kind of evidence required consists of careful observation of character and disposition during life, tested by accurate examination after death. This was the way in which Broca made his discovery of the "organ of language"—that is to say, of that part of the brain disease of which produced aphasia; by far the most solid acquisition which cerebral anatomy has made since Gall's time. The conditions required are these: (1) A competent observer capable of observing, judging, and analysing character; (2) Discernment of a morbid tendency during life limited to a single one of the elementary instincts; (3) Discovery of disease of the brain in a specially defined region after death, accompanied by well-grounded evidence that the rest of the brain was unaffected. The combination of these conditions is not all that is wanted, but it is the minimum. Evidence falling short of this standard may be useful in putting inquirers on the right track, or in suggesting a sound working hypothesis for further investigation; but this is all. Now, it will, I think, be clear to every careful reader of Dr. Hollander's cases that much of his evidence falls short of this standard. In some of the cases no post-mortem evidence is given. In many of them the injury to the brain discovered after death covered an area far larger than that which Dr. Hollander, apparently following Gall, assigns to the instinct in question. In other cases, again, the same symptoms would seem, supposing Dr. Hollander's assignment of function to organ to be correct, to be caused by over-stimulation of the organ that followed on its total destruction. And, what is more important, too much reliance is placed on *enumeratio simplex*, to use Lord Bacon's expression. It has to be shown, if possible, not merely that a morbid condition of function co-existed with an injury in a special region of the brain, but that the same morbid condition is *not* found in connection with injuries to another region. Perhaps the most interesting series of facts mentioned by Dr. Hollander is that relating to the instinct of nutrition (pp. 210-16). On the seat of the altruistic instincts, especially those of benevolence and veneration, the few pathological observations recorded are highly interesting and suggestive; though Dr. Hollander himself admits that they are insufficient, since he

deals with them as "materials for future localization." On the situation of special memories for number, form, place, time, colour, he appears to me entirely to fail in proving his, or rather Gall's, view.

It may also be noted that in the diagram of the brain presented in the frontispiece of Dr. Hollander's book the space allotted to the frontal lobes is likely to give rise to misconception, if the reader is allowed to suppose that the whole of this space is concerned with intellectual functions. It is more probably the pre-frontal than the frontal lobes with which these functions are connected; the larger part of the frontal lobes being occupied with the higher altruistic sentiments of benevolence and veneration. The point is of importance, if a theory of brain-functions is to be brought into adjustment with the facts of human nature, as recorded by its most skilled observers, whether statesmen, philosophers, or poets. With one accord all of these tell us that moral impulses have far more to do with the actions of men than reflective processes. Whether for good or evil, the intellect is subordinate to the heart.

That there is a general truth in the broad outlines of Gall's scheme of localization is a conclusion which, in spite of prolonged opposition, is gradually making its way in the scientific world; a conclusion anticipated to some extent by popular judgment and by the finer observation of artists. That in many ways it needs recasting will be generally admitted; and something was said in the preceding paper of the method to be followed in this process. Such criticism as I have offered of Dr. Hollander's work does not at all affect its value as a stimulus to further research, carried on by methods widely different from those which for half a century after Gall's death held the field, and which are still actively pursued. He urges, and with indubitable truth, that the most hopeful path of inquiry is to be found in pathological research wisely conducted. He adds that for this purpose, and also for other purposes, our present mode of treating lunatics needs fundamental changes. Our present monstrous plan of massing them together by thousands, so that the physician in charge rarely knows half of them by sight, will have to be abandoned. Individual treatment, and, where it may be possible, domestic and affectionate care, should be substituted. A record of the patient's life and character before, as well as after, the outset of disease should be kept in a way widely different from any that is now possible.

A short notice of Dr. Ingram's book on human nature will complete this series of papers by putting Comte's cerebral theory in

its true light as a valuable working hypothesis, not, indeed, as yet scientifically demonstrated, but nevertheless throwing great and indispensable light on social and moral problems.

3

It has already been mentioned that Auguste Comte accepted many of the leading principles of Gall's theory of the brain, regarding some as scientifically proved and others as affording material for a sound and useful working hypothesis as to the constitution of human nature. Reference has already been made to Dr. Ingram's recent work on this subject,¹ the first three chapters of which contain a very lucid statement of Comte's cerebral theory, taken from the final chapter of the first volume of his *Politique Positive*. Those who are interested in the subject will find Dr. Ingram's short work an excellent introduction to the study of the original.

And who is there that is not interested? This is not a matter to be monopolized by academicians, scholastics, or university professors. For thousands of years, from the earliest beginnings of history, men of every rank, race, and colour have insisted on knowing what they could of the nature of man. Prophets, poets, law-givers, founders of religions, have gained a hearing because they were thought to know more about it than the mass of men and women round them. So absorbed were men in the study of it in primeval days that they found in it their first key for deciphering the riddle of the universe. Of the world around him man knew nothing except what was needed for the supply of his most urgent animal wants. On these points primitive man was a positivist, as Comte, notwithstanding his Law of the Three Stages, invariably maintained.² He knew much more than the average university graduate could tell him as to the way in which a flint would flake when struck, or how to rub two pieces of wood together so as to bring smoke and flame.

And so, too, had he a firm grasp of certain elementary facts as to his own nature: of the strain of muscular effort, of the storms of conflicting passions—greed, lust, and anger—of rare impulses of affection and reverence. It was by the help of facts of this kind that he built up his first crude theories of the universe. The forces of nature were assimilated to those of his own body and soul. This

¹ *Human Nature and Morals According to Auguste Comte*, with notes illustrative of the Principles of Positivism, by John K. Ingram. (A. and C. Black; 1901.)

² See *Phil. Pos.*, vol. iv, ch. li, p. 491.

is not the place to describe the rise and growth of the two phases of man's early religion—fetichism and polytheism—further than to say that both had their principal source in man's experience of his own passions.

Prophets, poets, and philosophers have told man from time to time, each in their own very different language, that knowledge of himself was worth more than any other kind of knowledge. Which have been the most effective teachers? We need not decide the question. But at least it may be said that philosophers, taken as a class, have not as yet convinced the world that they have a monopoly of this knowledge. There are many who think, and not without reason, that there is more wisdom to be got from the great poets than from systematic thinkers. In sounding the depths of the soul, in exploring the hidden paths of passion, what sane man will place the author of *Bacon's Essays* on the same level with the author of *Lear* or *Hamlet*? Compare Æschylus with Plato, Aquinas with Dante, Kant with Goethe, the result will be the same. With very rare exceptions, the influence of the poet (I speak only of the few great ones) has not merely been wider, but it has gone deeper.

The reason is not far to seek. Most philosophers have concerned themselves with analysing thoughts. Poets, without ignoring thoughts, have concentrated their attention on passions and actions. Of the best priests and prophets the same may be said. Striving to restore order among man's conflicting passions, and to establish a "rule" of life, they have been compelled to look on life as a whole. Conduct, says a modern poet, is three-fourths of life. To quote Corneille's paraphrase of the *Imitation* :—

Et ce qu'on aura su fléchira-t-il un juge
Qui ne regardera que ce qu'on aura fait?

Now, metaphysicians and psychologists have in very many cases ignored those elementary truths; yet they have been long known to the simple, and to those of the wise who were capable of learning from the simple. Open any manual of the history of philosophy—that of Renouvier or of G. H. Lewes, for example—or any modern treatise, whether of what is called distinctively "Philosophy" or of "Psychology," you find nine-tenths of their contents occupied with analysis of intellectual processes. Of the value of such analysis, very great in some cases, very small in others, this is not the place to speak. The sole point here insisted on is that the mass of plain men and women who feel the need of knowing something about their own spiritual nature—not this or that part of it, but the whole of it, mind, heart, and will altogether—find far more of

what they want in the *Imitation* of Thomas à Kempis than in Locke's or Leibnitz's *Essays on the Understanding* or in Kant's *Critique of the Pure Reason*.

Now, it was precisely because Gall's scheme of the innate propensities of human nature, as embodied in the structure of the brain, met this want that it produced so startling an impression on European thought in the early decades of the nineteenth century. Wise men occupied with reforming work in many departments—in the treatment of criminals, in the training of the young, for instances—were quick to recognize its significance. No part of Gall's work had deeper results than his endeavours to demonstrate in the organization of man and of the higher vertebrates the existence of a principle of unselfish love. The sixty-five pages devoted to this subject¹ are well worth re-studying. When it is remembered that theologians were still teaching the utter corruption of human nature, and that Hobbes's doctrine that all sentiments and affections were modes of self-love had as yet received no systematic contradiction, we are not surprised at Comte's comparison of this part of Gall's work with the hypothesis of Copernicus in far-reaching social importance. The eternal problem of wise government of human nature, untouched either for better or for worse by all the "wireless telegraphies" that the coming centuries may have in store for us, was brought down from a far-off region of inscrutable mystery to a homely, familiar land which all may tread; where there is

grass about,
Under befriending trees,
Where the shy buds venture out,
And the air by mild degrees
Puts winter's death past doubt.

For if, indeed, the capacity for unselfish love be innate in each one of us, as also in some of the higher animals who are our fellow-workers, a gleam of light is shed on the dark problems of life. Internecine attrition, with survival of what it may please destiny to let survive, ceases to be the sole and supreme law. A leverage is offered us on which to work in moulding man's life to higher things. The problem of reducing the conflicting emotions of man's life to harmony, of securing the ascendancy of altruistic over egoistic impulses in such a way as to leave the various forms of self-love free play for the activities and needs of vitality, remains, doubtless, complex and arduous in the highest degree, taxing the highest

¹ *Fonctions du Cerveau*, vol. v, pp. 254-319.

wisdom and devotion of countless generations, but still a soluble, not a chimerical and hopeless, problem. Each generation of workers may know itself to be nearer the goal.

Thoughts of this kind may suffice to indicate the importance to students of Positivism of Comte's picture of the psychical nature of man, and of its connection with his physical structure. For further details I must again refer to Dr. Ingram's volume; those who have leisure should study the subject in Comte's own writings, notably in the concluding chapter of the first volume of his *Positive Polity*. Once more let me insist on Comte's declaration that the position of the organs, with which the functions defined by him are connected, is not regarded by him as demonstrated, but is put forward as a working hypothesis. Such an institution is recognized in every department of science, and, indeed, is in many cases grossly abused. But in the present instance the important condition is complied with that is too often ignored: the hypothesis is amenable to disproof or to verification. In the meantime, since to deal with undefined functions leads almost inevitably to vagueness of thought, there are advantages in instituting provisionally imaginary organs, always provided that their provisional character is recognized. Finally, let it be borne in mind that, whatever modifications the hypothesis may need in the future, the psychical facts with which the hypothesis deals remain unaltered.

Before leaving Dr. Ingram's book I should like to call attention to a series of valuable "Notes Illustrative of the Principles of Positivism" with which it concludes. Most of those deal with Comte's way of using certain terms, familiar enough to philosophic students, but not always intelligible to the public. Such, for instance, are the contrasts between *absolute* and *relative*, *abstract* and *concrete*, *objective* and *subjective*, *laws* and *causes*, *static* and *dynamic*. Few thinkers abstained so carefully from technical terms, and, above all, from new terms, as Comte. It is the more important to have a clear understanding of the few which he employed, and Dr. Ingram's explanation of them leaves nothing to be desired. But in view of present controversies, and of the subject spoken of in the foregoing papers, I invite special attention to the note on "Psychological Introspection." Comte, as everyone knows, was extremely sceptical of the value of this process as a method of research, "believing that the direct observation of one's own mind in the act of thought, or under the influence of emotion, could not lead to trustworthy results." Not, of course, that he denied the obvious fact that our general knowledge of thought and emotion

was derived from consciousness. But to have general knowledge of a range of facts is one thing; to investigate the laws which regulate them is quite another; and Comte disbelieved in psychological introspection as a means of discovering these laws. For this view he has been roundly taken to task by the late Professor Huxley, who regards it as a convincing proof of Comte's "scientific incapacity" and "philosophical incompetence," and who contrasts it with what he represents to be Hume's view of the usefulness and necessity of the method of internal observation.

But, as Dr. Ingram shows convincingly enough by citing Hume's actual words, Hume's position in this matter is identical with that of Comte. The passage in question will be found in the Introduction to Hume's *Treatise of Human Nature*. Apart from its temporary interest as an illustration of the reckless inaccuracy into which Huxley was usually hurried when he spoke of Comte and his school, it contains a serviceable warning against fruitless expenditure of intellectual energy in a barren field.

Moral philosophy [says Hume] has this peculiar disadvantage, which is not found in natural—that, in collecting its experiments, it cannot make them purposely, with premeditation, and after such a manner as to satisfy itself concerning every particular difficulty which may arise. When I am at a loss to know the effects of one body upon another in any situation, I need only put them in that situation and observe what results from it. But should I endeavour to clear up in the same manner any doubts in moral philosophy by placing myself in the same case with that which I consider, 'tis evident this reflection and premeditation would so disturb the operation of my natural principles as must render it impossible to form any just conclusion from the phenomenon. We must, therefore, glean up our experiments in this science from a cautious observation of *human life*, and take them as they appear in the common course of the world, by *men's behaviour* in company, in affairs, and in their pleasures. When experiments of this kind are judiciously collected and compared, we may hope to establish on them a science which will not be inferior in certainty, and will be much superior in utility, to any other of human comprehension.

VI

MUTUAL AID

THERE is great value in mottoes. They condense a large and shapeless mass of thought into crystalline hardness and clearness; they enable us to concentrate attention on what would otherwise pass away and be forgotten like last year's clouds. Mottoes are like other formulæ: we cannot do without them, yet we must not be their slaves. And, to prevent such bondage, it is well to take up one and another of them now and then, and ask what it means. Perhaps the crystal, closely looked at, may show new lights and tints.

Love is our Principle: this is the first clause of the threefold formula of Positivism,¹ looked at as a social doctrine. Of the two other clauses relating to Order and Progress—to evolution, as some might phrase it, in accordance with a definite law—we need say nothing at present. Let us fix our thoughts for a moment on the Principle.

The first thing to do is to acknowledge Love as a certain and unassailable fact, to be taken account of by science as much as gravitation, electricity, chemical affinity, or the multiplication table. It seems at first sight strange that there should be any doubt about so very obvious a truism. Nevertheless, doubt there is, as anyone may assure himself who asks the first average man of science he meets to discuss the subject. He is very likely to receive the answer that Love is a matter of sentiment, and that science has nothing to do with sentiment. Is the study of human nature, then, beyond the range of science? Human nature, looked at apart from sentiment, would be like *Hamlet* with the principal part left out. It needs but a glance at the drama of history, or at the homelier drama of commonplace life always going on around us, to teach us so much.

Other men will give our inquirer what seems to be a more satisfying answer. You must go, they will tell him, to the psychologists. Psychology is the scientific study of the *psyché*, of all that distinguishes living from dead matter, and especially of that department of life that Bichat called the life of relation; the study of sensation, motion, and all other functions of the brain and nerves. Unfortunately, when our inquirer opens his elementary treatises of

¹ See p. 39 (note).—ED.

psychology, he finds that the main thing spoken of is something that is called Mind, and our inquirer finds himself very often plunging in an ocean, sometimes in a morass, of metaphysics. He is told that he must study his own mind in the act of thinking—a difficult art which long practice will enable him to acquire. He remarks that other men engaged in the same practice often arrive at very different and incompatible conclusions. Lastly, he finds that at the end of the process he is as far from what he was in search of as when he began. He hoped to learn something about emotion, passion, impulse. But he is disappointed. He is told that these things belong to “tracts of consciousness in which integration is undecided,” that they “cohere little with one another and with other feelings,” that they “play but subordinate parts in the actions we chiefly class as mental.”¹ Mr. Spencer is, of course, too great a thinker to leave Emotion out of account; as may be seen by reference to §§ 209–13 and §§ 494–540 of his psychological treatise. But it is quite otherwise with many, perhaps with most, writers on psychology. And as psychology is now a subject recommended to school teachers by our various educational authorities, this error of regarding the *psyché* as made up chiefly of mental processes becomes of very serious social importance. A little book like Mr. J. M. Baldwin's *Story of the Mind*² (in the Story Series of George Newnes) deserves more consideration from this point of view than many a voluminous treatise. Students of psychology are, of course, aware that Mr. Baldwin's reputation rests upon other publications much more systematic and elaborate than this little primer. But to these we need not refer at present. Nor do I wish to speak now of the debatable propositions with which it bristles from the preface onwards; as that “the Evolution theory is adopted in its application to the mind.” Which evolution theory? We are left the more in doubt that a few lines afterwards (p. 7) we are told that the evolutionary process by which the purpose of the universe is working itself out is perhaps the law of Probabilities! But it is not for the purpose of discussing this or the other debatable detail that I refer to this and similar works; it is that from beginning to end the *psyché* which the book professes to deal with is identified with Mind. The book is called *The Story of the Mind*. Its first sentence runs thus:—

Psychology is the science of the mind. It aims to find out all about the mind—the whole story—just as the other sciences

¹ Spencer, *Principles of Psychology*, § 75.

² 1899

aim to find out all about the subjects of which they treat—astronomy, of the stars; geology, of the earth; physiology, of the body.

Let it be said at once that Mr. Baldwin's *Story of the Mind* contains much interesting, though rather desultory, information about a great many subjects. It touches on recent experimental researches on sensation and memory, on the comparison of mental processes in higher animals and in children, on the art of teaching, on certain diseases of the brain, on language, and on many other matters of much interest and importance. But of what we are seeking, a plain account of the elementary affections and passions of man and the higher vertebrates, we shall find hardly anything.

Gall's crude hypothesis of brain-functions had the enormous advantage of concentrating attention on certain elementary facts of human nature which are instinctively familiar to the mass of men and women, but which the academic world is in perpetual danger of forgetting. In any case, in Gall's psychology, and yet more in the revision of that psychology put forward by Comte in pp. 669-735 of vol. i of *Politique Positive*,¹ we have what we sought, a picture that preserves due proportions between the three aspects of man's psychic life—Feeling, Thought, and Activity. Elsewhere among systematic thinkers we shall usually seek in vain. If we want further guidance, we have to betake ourselves to the great poets, to the great naturalists, or to the practical wisdom and good sense of men and women unversed in scholastic ways. It was a soldier from whom that golden word came: *Les grandes pensées viennent du cœur*.²

These thoughts were suggested, or at least enforced, by Prince Kropotkin's remarkable work on *Mutual Aid*, published three years ago.³ Apart altogether from the strenuous struggles of his political life, Prince Kropotkin has become widely known to English readers by his lucid expositions of recent scientific discoveries, indicating philosophical capacity of no ordinary kind. In this work he makes a direct and important contribution to the psychology of man and animals, of the kind in which most modern treatises on the subject are so deplorably wanting.

Let us allow Prince Kropotkin to introduce his subject:—

Two aspects of animal life impressed me most during the journeys which I made in my youth in Eastern Siberia and Northern Manchuria. One of them was the extreme severity of

¹ Pp. 540-93 of Eng. tr.

² "Great thoughts come from the heart."—Vauvenargues; *Maximes*.

³ *Mutual Aid: A Factor of Evolution*. (Heinemann; 1902.)—ED.

the struggle for existence which most animals have to carry on against an inclement Nature; the enormous destruction of life which periodically results from natural agencies; and the consequent paucity of life over the vast territory which fell under my observation. And the other was that, even in those few spots where animal life teemed in abundance, I failed to find—although I was eagerly looking for it—that bitter struggle for the means of existence, *among animals belonging to the same species*, which was considered by most Darwinists (though not always by Darwin himself) as the dominant characteristic of struggle for life, and the main factor of evolution.

The author proceeds to describe the merciless rigours of the North Eurasian climate; the hard, long winter, the short burst of spring, the recurrence of cold in May, the storms of late summer, the rainfloods of autumn, the snowfalls of October. But while he was thus impressed by the overwhelming importance of the natural checks to over-multiplication thus imposed by Nature, he was equally impressed by doubts as to the reality of that fearful competition for food and life within each species which was an article of faith with most Darwinists.

On the other hand, wherever I saw animal life in abundance, as for instance on the lakes, where scores of species and millions of individuals came together to rear their progeny; in the colonies of rodents, in the migrations of birds which took place at that time on a truly American scale along the Usuri; and especially in a migration of fallowdeer which I witnessed on the Amur, and during which scores of thousands of these intelligent animals came together from an immense territory, flying before the coming deep snow in order to cross the Amur where it is narrowest—in all these scenes of animal life which passed before my eyes I saw Mutual Aid and Mutual Support carried on to an extent which made me suspect in it a feature of the greatest importance for the maintenance of life, the preservation of each species and its further evolution.¹

The first seventy-five pages of this very remarkable book are a collection of accredited facts, reported by observers in every department of natural history, in illustration of this agency of Mutual Aid as one of the dominant factors in evolution; the result being to reduce the agency of Malthusian competition to far narrower limits than was imagined, if not by Darwin himself, yet certainly by Huxley and many other Darwinists.

Darwin himself was far too vigorous a thinker, and far too

¹ Pp. viii-ix.

accurate an observer, to have underrated the importance of Mutual Aid as a factor in the evolution of animal life. In the third chapter of Part I of his *Descent of Man* he supplies a long list of facts bearing on this point; the warning each other of danger, the posting of sentinels, the aid rendered by each to all in hunting expeditions—these are some of the most ordinary and universal instances of the social instinct. We have to thank Prince Kropotkin for so largely adding to the number.

Yet it should be noted that, in thus insisting on the innate character of the social instinct, neither Prince Kropotkin nor Darwin was first in the field. Aristotle, the founder of Social Statics, had told us that man was a social or civic animal (*politikon zöon*). When the doctrinal trammels imposed by the Catholic Church, and accepted by most Protestants, were relaxed in the eighteenth century, Leroy's well-known *Lettres sur les Animaux* established a moral kinship between ourselves and the higher vertebrates. But the chief merit of establishing the innate and organic character of altruism, in both animals and man, belongs unquestionably to Gall. I advise those who doubt it to read the chapter on the subject in the fifth volume of his *Fonctions du Cerveau*, a work included by Comte, as also are Leroy's *Lettres*, in the Positivist Library.¹ They may sweep away, if they choose, the whole scaffolding of Gall's hazardous hypothesis as to the attribution of this instinct to this or that convolution of the brain. No one who looks at that hypothesis by the light of researches on brain functions made during the last half-century can regard it as proved; most will think it disproved. I prefer, for my own part, to regard it as a convenient mode of emphasizing the conviction, for which evidence of other kinds abounds, that altruistic feeling is rooted in the organic structure of man and of the higher animals; possibly of all animals. How it came there is a question which may, or may not, be answerable. Infinitely more important is the question, *Is it there?* On the answer to that question depends the possibility of a rule of life which shall survive every onslaught of theological and anti-theological controversy, and which shall govern man as long as man's life lasts. Sentiment, indeed, even the purest and noblest, is not morality. Standing alone, it may lead, as it often has led, to utter moral collapse. Nevertheless, it remains for ever true that Love is the Principle.

¹ For a full account of this Library see chapter on "The Positivist Library" in Frederic Harrison's *Among My Books*. (Macmillan & Co.; 1912.)—ED.

CHAPTER III
SOCIOLOGY

I

THE SCIENCE OF SOCIOLOGY

INTRODUCTORY

I PROPOSE in this and succeeding papers to give the substance of the fourth volume of the *Philosophie Positive*.¹ In the three preceding volumes Comte had dealt with bodies of truth already recognized as sciences, had shown their logical connection, and had arranged them in the order of increasing speciality and complexity. He begins the fourth volume by remarking that the science of social physics, otherwise named sociology,² did not as yet exist and had to be created. There could be no question of presenting it in a complete form. All that could be hoped was to explain the general spirit of the science, and to establish its fundamental principles.

Like other sciences, it has to be studied as a body of abstract truth quite apart from practical applications. Nevertheless, as the practical application in the present case is concerned with nothing less than putting an end to the anarchy of opinion which is dislocating society, it is well to begin by looking at the matter from this standpoint before entering on the strictly scientific inquiry.

In a healthy state of the political organism order and progress go together. They are as intimately associated as organism and life in an animal. But by an anomaly peculiar to modern times they have been dissociated and brought into antagonism. This is so throughout the West, but more especially in France. For three centuries systematic onslaughts have been made on the old framework of society. On what principles it is to be replaced no one is aware. Assailants and defenders alike strive to rebuild with old materials, borrowing ideas of order from the mediæval fabric, ideas

¹ Excluding, however, the last two lectures of this volume, on Social Statics and Social Dynamics.—ED.

² Comte introduced the term "sociology" in the forty-seventh lecture of vol. iv, instead of his previous expression "social physics."—ED.

of progress from the negative philosophy which began with Protestantism and culminated in the French Revolution. But it is time to look more closely at the two antagonistic systems.

Our debt to the theological system, under which the formation and early growth of society took place, is immense. But everything indicates its decline, and all efforts to restore it do but renew men's ardour for its entire destruction. The first test of a sound political doctrine is to be consistent with itself when developed and applied. How far does theological polity satisfy this condition? Obviously the whole course of modern civilization—art, industry, science—is avowedly alien to it; and yet no reactionary statesman, not even Bonaparte, has dreamt of trying to suppress these things. Thinkers like de Maistre, who aimed at restoring the papacy to its old supremacy, based its claims on purely human grounds, leaving divine right wholly on one side. See again how completely the retrograde school throws over the most vital of its principles, the independence of the spiritual power. Not merely in Protestant but in Catholic countries the Church is content to remain subject to the national government. How could it be otherwise? The first condition of an independent Church of Christendom would be that the sects should reunite. And even if this were possible, the State governments would take very good care that control of Church matters should not pass from their hands. The Holy Alliance formed after 1815 chose for its chief not the Pope, but the Czar. Again, not to speak of the internal dissensions in the retrograde camp between the Catholic and the feudal element, between the nobility and the monarchy, we find the retrogrades using revolutionary language when it suits them. They claim freedom for Irish or for Poles while rigorously suppressing Protestants in Spain and Austria.

Turning to the revolutionary school, we have to begin, as in the case of its rival, by recognizing its necessity. But for its exertions the positive school could never have arisen, or even have been thought of. Our mental powers are far too feeble to conceive of a social state wholly diverse from that in which we live. Catholicism had to be in great part destroyed before the conception of a non-Catholic society could be presented to the imagination; just as it was impossible even for so strong a man as Aristotle to suppose a society without slavery. Therefore the rise and progress of the revolutionary doctrine was inevitable. Each of its principles is, in fact, an embodiment of the spontaneous process of destruction in a definite formula. Unfortunately, these formulas, instead of being

regarded as temporary and transient, came to be considered as absolute truths, and as such have become distinctively obstructive to progress. We may regret this, but there was no help for it. Revolutionary ardour would never have risen to the needful level had not faith in its principles been overwhelmingly strong. Still, we have to face the fact that the revolutionary doctrine no less than the theological has become at the present time hostile to the establishment of the new order which lies before us in the future.

Let us look more in detail at the dogmas of this school. Its first and most fundamental principle is the right of private judgment, with which, of course, freedom of the press, freedom of speaking and teaching, and other liberties of the kind are connected. Note in passing that the retrogrades, no less than their opponents, assert this principle. It arose spontaneously in the course of the destructive movement, and has now come to be regarded as absolutely sound. We may at once admit that without it the positive philosophy could not have arisen. And yet this so-called truth turns out, when tested, to be quite untenable. If there is to be any science of social phenomena, it must follow the way of all other sciences—*i.e.*, when a law of nature is discovered it is definitely accepted, and not perpetually churned about as though for all time to come it were to remain an open question. The leading truths of science are not open questions. The mass of men accept them on trust from those whose competence is recognized.

Equality, another principle of revolutionary philosophy, must be judged in the same way. Needful as a protest against feudalism, it impedes reorganization when regarded as an abstract and absolute truth. In point of fact, men are born with vast inequalities, which the progress of civilization tends not to level, but to accentuate. Take again a third doctrine of this school, the sovereignty of the people. As a solvent of the old social fabric it was most effective. But for purposes of rebuilding it is worse than useless. To suppose that the better qualified are to remain in perpetual subjection to the unqualified is an absurdity. The doctrine of national independence has been overstrained in the same way. The papacy has lost its old power of uniting nations; but in some way or other it will remain desirable for Europe to retain some control over her constituent elements. And finally we have to apply to the revolutionary doctrine the test which proved fatal to its rival. Is it consistent with itself? Obviously it is not. In the first place, this so-called doctrine of progress has often been shamelessly retrograde, as when it sought under Rousseau's guidance to revert to a so-called state

of nature in which art, industry, and science would be needless excrescences. The tragic fate of Lavoisier is a startling example. Again, in defending its theories it has invested them with a sort of religious sanction borrowed from the theological system. It has set up an attenuated Christianity as a substitute for Catholicism, insisting on the need for some theological creed. While protesting against feudalism, it has given a new impulse to the military spirit, and has justified attacks on weaker civilizations on the specious plea of helping their advancement.

Thus the revolutionary and the retrograde school are both alike open to the charge of inconsistency. Their incessant antagonism and the alternate victory of each, neither being able to crush its rival, has resulted in the rise of a third party, which puts forward claims to reconcile and amalgamate them; the party which calls itself conservative, and which aims at imitation of the English constitution—a system adapted to English history and politics, but wholly unadapted to other Western countries. The oscillation of those parties has come to be regarded as normal and inevitable. On only one point are they agreed: each and all of them treat with indifference or hostility any attempt to seek for fixed scientific principles on which political action may be securely based. Such principles can only be discovered by the few who have qualified themselves for the search. To determine the value of a social institution is an extremely arduous and delicate task. For against the best of them, or in support of the worst, there is always much to be urged; and it is no light or easy matter, it needs the most instructed and the most comprehensive judgment, to strike the balance of approval or rejection. Meantime, as everyone thinks himself qualified to judge, the crop of extravagant propositions offered for acceptance increases daily. So far these aberrations have been in the main confined to public life; private and domestic morals have been left untouched. But this is only a question of time. Divorce, free-love, and other protests against traditions hitherto held sacred will speedily be forced forward. In public life the worst evil is the resort to corruption of every kind, from the coarsest to the most insidious, as the leverage of government. Exorbitant multiplication of functionaries is one form; another is the shameless permission to the privileged few to hold what opinions they please, while free speech is rigidly repressed among the masses. Here the Jesuits have set an evil example, which the politicians of every school have not been slow to follow.

Needless to say that scientific research into social phenomena

has been disregarded and discouraged, It is sought to remodel institutions without any care for the principles on which they are to be founded. Work that belongs to the spiritual sphere has been engrossed by the temporal. Governments are striving, and with miserable failure, to fill the office of thinkers. The result is that the greatest problems are entrusted to men utterly unfit for the task; lawyers and literary men, whose sole faculty is that of stringing sentences together cleverly, having neither the training nor the intelligence qualifying them to distinguish truth from error. Never was there a time in the world's history when mediocrity had such chances of success.

Thoughts like the foregoing might well inspire despair, were it not for the principles laid down in the previous volumes of this treatise.¹ But as, in other and simpler domains of thought, the fictions of theology and the cloudy abstractions of metaphysics have been replaced by the clear and definite conceptions of positive science, so it will be here, and that speedily. The separate elements of the positive solution exist; they have only to be united in a systematic whole. Social phenomena form no exception to the other phenomena of nature, except that, being more complex, their reduction to positive laws has been longer delayed. But in them, as in all others, the adoption of the positive method is certain, whether or not the particular application of the method here presented be the right one.

Remark first that this method fulfils the canon of consistency. Not merely does it take into account all aspects of existing civilization, but it embraces all transformations in the past history of man—a condition in which theological and revolutionary thinkers utterly fail. The evolution of Humanity takes its place as part of the general system of nature. The method is the same throughout. There is no break.

Teaching of this kind will find points of contact with the most opposite schools, rendering scrupulous justice to each of them. Its guarantee for Order is beyond dispute. Science has no other object than to establish order in the region of intellect, and on this all other kinds of order ultimately depend. Positive polity will control the revolutionary spirit, because, by showing the true services which the revolution has rendered, it can assign their proper limits. All that is useful in the revolution it will assimilate. Again, many social questions, scientifically examined, will be seen to turn not on

¹ *I.e.*, vols. i-iii of the *Phil. Pos.*—ED.

government, but on public opinion and improved morality. So viewed, they cease to be material for political faction. Further, the positive spirit has no pet theory of government to be pressed at all costs irrespective of time or place, as when it was sought to civilize Tahiti by the Protestant religion and a parliament. In some difficulties it will be frankly recognized that a radical cure is impossible, and that wise resignation is the proper course. A final security for order is that the positive method tends to eliminate incapacity. It can hardly be handled effectively by those who have paid no attention to the simpler phenomena of physics or biology.

As to guarantees of Progress under the positive system, they are obvious and certain. It is from the growth of scientific discovery that our distinct conception of progress has arisen. Christianity no doubt brought with it the idea of an advance upon the old dispensation. But its political type was fixed, and precluded farther advance. Progress in the revolutionary philosophy is mainly limited to the removal of restrictions—a purely negative result. And even here it is to the positive rather than to the metaphysical spirit that the elimination of theological institutions is really due.

By far the most important department of progress is that which relates to the betterment of the mass of the population, the most urgent and arduous problem of our time. And none will so conclusively prove the superiority of the positive school. The revolutionary mode of handling it is either to make it easier for men of exceptional power to rise from the ranks, leaving those behind them just where they were, or else to indulge in mischievous dreams of abolishing private property and of equalizing all human lots. Scientific study of the laws that govern the social fabric will reassure the friends of order against subversive schemes, will define the limits of temporal and spiritual powers in effecting social improvements, and will interpose an independent moral authority between workmen and their chiefs capable of arbitrating and of pacifying their strife.

Such being the vast field of public utility opened out by the reduction of social phenomena to scientific laws, it might be thought that students of the other positive sciences would hasten to occupy it. But a serious obstacle to this course is the absorption of these men in their own specialities, causing them to shrink from all that is comprehensive and general. And yet, so long as this unreasonable clinging to speciality continues, the two rival schools whose incompetence we have been discussing will retain their ascendancy.

The very process of applying scientific method to the facts of social life implies the subordination of the special to the general point of view. What is needed is that the various aspects of human life shall be looked at in their relation to one another, in order that due proportion be observed between the purposes to be aimed at. Unless, and until, the positive school takes this attitude, the theological and revolutionary schools, which in their own erroneous way strive to deal with life as a whole, will retain their influence, and the disastrous oscillation between them will not cease.

COMTE'S PREDECESSORS

There are two reasons for the imperfect condition of sociological science. One of these was pointed out in a previous paper.¹ It is more complicated than physics or biology; and biology can hardly be said to have been constituted as a distinct science till the beginning of the nineteenth century. But there is another reason. The fundamental problem of sociology is to discover the laws of social evolution. It follows that the phenomena of evolution must first present themselves to the student on a sufficiently extended scale. Aristotle had only Greek history before him. But to this the modern observer adds the facts supplied by the Roman Empire, the mediæval Church, and the five centuries of modern history culminating in the Revolution.

It is obvious that the greatest thinkers of antiquity had no conception whatever of a progressive growth of society in accordance with natural laws. Their tendency was to credit the legislator with unlimited powers of moulding society into any shape he pleased. Plato offers a very striking type of this state of mind. He put forward an ideal of a society² which was to be governed by philosophers, and in which the two fundamental institutions of the family and property were to be suppressed; on the whole, perhaps, the most notable example of systematic wrong thinking ever given to the world. Aristotle's refutation³ of these mischievous delusions may be read with profit. It is penetrated through and through with the positive spirit; that is to say, with the sense of reality and utility, of organic construction, and of human sympathy.

By refuting Plato, Aristotle had laid the foundation of what Comte calls Social Statics, the science which answers to the study of equilibrium in mechanics. In this branch of sociology we study

¹ That on "The Ladder of the Sciences," in Part II.

² In the *Republic*.—ED.

³ In his *Politics*.—ED.

the permanent conditions which make society, in whatever time and place, possible. Social Dynamics, on the other hand, which regards society as an organism having its own special laws of growth and development, was as foreign to Aristotle's mind as to other thinkers of his time. The greater part of his treatise, though full of striking observations and thoughts, is occupied with the discussion of different forms of constitution and government. In all these constitutions slave labour was taken for granted. Aristotle failed to foresee the disappearance of slavery. St. Paul and his fellow-workers, it may be said in passing, were equally blind to it three centuries afterwards.

The first event in history which implanted in the European mind the conception of progress was the establishment of the Christian Church. Catholic teaching insisted on the difference between the Old and the New Dispensations, between the Law and the Gospel. The new did not imply the condemnation of the old; it grew out of it, was founded upon it, went beyond it. The old was fitted to its time, but when the time was past it gave way to something better. It is impossible to exaggerate the importance of this conception. Those who grew up under teaching of this kind were far better prepared to grasp the notion of laws of development in human affairs than were the pupils of Greek philosophical schools. In the thirteenth century, the culminating period of mediæval thought, a yet further step was taken. Abbot Joachim boldly prophesied that, as the reign of God the Father was followed by the reign of God the Son, so this in turn would be succeeded by the reign of the Holy Spirit. Joachim found many listeners. But the decline of Catholicism had begun before this audacious thought could work its way to the general acceptance of Christendom. The Protestant sects never rose to this height.

But, though Christianity made it in this way easier for men to form the conception of a progressive society, it raised new obstacles of its own. It set up an absolute type of perfection beyond which there was to be no advance. Renan closes his celebrated *Life of Jesus* with the words, *Jésus ne sera pas surpassé*. If Renan could say this, what has been the effect of Christian dogma on those who accepted it unreservedly? The Catholic Church prepared the way for the idea of progress; Catholic doctrine has thwarted it.

In the fourteenth and fifteenth centuries the decline of the Church as a social and political power went on rapidly; and meantime there came the Renaissance of art and science. The first effect of this was to impress students of Homer, Virgil, and Cicero with the

immense superiority of ancient writers over modern. Men debate even now, and some may continue, perhaps, to debate till doomsday, whether or no Shakespeare and Dante are greater than Æschylus or Homer. On the whole, the Renaissance of literature and the classical system of education that followed from it have done more to discourage the notion of progress than to promote it. But the Renaissance of science had a wholly different result. Here the handing on of the torch from Greeks to Arabs, and from these to the schools of Western Europe, had consequences that no one could possibly mistake.

To take an instance. The later Greeks laid the foundations of some sort of algebra. In the hands of Mohammed ben Musa and other Arabians it became a distinct branch of science. Leonardo of Pisa and other Italians went on with the work from the thirteenth to the sixteenth century. The great Frenchman Vieta, followed by our own countryman Harriott, carried it still further, up to the time when the creative genius of Descartes, by using algebra as an instrument for generalizing the problems of geometry, gave it an entirely new meaning and purpose. So again in mechanics, Galileo began where Archimedes left off. In astronomy the same thing is equally obvious. The Arabs went on studying Ptolemy's version of Hipparchus from the ninth to the thirteenth century; and, being better instrument makers than the Greeks, made better observations of the stars and planets. Copernicus and Kepler inherited their results, with consequences that need not be repeated here. Thus the first clear conception of the progress of Humanity is due to the scientific spirit. It was a great mathematician, Pascal, who first defined it clearly in his celebrated aphorism: The long succession of the generations of mankind may be looked at as a single man, ever living and ever learning. Francis Bacon had said something of this kind before; and if Bacon had devoted more time to exact scientific study and less to worldly ambition, he might have said it more effectively and with less disdain for predecessors who were in many respects his superiors.

But the establishment of the fact of progress is a very different thing from the establishment of the science of Sociology. Progress, taken by itself and without reference to the order of which it is the development, is always a misleading, often a very mischievous, word; all the more that it can be used with so very slight an exertion of the reasoning faculties. Men knew that the planets moved many centuries before it was known how they moved. It has been obvious since the beginning of the world that plants and

animals grow; but the scientific study of their growth is a very recent matter, and is still extremely imperfect. In the science of living bodies there are two divisions which, for the purposes of study, have to be examined in the first place separately, though afterwards to be recombined; the study of structure, the study of function: often spoken of as anatomy and physiology. And as with the life of the individual, so with the life of the social organism, we have to study separately social structure and social growth: order and progress. And in the second case, as in the first, those have to be looked at in connection with their environment. For action and reaction between organism and environment, tending towards adjustment but never reaching it, is that which constitutes life, whether individual or social.

The conception of progress as the development of order, of the evolution of Humanity in accordance with definite and assignable laws, is the work of the nineteenth century. In the main it is traceable to Comte's great discovery of 1822, commonly spoken of as the law of the three stages.¹ But no discovery was ever made without many anticipations of it by previous thinkers. And of all men since Aristotle, Comte was the readiest to acknowledge forecasts of this kind.

One of the first to apply scientific method to social phenomena was Montesquieu, in his great work, *The Spirit of Laws*, published in 1748. That social and political arrangements were subject to the control of natural laws Montesquieu saw clearly. He was well versed in the science of his time; and, indeed, he was the first to make a satisfactory attempt to define what a natural law was.² "Laws," he begins by saying, "are necessary relations springing from the nature of things." This is vague, but he goes on to explain: "These rules by which the world is governed consist in constancy of relation. When two moving bodies are brought into contact, motion is received, increased, diminished, lost, in accordance with relations of mass and velocity. There is uniformity in every difference. There is constancy in every change." Behind the laws that men make for themselves, he goes on to say, there lie the laws that they are powerless to alter—the laws of their nature and their environment.

¹ Formulated by Comte in 1822 as follows:—"From the nature of the human intellect each branch of knowledge, in its development, is necessarily obliged to pass through three different theoretical states: the theological or fictitious state; the metaphysical or abstract state; lastly, the scientific or positive state."—ED.

² See Laffitte's *Grands Types de l'Humanité*, vol. ii, pp. 292-93.—ED.

Two years afterwards the great thinker and statesman Turgot, then a very young man, wrote his *Second Discourse on the successive advances of the human mind*,¹ in which he renewed and expanded Pascal's thought on the continuity of mankind. This discourse contains a very remarkable anticipation of Comte's law of the three stages, to which, however, no attention seems to have been directed till after Comte's death. The explanation of phenomena, first by supernatural agencies animated by human passions, then by abstractions, finally by mathematical laws, is clearly indicated. But no use is made of this thought as the foundation-stone of positive philosophy. Nor was it possible that it should be so regarded. Science for Turgot, as for Montesquieu, meant mathematical and mechanical science. The sciences of chemistry and biology were not as yet thought of as distinct branches of knowledge. Without biology there can be no true sociology. Apart from the conception of the series of the sciences following in the order of their increasing complexity, the law of the three stages remained barren of social result. How these two abstract conceptions were kindled by Comte's genius must be stated afterwards. The same remark may be made of Hume's remarkable essay on the "Natural History of Religion."²

Another great thinker must be numbered among the predecessors of Comte. In 1784 Kant wrote his *Conception of Universal History from the Point of View of World-Citizenship*. In this striking essay of twenty pages Kant attempts to show how the antagonisms of individuals and of societies are all working by a process of natural development towards final harmony; and, further, that the clear perception of the tendency towards such harmony will be itself one of the motor forces making for the ultimate result.³

Finally, we come to Condorcet, of whom Comte spoke always as his spiritual father. So much has been said of him in this *Review*⁴ that a very few words will here suffice. In Condorcet's essay on the *Progress of the Human Mind*⁵ we have the thoughts of Turgot and of Kant illumined by the flame of revolutionary enthusiasm which the certainty of death at the hands of unworthy

¹ *Deuxième Discours sur les progrès successifs de l'esprit humain*, delivered at the Sorbonne in 1750.—ED.

² 1757

³ See close of paper on "The Centenary of Kant" in Part V.—ED.

⁴ See the *Positivist Review* of November and December, 1893, and August, 1894.—ED.

⁵ *Esquisse d'un Tableau historique des progrès de l'esprit humain*, 1793.—ED.

colleagues and the wreck of his highest hopes for the immediate future were unable to quench. Of the ten chapters of his work the title of the ninth is worth quoting as indicating how inseparable in his mind were the intellectual and social movements: "From Descartes to the Establishment of the French Republic." That he was blinded by the ardour of his imperfect creed to the services rendered by the mediæval Church, and that he lived before Gall had incorporated the study of the higher functions of the brain into biological science, involved shortcomings in his work which it was one of the first tasks of Comte to rectify.

One word as to the economists of the eighteenth century, who have been sometimes classed among the first founders of sociology. That they played an important part in the movement of their time by removing the fetters of mediæval industry is certain. But their claim to create a distinct science of wealth apart from the study of society as a whole has done more to retard sociological science than to promote it. From this reproach, however, Adam Smith and Hume must be held exempt, for no such claim as this is to be found in their writings.

METHODS OF RESEARCH

That Sociology is in a far less perfect state than Physics or Biology is due partly to the complexity of its phenomena, partly to their connection with human interests and passions. But we see in its growth just the same stages as in other sciences: a theological and a metaphysical stage, and at last a dawning stage of positivism. Here, as in other sciences, we find the positive stage distinguished from the two former—first, by building on facts rather than on fancies; secondly, by looking at principles not as absolute dogmas, but in relation to their surroundings; thirdly, by the recognition of natural laws governing any artificial arrangements which man may make. Many politicians formerly, as some even now, evolved from their own minds what they thought was the best constitution; they maintained it to be the best, not merely for this or that country now, but for all countries in all times; and they believed it to be a panacea for all human ills. The constitution-mongering that went on during the French Revolution is the completest type of this state of mind. There is plenty of it still; but wise men are beginning to reckon it with the dreams of the alchemists. Adherence to fact, relativity of principle, recognition of natural laws controlling though not dispensing with human intervention—these are the features of sociology as of other sciences; and they are all summed

up in the word which is the touchstone of positive science: prevision.

Guided by the great principle of the consensus of all the parts of an organism, the scientific observer looking at a single part is often able to tell what the other parts will be like before he sees them. A thigh-bone was brought to Owen¹ from New Zealand; he saw it to be the bone of a bird of a particular class, and constructed the rest of the skeleton. Subsequent discovery of other bones showed his prediction to be very nearly true. In India, the varied races of which form an epitome of human progress, the discovery of polyandry in a mountain tribe will at once be recognized as compatible with many social virtues, and the tribe will be dealt with by the magistrate accordingly. Here, again, we have prevision of the whole from a part. A far more striking instance of scientific prediction in sociology is offered in M. Laffitte's striking analysis of Chinese civilization a quarter of a century ago,² when the Tai-ping rebellion seemed to threaten it with extinction, and Anglo-Indians were looking forward to the seizure of new provinces. Careful study of Chinese history, ancient and recent, under the guidance of Comte's philosophy of history, convinced M. Laffitte that these symptoms of dissolution were illusory, and that China would hold her own; although a more effective apprenticeship in the military art would be necessary. Subsequent events, the latest not excluded, have verified this prediction. But it is not to be supposed that all sociological forecasts will be verified, any more than the forecasts of the wisest physicians. It is enough that they are likelier to be true than those of untrained observers.

Everyone thinks he can observe social and political facts. In some sciences a man will admit that observation is difficult, because the facts are far away from him. He knows that he must have an observatory, well fitted with telescopes and other apparatus, in order to be an astronomer. He cannot be a chemist if he has no laboratory. As for biology, he has a notion that it is the business of doctors, and that he had better leave it alone. But, he will say, "surely in the common every-day life of man everyone can carry on observations for himself. We want no instruments, no scientific apparatus here." Now, the first step in social science is to recognize that this is a delusion. Scientific observation of social facts is not less but more difficult than observation of the stars.

¹ Richard Owen, the biologist.—ED.

² See *A General View of Chinese Civilization and of the Relations of the West with China*. Translated by J. C. Hall. (Trübner and Co.; 1887.)—ED.

Science is nothing but common sense systematized and carried a few steps farther. The countryman who chalks his door to keep count of his sales of beer or bread is a rudimentary mathematician. The senior wrangler deals with the same facts, but in a larger and more systematic way. In out-of-the-way places you will still find people who will tell you the time of day or night by looking at the sun or at Charles's Wain. This is rudimentary astronomy, and it is a pity that the pedantry of modern teaching should have driven it out of children's heads. Albertus Magnus, one of the founders of chemistry, got much of his knowledge by travelling about among the miners of South Germany. As for a knowledge of living things, cattle-breeders, gardeners, farmers, village herbalists have a large stock of it, very real as far as it goes, though often mixed up with prejudices and fancies. Such knowledge is the starting-point of science; but it is not science. And why? Because it is unorganized knowledge; because it contains no test for distinguishing true from false; because it supplies no theory by which to link isolated observations into a connected whole. The average Englishman hates the very word *theory*. Nevertheless, without theory there is no science, either in astronomy or in sociology. To observe by the light of a theory is the distinctive note of scientific observation.

The theory may be very erroneous; yet the observations made by the light of it may be in the truest sense scientific; they may enable us to predict. The Ptolemaic theory of the solar system has disappeared. But the long series of Greek and Arabic observations made under its guidance were thoroughly scientific; the accuracy with which eclipses or the place of any planet could be foretold in those days was very considerable. So with old theories before Harvey's time as to the functions of the lungs and heart. They were wrong; but they held together a mass of useful observations which otherwise would have been scattered and lost. All men observe; as indeed do all the higher animals. But to pass from common sense to science, to add new observations to the old, and connect them into a whole, we need a theory. It may be a mere supernatural myth, or it may be a mixture of truth and error; but there it must be. Our observations without it will be a mere heap of bricks and stones. No house will be built. It will be said that observation is warped in theory. Quite true. But it is like the saying that we so often hear in these days: All government is extremely liable to abuse. True; but when the inference is drawn, Let us dispense with government, we demur. The two cases are

analogous. Without government there is no society; without theory there can be no science.

Scientific observation of social facts is therefore not easier, but harder, than scientific observation of astronomical facts, because there is greater difficulty in constructing a rational theory by which to observe. The notion that our close contact with social and political facts makes them easier to observe is as far from the truth as possible. It is just this closeness which creates the difficulty. *On n'observe bien, says Comte, qu'en se plaçant en dehors.* We must get outside the facts if we want to look at them. If we were on the moon's surface, we should not see her to be round. That the earth is round we know, but only by careful reasoning. It is just because we are surrounded by the facts of our social and political life that most of us fail to observe them unless we have a clue to the labyrinth in the shape of a good working hypothesis.

What has happened in the present century is a striking proof of this. Between 1820 and 1830 Comte founded the science of Sociology.¹ He showed the analogy between social organisms and individual organisms; he proved that the former, like the latter, followed definite processes of growth. A host of workers has entered the field which he thus opened. Observations on folk-lore, on the growth of institutions, on the varied forms and history of religions, which had hitherto been scattered through books of travel or gathered into collections of anecdotes, have now a wholly new interest for us as verifications, corrections, or enlargements of Comte's laws of social structure and growth.

Let us pass from the method of direct observation to the method of experiment, which has done such great things in physics and chemistry, and which has been useful in biology, though to a more limited extent. In the higher animals violent interference with an important organ leads in many cases, though not in all, to such general disturbance of the whole as renders resort to this method equally unscientific and inhumane. In Sociology no such thing as experiment is possible, if we mean by it artificial interference with a given social structure for the sake of watching the result. But, in the science of Life, disease and the cure of disease, by lowering or exalting the functions of an organ, often throw new light on its

¹ See *Early Essays on Social Philosophy*, translated from the French of Auguste Comte by H. D. Hutton. A new edition with additional notes, and with an introduction by Frederic Harrison. (George Routledge and Sons; 1911.)—ED.

normal condition. In disease the laws of life are not abrogated; it is only that particular functions go on with greater or less intensity. The study of these modifications is the branch of science called Pathology. There is a pathology of social as well as of individual life. We have but too many examples of social diseases and malformations, crowded cities, crime, pauperism, insurrection, oppression of uncivilized races, and the like, and but too many ill-advised attempts to cure them, to be in want of material for studies of this kind. Pathology of individuals is, by common consent, entrusted to those who have passed through some qualifying discipline. Is it reasonable to suppose that the entire absence of analogous discipline in the case of modern journalism can result in wise counsel?

The third method of research is that known in biology as the method of comparison. Like that which we have just considered, it is, of course, only a special mode of observation, but one sufficiently distinct to be examined separately. First, the different social races may be compared. If we could see the earth at the time when man was still struggling for predominance with other animal races, we should learn more from this comparison than we can now, when, through the lapse of ages, man's superiority has become so vast. Yet even now much is to be gained from the study of family life among the higher vertebrates, carried on in the philosophical spirit which Georges Leroy, the friend of Hume, showed in his *Letters on Animals*, and which Romanes and others have continued in our own day.

A far richer and more available field for the use of this method is the study of human societies which, from racial or from physical causes, have been retarded in their growth, and which, to some extent, reproduce for us the condition of prehistoric man. This is the field to which Mr. Spencer, in the sociological part of his great treatise, has given somewhat too exclusive attention. The mass of material which, with the help of colleagues, he has gathered together in his *Descriptive Sociology* will remain of great value for future students. Unfortunately, Mr. Spencer has missed the significance of what is commonly called "History"—the evolution of Western Europe during the last twenty-five centuries. In the science of life the first business has been to gain a clear, though not complete, conception of man, as the highest and best known to us of animals, and afterwards to throw light on the details of his organization by comparing them with analogous structures in the lower races. From Aristotle to Bichat, Hunter, and Lamarck, man has been the

principal object in view. The study of the lower vertebrates and of invertebrates, fruitful as it has been, was held subordinate to this. Had the study of life begun with protozoa and protophyta, very little progress would have been made.

It is the same in Sociology. Condorcet, in 1794, struck into the right path, however imperfectly he followed it, by concentrating attention on the highest type of social evolution, that followed by Greece and Rome, by mediæval and modern Europe, during the last twenty-five centuries. Here alone can the laws of human progress be adequately studied; for only here, and here only in recent times, has progress been carried sufficiently far to make its existence undeniable. The laws of social cohesion and social movement once established in this highest division of Humanity, light is thrown at once on the more retarded societies who form the majority in our planet. We are enabled to deal with them rationally and humanely. We become convinced that attempts to force our creeds or our drugs upon them at the point of the bayonet are as grotesque as they are cruel. The action of higher upon lower civilizations, when directed by intelligible and humane principles, will lead in the future to great results.

But the first condition is that the laws which have guided the growth of Western civilization shall become known to us. The rest will follow. Till then all attempts to discover the laws of social development in savage races, or to discover how much of their condition is due to climate and how much to organic differences, are apt to lead to mere accumulations of antiquarian knowledge loosely held together by some arbitrary scheme of evolution. To begin the study of sociology with Patagonians, Esquimaux, or Australian negritos, rather than with the societies of Western Europe, is to invert the rational order of study. In all sciences we should begin with what is known best, and then pass to the less known. In the sciences of life and of society it is all-important to gain at once some grasp of the whole organism, and of the consensus of its parts; and this can be appreciated better in the highest types than in lower organisms, like polyps in zoology, or like the nomads of the desert or the tribes of the Congo in sociology. In these the relation of the parts to the whole is far less easy to discern.

It will be asked, Are we not in this way narrowing the field for comparison too closely? Concentrating our attention on one nation, or one group of nations, with what others are we to compare them? The question is important, and the answer will lead us far. Western Europe, as it now stands, contains, it is true, not a very large

number of distinct nations. If we include the populations of North and South America and the new nations now forming in Australasia and South Africa, the field is somewhat wider. But these nations in their present state form but a fractional part of the material to be considered. The present condition grows out of that immediately preceding it, and that again out of the generations that went before, and so onwards through the records of the past as far as they can be traced. In the twenty-five centuries that have passed since the times of Thales and the Persian War there have passed some five and seventy generations. These may be regarded for the purpose before us as so many distinct social organisms, having degrees of similitude with each other which admit of being assigned with great precision. Examination of the points which the first in the series has in common with the last, or of those in which they differ, supplemented by minuter examination of the likenesses and unlikenesses of any one of them to that which precedes or follows it, gives scope for the method of comparison far exceeding anything offered in natural history.

But there is yet more than this to be thought of. Each link in this long series not merely follows the link before it, but grows out of it. The present, said Leibnitz, is pregnant with the future. So it has always been, and will always be. In organic evolution the succession of life on the earth is doubtfully traced through the fragmentary remains of geologic records. Whether the process of succession be the growth of organs in response to the call made upon them, as Lamarck thought, or, as Weismann believes, the modification of germinal plasma in obedience to competitive struggle, or whether both these factors operate in combination with others not yet dreamt of—these things may long remain doubtful. But be the heredity of species as obscure as it may, of sociological heredity there can be no doubt whatever. Evidence accessible to everyone shows clearly that the combined influence of previous generations is an operative force of great and increasing potency acting on each new member of the series as it awakes to life. Thus it is that out of the method of comparison applicable to all individual and social organisms there arises, in the case of man, the new method of filiation. By its help analysis of the past may enable us to foresee the future; not in minute detail, but enough to be of great service in directing our political and social action.

RELATION TO OTHER SCIENCES

In the last paper it was pointed out that the principal field of

study in this science lay in European history during the last twenty-five centuries, and that the principal method of study was the method of Filiation—that is to say, observation of the way in which each generation in turn proceeded from the foregoing and gave birth to the following. The accumulating results of generations constitute a force to which, as the years move on, we are increasingly subject. The living are more and more under the dominion of the dead. It is needful to know the laws under which this dominion is exercised.

This to some seems a slavish doctrine, as though obedience to law were destined at last to crush out individual freedom. But which is the more free—the sailor of old times ignoring, because ignorant of, the laws of scientific navigation, now hugging the shore, now yielding himself to the mercy of the wind and waves; or the sailor of our own time conforming to mathematical and astronomical science as set forth in his *Nautical Almanac*, knowing how to find his place at sea, what at every point he passes is the variation of his compass, what the strength and velocity of each oceanic current, what the probable path of the approaching cyclone? Neither in navigation nor in any other department of man's life are law and freedom opposed. They invariably go together. It is urgent to know the laws of our social existence, that each of us may guide his own life accordingly and help as a citizen to guide the lives of his fellows.

Although the continuous life of Western Europe, Græco-Roman, mediæval, and modern, forms the principal field of sociological inquiry, it is, of course, not the only field. The study of prehistoric man, as imperfectly gathered from relics that have survived glacial periods, or from supposed similitude with the life of primitive tribes as now seen in India, Africa, America, or Polynesia, will yield subsidiary aid. Materials of greater value are supplied by Indian, Peruvian, Egyptian, and Assyrian theocracies; and again by the organized fetichism of China. But the principal outlines must be first drawn out, not, indeed, with absolute fixity, but with that probable and proximate approach to truth which in most of the affairs of life is all we have to work on, and which suffices for practical action. For this we must rely mainly on the evolution of Western Europe and its colonial outgrowths, where the phenomena can be studied in their completest form and with the greatest accuracy. Once having done this, the time comes for throwing fuller light on the details and for confirming or modifying the conclusions reached by study of societies in which, for various reasons, development has been retarded. The almost complete omission of

the study of historical continuity from Mr. Spencer's remarkable work detracts from its claim to be called a Synthetic Philosophy.

The expediency of studying the complete type first, and afterwards the types that are less complete, finds its parallel in the history of biology. Like all other sciences, biology grew out of man's practical needs—the need in this case being the cure of wounds and diseases and the discovery of herbs and minerals that were useful for the purpose. Gradually the structure of man came to be systematically studied. Aristotle, the Alexandrian anatomists, Galen, the Italians of the fifteenth century, and the great Harvey carried on the work with increasing success. All of them, and Harvey especially, gained all the light they could from study of the lower animals, without, however, losing sight of their main purpose. Hunter, Lamarck, and Bichat worked in the same spirit. Bichat, the greatest of them all, worked exclusively on human structure, finding ample scope there for his amazing powers of comparison and co-ordination, and having no time in his short life for other work.

For all of them man was the central goal of study, the standard with which the series of organisms of gradually diminishing complexity has been compared. And as it has been with the science of life, so it must be with the history of human civilization. The highest and fullest type must be the central object of study; unless sociology is to degenerate into collections of folk-lore, interesting as a pastime, but without value for the serious guidance of human life.

I pass now to the relation of Sociology with the other natural sciences. Until it has been brought into line with these, disputes will continue to be raised as to whether it can be looked upon as a science at all. Obviously the history of Western Europe, of which we have been speaking as the central field of work, is not in itself a science. The word *science* is a misnomer when applied to a mere record of events. Diaries of the weather, records of the symptoms of a sick man, biographies of Cæsar or Charlemagne, histories of the Punic War or of the Norman Conquest—all these things are useful and indispensable; but they are not science. Science deals with laws of nature. Its business is to find unity in plurality; the common feature in a mass of details otherwise diverse; the mode in which one phenomenon depends upon another, so that, one of the two being observed, the other may be predicted without observation. A law of nature is a familiar term; it is strange how few, even among philosophic thinkers, have tried to explain exactly what it means. I believe that the first complete

and coherent exposition of it is that given by M. Laffitte in the fifth of his lectures on Comte's *First Philosophy*.¹ I search the *Synthetic Philosophy* of Mr. Spencer for any equivalent explanation in vain. Nor is one to be found in the older philosophic writers, from Aristotle to Kant. M. Laffitte, here as elsewhere rendering explicit what in Comte's writings had been implicit, and therefore not clearly understood, shows the identity of a law of nature with the mathematical conception of an equation. To this I will revert in a subsequent paper.² I speak of it now by way of enforcing the precept so strenuously inculcated by Comte, from the beginning of his career to the end, on the importance of mathematical training for the discussion of social and moral problems. Than a mathematician who remains a mathematician, and nothing more, there exists perhaps at the present day no more useless personage. There was a time for pure algebraists once, but it is past. Nevertheless, it is perhaps from the want of the special discipline that mathematical training gives, more than from any other reason, that the disciples of Comte have, as a body, failed as yet to secure the influence that intrinsically belongs to the Positive school in European thought. The present writer is too painfully conscious of such a defect in his own case not to exhort those who belong to a younger generation to remedy the defect in their own training so far as they may. Once more, there can be no question of reviving Condorcet's dream of applying algebra as an instrument of research to the infinite complexity of social phenomena. It is the logical value of Mathematics that is here in question. It is only in mathematics that the meaning of the words "law of nature" can be precisely apprehended.

So much for the connection of Sociology with the most abstract and general of the sciences. A few words as to its relation, first, with Cosmology—the laws of the inorganic world surrounding us; secondly, with Biology. Under Cosmology are comprehended the sciences known as Astronomy, Physics, and Chemistry. The discoveries of the present century have done much to show the intimate correlation of these sciences; but they have done nothing to disturb the order of succession in which, as Comte showed in 1825, they can be most conveniently presented to those who wish to understand clearly man's position in the world. It is quite true that to a superhuman intelligence, placed outside our solar system, its evolution

¹ See Laffitte's *Philosophie Première*, vol. i, pp. 167-96.

² The paper on "Laws of Nature" in Part II.—ED.

many million centuries ago from nebulous matter might present itself as a single physical or mathematical problem. But as our intelligence is human, and not superhuman, we have to study things as best we may with our limited faculties. Our dependence on astronomical conditions has to be looked at quite separately from our dependence on terrestrial conditions. No clear conception of human destiny can be formed without understanding how it is connected with the earth's distance from the sun, with her periods of rotation and revolution, with the inclination of her axis to the plane of her orbit, and other facts belonging to the same branch of science. A moment's thought will show us how all the arrangements of life hang on the calendar. Few are aware of the vast sum of intellectual effort expended on determining the length of the year. Perhaps one in ten thousand of those that cross the sea may know something of the genius and the toil that have gone to the making of the *Nautical Almanac* by which the ship's path is guided day after day.

The bearing on human life of gravitation, electricity, heat, light, chemical affinity, has been examined in this course of Positive education under the head of Biology.¹ Merely noting that these things need again to be called in mind by the sociologist when dealing with such facts as those of climate, or again the facts of human industry, we may pass at once to the direct relation between Biology and Sociology. Far the most important of these points of contact lies in the highest functions of life—the functions of the brain.

In the last of the biographies in the *New Calendar of Great Men*, the life of Gall, there is a reference² to Comte's purpose of combining the points of view of Gall and of Condorcet. Briefly, what this comes to is the necessity for scientific knowledge of human nature before there can be any clear insight into the past or future of mankind. Take a familiar example. Nothing is more common in the controversies of the day, or even in historical writing, than the assumption that all statesmen other than those of the writer's party are actuated by selfish ambitions; that all religious leaders other than those of the writer's faith are scheming hypocrites. Much historical writing in the eighteenth century, even when the writers were such men as Voltaire and Gibbon, is tainted with errors of this kind, springing from false conceptions as to the inherent selfishness of human nature. The *Lives of the Saints* show the opposite

¹ *I.e.*, in ch. xliii of the *Phil. Pos.*—ED.

² P. 644.—ED.

error. Men whose actions are described as springing from a wholly selfish, or a wholly unselfish, source are as imaginary as angels or mermaids. If we read a history in which men are described as living to the age of nine hundred years, our knowledge of man's physical nature tells us that we are reading fables. And so it is when we read the history of a religious movement written on the assumption that all priesthoods (or it may be all but one) are organized impostures, or, again, that all governments are systematically malevolent to their subjects. The course of civilization creates no new instincts; destroys none that existed before it began. All that it can do is to modify—to strengthen some, weaken others, and so make continual approach towards an ideal of harmony that can never be fully reached. Thus, he who would explain—*i.e.*, reduce to law—the course of history must first understand the elementary psychology which man shares with the higher vertebrates. To handle the problems of the history of civilization without knowledge of the elements of which human society is composed is as though a blind man should set himself up as an observer of the stars.

There is another point of view from which it is equally important that the sociologist should be familiar with biological results and methods. He has often to maintain the principles of his science against unreasonable encroachments from biology. The most notable instance of this is the preposterous importance given in the last half-century to racial differences—sometimes real but trifling, sometimes purely imaginary—which has been equally disastrous to historical studies and to practical politics. Events of every kind, from the fall of the Roman Empire to Protestantism, the French Revolution, or the latest Irish quarrel, are accounted for with fatal facility by imaginary organic differences between Roman, Celt, and Teuton. The sociologist may be sceptical of these conclusions, but they can only be dissipated by showing the entire absence, or at least insufficiency, of biological evidence for them. In any case, the problem of distinguishing between what is due to physical heredity and what to sociological filiation is one which the sociologist unversed in biological method will find it impossible to determine.

Such being the relation of Sociology to Mathematics, to Physics, and to Biology, how does it stand with reference to the final science of Ethics—the science of human life and conduct? This is a question not to be answered in a page or an article—hardly even in a volume. But one remark may be made with which this series of papers will close. The study of man consists of two divisions, elementary and final, between which the science of Sociology is interposed. In the

first¹ we study man as the highest of the vertebrates, in bone, muscle, and other organs resembling and not surpassing the rest; in brain superior, but with no instinct, propensity, or faculty which they do not share with him in various degrees. To have established this conclusion is the immortal service rendered by Leroy and Gall. They showed that the instincts which found the family are the same in all. The social affections of friendship, and even of veneration and pity, may be traced far down in the scale. Most of them were capable of founding rudimentary societies; though to one race only could it be given after long prehistoric struggles to establish its mastery over the planet.

To this elementary study of human nature succeeds the final study² of man as the creature of Humanity. Between the elementary knowledge of primitive man and the final knowledge of man's duty, conduct, ideals, hopes, fears, the science of Sociology intervenes, unfolding the gradual course of human destiny under the influence of religion, government, language, war, industry. *Entre l'homme et le monde il faut l'Humanité.*³

II

A SOCIOLOGICAL SOCIETY

ON June 29⁴ a small meeting was held at the rooms of the Statistical Society to consider whether a society should be founded for the scientific study of Sociology. Many schools of thought were represented at the meeting. Professor Geddes, Mr. J. A. Hobson, Mr. L. T. Hobhouse, and Mr. Benjamin Kidd took part in it, with several others, among them the present writer. Some doubts were expressed on the point whether such a society, if formed, would encroach on ground already occupied by other associations. But ultimately it was decided to proceed with its formation.⁵

The few remarks made by myself raised the question whether the conception of Sociology as a distinct science was sufficiently clear and well defined to enable us to avoid mistaking mere collections of social facts, or bundles of crude, undemonstrated opinions,

¹ Biology.—ED.

² Ethics.—ED.

³ "Between Man and the World we need Humanity."—Comte, *Appel aux Conservateurs*; 1855.—ED.

⁴ 1903

⁵ Now the Sociological Society of London.—ED.

for conclusions based, like those of biology or chemistry, on scientific laws. This, I suggested, was the question which should, in the first place, occupy the attention of such a society as it was proposed to form. A striking illustration of the need for adopting some such procedure as this is afforded by the fate of the Social Science Association, founded forty or fifty years ago, and long since deceased, after holding many congresses and carrying on its operations for a quarter of a century. Undoubtedly it did in its day much useful work. In its volumes of transactions are to be found many valuable memoirs on law reform, on criminal legislation, on trades unions, on temperance, on pauperism, on primary education, on public health, and on many other important subjects. But, whatever else this Association might be called, the last epithet which could be applied to it was "scientific." The note of science is to discover natural laws, and by means of such laws to predict phenomena before their occurrence or before opportunity for direct observation of them has been afforded. Prediction, as Auguste Comte long ago explained, is the test of science. Thus, for example, the knowledge given us by geometry of the mutual relations of the sides and angles of a triangle enables us, if one side and the adjacent angles be given, to predict the remaining sides, and thus, for instance, to determine the height of a tower while we have no means of measuring it directly. Thus the astronomer, equipped with his calculus and with the law of gravitation, can assign the position of a planet on any day and hour of a past or future year. Thus, again, the biologist, from the thigh-bone of the extinct and unknown *Dinornis*, was enabled to reconstruct, with near approach to accuracy, the entire bird. It is needless to multiply illustrations; they form the substance of all that is properly to be called science, as opposed to mere collections of facts or bundles of opinions. It is, of course, obvious that the power of precise prediction varies with the complications of the facts. If, for instance, the planets were more nearly equal to one another and to the sun in mass, their mutual gravitations would be so complex that the precise laws of their motions would be perhaps undiscoverable by man's very limited intelligence, and we should have to content ourselves with very imperfect approximations to the truth. Such approximations are all we can hope for in such complicated phenomena as those dealt with in the phenomena of biology and sociology. Nevertheless, the test of scientific treatment is the same there as elsewhere—prediction. Our aim must always be to be able to solve problems of this kind: Given a definite change in the environment of an organism (whether

it be a society or an individual), predict, so far as we can, the changes that will result in the life of that organism.

However this may be, the point on which stress should be laid is that what we want is not the piling up of masses of new material, but the search for natural laws, both of co-existence and of succession, which shall enable us to interpret the facts already before us. The first great step in this direction was made eighty years ago by Auguste Comte, who may be justly called the founder of Sociology, although no one has more clearly pointed out the debt due to his predecessors—Kant, Condorcet, Montesquieu, and others. I am disposed to think that, if a society for the cultivation of sociological science be founded, it could adopt no wiser course than to take the forty-eighth lecture of Comte's course of Positive Philosophy as a guide to its initial operations. This lecture deals with the "Characteristics of the Positive Method in its Application to Social Phenomena." It will be found in the fourth volume of Comte's *Philosophie Positive*, pp. 209-336. This corresponds to vol. ii, chap. iii, of Miss Martineau's condensed translation; here, however, as elsewhere, the condensation misses many points of the original.

My reason for the choice of this passage of Comte's works as a sort of preliminary text-book to guide the operations of a sociological society is that in it he has treated, in the most general and abstract way, and apart from special applications which would arouse immediate controversy, the two essential aspects of the science—the statical and the dynamical; in other words, the consensus of the social organism and its processes of development. Doubtless, those who regard Comte, as the present writer has for many years regarded him, as the greatest thinker of modern history will go farther than this; they will study the fifth and sixth volumes of the *Philosophie* and the second and third volumes of the *Politique*. I am merely suggesting the chapter of which I have spoken as a sort of platform on which students of sociological science may agree to meet for discussion.

To dwell thus at starting on the consensus of the social organism will ensure the scientific character of the proposed society by giving prominence to that side of Sociology on which its relation to the allied science of Biology is most distinctly visible. Notwithstanding all that has been said by Comte, and by writers more or less under his influence, much remains to be done to make the thought of this consensus sufficiently precise and certain to serve as a basis for prediction; as it has so often served in the case of individual organisms. The attempt to do this will in any case save the society

from the danger of wasting its energies on special studies of this or that aspect of social life, pursued without regard to the life of the organism as a whole, as in the case of the pseudo-science of political economy fifty years ago.

With regard to social dynamics—the study of the natural laws underlying the succession of generations of which our own is the outcome—one of the principles to be borne in mind would seem to be this. In Biology it is a habit with naturalists, and, indeed, it is almost unavoidable, to take the most complicated of organisms—man—as the standard to which lower and simpler organisms should be compared, each, of course, in its appropriate degree. So should it be with the series of successive generations that form the subject-matter of Sociology. It is on the later and more highly evolved generations that attention should, in the first place, be chiefly concentrated. The study of the earlier forms of society will, of course, throw light on the later. But we should guard against the danger, which experience has shown to be a real one, of studying primitive forms too exclusively. Under the plausible pretext of beginning at the beginning, sociological societies may drift, as anthropological societies have already drifted, into disquisitions on the life and manners of prehistoric man, in which the facts are sometimes as dubious as the conclusions drawn from them. A latent desire to avoid burning questions may lead to a dissipation of energy in the agreeable regions of folk-lore. But it may be noted that, if the science of biology a century and a half ago had begun with Protozoa, it might be absorbed in Protozoa still. Happily, the common sense of mankind saw to it that it began with Man; without prejudice, and, indeed, with great advantage, to our insight into the lower forms of life. So it must be with Sociology. The highly elaborated social life of recent centuries must be the main field of study. Practical wisdom coincides with theory in dictating this course. Those who open the great book of history should read not for amusement, but warily. Rightly interpreted, it may disclose the secrets of destiny.¹

¹ A fuller exposition of Dr. Bridges' views on this subject will be found in his paper on "Some Guiding Principles in the Philosophy of History." See *Sociological Papers*, vol. ii (Macmillan & Co.; 1906), or the volume of *Essays and Addresses* (Chapman & Hall; 1907).—ED.

III

COMTE AND SPENCER ON SOCIOLOGY.

MR. SPENCER'S *Autobiography*¹ is now before the world. Autobiography, when courageous and frank, is nearly always interesting; and where the writer has played a prominent part in life the interest is extreme. These conditions are united in Mr. Spencer's book, which, however, it is not my purpose to discuss on the present occasion. I refer to it only for the light it throws on a point which has been much disputed—the relation of the philosophy of Spencer to that of Comte.

Briefly stated, Mr. Spencer's position is (a) that his first work, published in the autumn of 1850, under the title *Social Statics*, was written without knowledge that Comte had given a similar title, though with a different meaning, to one of the divisions of the *Philosophie Positive*; (b) that when, in 1851, he was brought into close intercourse with such students of Comte as George Henry Lewes and George Eliot, and was persuaded by them to read portions of Comte for himself, the influence exercised upon him by Comte, which he admits to have been very great, was the influence, not of agreement, but antagonism.² The process of refuting Comte gave him conceptions which he would not otherwise have formed. Let us look separately at these points.

The expression "Statique Sociale" was used by Comte in the forty-eighth chapter of the *Philosophie Positive*, as one of the two divisions of "Physique Sociale," or "Sociologie"; the other division being called "Dynamique Sociale." The distinction, as Comte defines it, is analogous to that between organization and life in biology. In practical life it corresponds to the distinction between Order and Progress. In the title of the fiftieth chapter, which is specially devoted to the subject, *Social Statics* was defined as "the general theory of the spontaneous order existing in human societies."

Mr. Spencer tells us in his *Autobiography*³ that when his own treatise on *Social Statics* was written he knew nothing more of Auguste Comte than that he was a French philosopher. He tells us further that the title which he had originally proposed for the book was *A System of Social and Political Morality*. Owing to the advice

¹ *An Autobiography*. Two vols.; 1904.—ED.

² See *Autobiography*, vol. i, pp. 444-46.

³ Vol. i, pp. 358-59.

of friends, he changed the title first to *Demostatics*, and subsequently to that which it ultimately bore.

Everyone will accept Mr. Spencer's assurance that at the time of publishing this work he had no direct knowledge of Comte's writings. Moreover, a brief glance at its contents is enough to show how widely its conclusions diverge from those of Comte, especially in all that relates to the functions of government. But the conception implied in the words "Social Physics"—the conception of giving a scientific basis to politics—had been diffused by Comte through European thought for more than twenty years before Spencer began to write. In England John Stuart Mill brought it prominently forward in the final chapters of his *Logic*, published in 1843. Its influence is traceable in Mr. Spencer's own description of the subject-matter of his book, which was, he says¹: "How an aggregate of citizens may stand without tendency to conflict and disruption—how men's relations may be kept in a balanced state; my belief being that the conforming of social arrangements to the law of equal freedom, or to the system of equity deducible from it, ensured the maintenance of equilibrium." Whatever may be said of the last part of this passage, the definitions of Social Statics given by the two thinkers are not widely divergent. The problem, "How an aggregate of citizens may stand without tendency to conflict and disruption," has obviously a close connection with "the general theory of the spontaneous order existing in human societies."

In 1851 Mr. Spencer, as the *Autobiography* shows us, came into close contact with two well-known students of Comte—George Henry Lewes and George Eliot. During the next two or three years the *Autobiography* gives ample proof of the attention given by Spencer to the subject of Comte's philosophy. He held long conversations on the leading principles of Comte with these two friends, and he carefully studied the condensed translation of the *Philosophie Positive*, published in 1853 by Harriet Martineau. Mr. Lewes' rather superficial summary² had appeared a few months earlier. Mr. Spencer assures us that the principal effect produced by his study of Comte was a desire to refute him, and that in the process of refutation many of his own characteristic ideas had their origin. Thus, for instance, his endeavour to expose the fallacies of Comte's Classification of the Sciences led to his essay on "The Genesis of Science," and so helped forward his evolutionary system of philosophy.

¹ *Ibid.*, p. 359.

² *Comte's Philosophy of the Sciences*; 1853.—ED.

The fundamental distinction between Comte's philosophy and Spencer's is stated very clearly by Mr. Spencer himself in a letter to G. H. Lewes, which will be found in the second volume. Lewes (p. 111) had criticized the strictures contained in Spencer's well-known pamphlet, *Reasons for Dissenting from the Philosophy of M. Comte*. Spencer replied in a long letter, which forms Appendix B. From this I extract the following significant passage (p. 488):—

The other important point is that raised in your question, "Was not Comte the man who first constructed a philosophy out of the separate sciences—and is not that your aim also?" Here, it seems to me, is the chief source of difference between us. I venture to think that you are assimilating two wholly different things—endeavouring to establish a lineal descent between systems which are not only generically distinct, or ordinally distinct, but which belong to distinct classes. What is Comte's professed aim? To give a coherent account of the progress of *human conceptions*. What is my aim? To give a coherent account of the progress of the *external world*. Comte proposes to describe the necessary, and the actual, filiation of *ideas*. I propose to describe the necessary, and the actual, filiation of *things*. Comte professes to interpret the genesis of *our knowledge of Nature*. My aim is to interpret, so far as it is possible, the genesis of the *phenomena which constitute Nature*. The one end is *subjective*. The other is *objective*. How, then, can the one be the originator of the other?

Now, this statement of the difference between the Comtian and the Spencerian synthesis will be accepted by most disciples of Comte. Words used by the present writer of the philosophy of Descartes emphasize a similar distinction:—

The positive synthesis of Descartes was an objective synthesis, an attempt to deduce all the phenomena of the universe from a single principle by mechanical progress mathematically calculated. Though destined to fail, the attempt was of vast importance, both as an incentive to mathematical and physical speculation in the hundred years that followed, and as a proof that a future synthesis must rest on a different principle. Wholly abandoning the attempt to consider, much less to explain, the Universe as a whole, the final synthesis avowedly takes Man as the central point, grouping the facts of Nature in orderly arrangement round him. In a word, while not ceasing to be scientific, it is subjective, not objective.¹

¹ *New Calendar of Great Men*, p. 485.

How far Mr. Spencer succeeded with his cosmogony this is not the place to inquire. But the fact that his aim was to explain the universe is no proof, as he seems to think it was, that he was not influenced by a previous thinker whose more modest and more philosophical aim had been to explain man's *relation to the universe*. Descartes was helped on by Vieta, and in his turn acted powerfully on Newton, though neither Newton nor Vieta troubled himself about cosmogonies. That Spencer was indebted to Comte for the conception of sociology as a distinct science, founded on the basis of other sciences, and proximately on the science of biology, is a statement too obvious to need discussion. Mr. Spencer himself admits Comte's priority, though he denies his own indebtedness. But priority in such a matter, extending as it did over nearly a generation, is decisive.

What we have now to consider is whether the work of the later thinker shows a real and important advance over the results achieved by the earlier.

The most striking difference between the two lies, not in Social Statics, but in Social Dynamics. In the conception of human society as an organism, displaying the two characteristics of organisms—specialization of structures and functions combined with *consensus*—the two thinkers are substantially agreed. And it will be admitted by most, if not all, of those who look on Comte as the source of the fundamental principle that many of the developments of this principle due to Mr. Spencer are of much interest and value. And here special reference should be made to the collection of sociological facts instituted under his superintendence, under the title of *Descriptive Sociology*.

But when we pass from Social Statics to Social Dynamics—from the study of the *consensus* of the different parts of the social organism to the study of society considered in a state of progressive movement—the student of Spencer is impressed by a singular deficiency. The philosophy of history is conspicuous by its absence. Now, there are many people to whom the importance of this omission is not at first sight obvious. Indeed, in most historical societies and academies at the present time the mere mention of the words "Philosophy of History" is apt to cause a pitying shrug or smile. Leaving specialists, however, let us try to answer the question, What can be hoped for from the use of the historical method in sociology? This question is discussed at length in the tenth chapter of the sixth book of Mill's *System of Logic*. More than sixty years have passed since it was written, but these years

have not in any way destroyed its value. It would have been well if Mr. Spencer could have profited by its perusal.

"The proximate cause," says Mill, "of every state of society is the state of society immediately preceding it. The fundamental problem, therefore, of the social science is to find the laws according to which any state of society produces the state which succeeds it and takes its place."¹

What do we mean precisely by a "state of society"? We mean by it the simultaneous condition of all the greater social facts; the condition of the society at any given time with regard to religious belief, dissemination of knowledge, distribution of wealth, family organization, artistic culture, form of government, relations of classes, and so on. Social Statics shows us a *consensus*, a correlation among these facts; such that, when some of them have been distinctly determined, the remainder may be inferred with a certain amount of precision, in the same way that an anatomist from one or more bones of an extinct animal may infer the rest. Passing from this to the laws which regulate the succession of states of society, how are we to obtain these except from the study of history? Doubtless a standard of historical research must be set up widely differing from that of the learned specialities which at present occupy the almost exclusive attention of historical societies. Discussions of government and of political constitutions must be brought into far more intimate connection with the history of religion, of science, of art, of industry, than is usually done by academies and professors before much advance can be made in the application and development of the laws of Social Dynamics laid down by Comte. Further, it seems evident that, in the first instance, attention should be concentrated on the more highly developed communities, of which records extending through many generations are preserved, rather than on savage or primitive tribes. It can only be from the former that we can derive the data requisite for examining the laws of social filiation. Whatever may be gained from the study of nascent societies, it will throw but little light on the laws of continuity. Authentic and detailed records of the history of a savage tribe through a long period are all but non-existent. Additional reasons may be given for concentrating attention mainly, though not exclusively, on the more civilized nations, one being that their action on the rest is likely to be preponderant.

However approached, the problem is obviously one of great

¹ *Logic*, bk. vi, ch. x, § 2.—ED.

complication and difficulty. But what reason have we for presuming that the changes of states of society should be easier to analyse and predict than the changes of radium? We have to combine the statical point of view with the dynamical—we have, that is, not merely to keep in view the correspondence between each element in a given state of society, but the correspondence between the simultaneous changes of these elements. Indeed, the complexity of the problem would render it almost hopeless but for the fact that one of these elements, although perhaps intrinsically the least energetic, is nevertheless found to preponderate among the agents of social progression. This element, to use Mill's words, is "the state of the speculative faculties of mankind, including the nature of the beliefs which by any means they have arrived at concerning themselves and the world by which they are surrounded."¹ Condorcet, in his *Progrès de l'esprit humain*, was the first explicitly to expound this connection between the progress of the mind and the progress of society, and it is for this reason that Comte gave him so prominent a place among the pioneers of sociology. In any case, the fact that our intellectual functions, though far inferior to the emotions and propensities in energy, should nevertheless prove to be the most potent factor in social change simplifies the discussion of the problem, since intellectual results can be separately and clearly defined, and round them other changes can be correlated.

But what are we to say of a thinker whose conception of sociological science omits the historical point of view as hardly deserving notice; who comes, for instance, to the conclusion, best stated in his own words, that "had Greece and Rome never existed, human life and the right conduct of it would have been, in their essentials, exactly what they are now";² who, in a word, left out of his consideration the essential problem of sociological science—the laws regulating the succession of social states? What can we say but compare him to one who should write a treatise on astronomy without reference to mathematics, to a chemist who should ignore the atomic theory, or to a biologist who should dispense with the comparative method?

There is an ethical side to this matter as well as an intellectual side. The study of the laws of social filiation is one which may well occupy the strongest intellects for generations to come. But, while admitting this, we should never forget that science, here as elsewhere, is but good sense developed and systematized. The

¹ *Ibid.*, § 7.—ED.

² *Autobiography*, vol. ii, p. 37.—ED.

essential truths of the rise and progress of Humanity are accessible to the simplest and the humblest. A child, while learning to count, may be taught his debt to Arabian and Indian forerunners, and thus be helped early in his career to surmount the hateful prejudices of race. Every word he uses, every tool his father or his father's comrades use—the plough, the wheel, the forge, the boat—may serve as an object-lesson of his debt to far-off ancestors. The ship that brings him food from beyond broad oceans tells a tale of a lonely thinker¹ slain in Syracuse more than twenty centuries ago. Countless are the ways in which the child can be brought to the knowledge of Humanity, for the gifts of Humanity are countless.

But of all this the *Synthetic Philosophy* of Mr. Spencer tells us nothing. If feelings of veneration are to be stirred by any of his writings, it can only be veneration for the unknown and perhaps impersonal Power that keeps "thirty million suns" in motion. There is megalomania in philosophy as well as in politics, and the illusion of it is as complete. Weighed against the life of one saint or hero—nay, rather against one act of heroic devotion—thirty million tenantless suns are as dust in the balance.

IV

MR. HOBSON ON THE SOCIAL PROBLEM.

MR. HOBSON'S book² is the work of a philosophic Socialist, who has a firmer grasp than most thinkers of our time of the truth, on which Auguste Comte so strongly insisted seventy years ago, that the attempt to construct a science of economics apart from ethics must inevitably result in failure. A passage from the last paragraph of his volume will indicate his point of view:—

We are faced at every turn by this question: "You say that the collective action of municipalities and States must be enlarged, that their control of industries and their administration of properties must be extended. How is the municipality or the State to be made an effective instrument for such work?" Everywhere the problem drives back into the region of individual character and motive. A well-planned mechanism of democracy, with just forms of political and industrial government, may be rendered quite ineffective by the inability of the community to

¹ Archimedes.—ED.

² *The Social Problem: Life and Work*. By J. A. Hobson. (Nisbet; 1901.)—ED.

control a selfish bureaucracy. This is, in fact, everywhere the crux of democracy. It cannot be securely overcome by the most carefully-balanced series of constitutional checks. The ultimate good working of such a democracy will depend on the intelligence and goodwill which the private citizens bring to bear upon the public life, and upon the existence of corresponding qualities and sentiments in the public servants. Only in proportion as civic life is so strengthened and so informed by common conceptions of social utility that the classes which are specialized for official work remain in deep and genuine sympathy with the body of citizens—so that the welfare of the community, and not the running of an official machine, is the leading motive of their work; while the ordinary citizen directs his intelligence and his goodwill towards public affairs, so as to feel that he can truly exercise some influence upon their administration—do the moral conditions of sound social economy exist.

Mr. Hobson begins by a searching examination into the claims of political economy to supply guidance in social questions. He distinguishes economic writers into new and old: the first, including the period from Adam Smith to Ricardo and Malthus; the second dealing with the modifications introduced by various writers in the second half of the nineteenth century, from J. S. Mill and Cairnes to Marshall and others of our own time. It was no difficult matter to show that the older presentations of the science, if science it is to be called, closely knit together as they were into a "rigid, superficially consistent, intelligible set of doctrines," and admirably devised for the services of the manufacturers and merchants of eighty years ago who were fighting the battle of Free Trade, offered no solution whatever of urgent social problems, had no bearing on the organization of human life, and, indeed, deterred many of the best minds from seeking for the principles on which such organization should rest. It was a laborious and, in many ways, a successful attempt to constitute the science of the production of marketable wealth. An artificial and wholly unreal distinction of productive from unproductive consumption excluded from consideration all that made for the higher conveniences, comforts, and joys of life, all moral and intellectual culture. An abstraction was made of the self-seeking motives of human action, and a forecast was made of the conduct of an "economic man," as unreal as any impossible root in an algebraic equation, who should be guided by these and none others. Crude, imperfect, and severed from the realities of life, this strange construction, nevertheless, served its temporary purpose well. It gave us the Large Loaf, without which England, whether for good or ill,

would have remained an agricultural nation, and the mushroom growth of towns in Lancashire and the West Riding would have been impossible.

During the latter half of the nineteenth century the course of events on the Continent, the action of Carlyle and Ruskin and of the Positivists at home, brought about a new and largely modified edition of the theory. Men began to appreciate the visionary nature of the "economic man." It was felt to be impossible to exclude religion, art, literature, health, enjoyment, and generally all that made life worth living, from the list of forces acting on human conduct. None the less, however, has the attempt to construct a distinct science of economics continued. It was hoped that allowance might be made for all these moral and social disturbing forces, just as allowance is made for the attraction of the planet Jupiter in deflecting the moon from the path which she would follow under the influence of solar and terrestrial gravitation. Social science would result from an elaborate composition of forces. Separate sciences would be formed of each factor in human conduct—economic, political, artistic, ethical; the final problem being to study these forces in combination, and to indicate their resultant.

Now, one of the most valuable chapters¹ in Mr. Hobson's book is devoted to a demonstration of the futility of any such procedure. It proposes, as he truly says, a mechanical solution of what is, not a mechanical, but an organic problem. A machine can be taken to pieces, the action of each part defined, and the resultant action of the whole predicted. But human society is an organism, not a machine. The connection between the whole and the parts is infinitely more subtle. Each part doubtless may and must be successively studied; but such studies cannot form separate sciences. There is not a science of respiration, of circulation, of digestion, of nervous function; there is a science of physiology in which all these functions are correlated.

For a science of wealth to be real, we must be agreed as to what wealth is. Undoubtedly the groups of facts relating to business, to the production of marketable commodities, to industrial and mercantile processes, to monetary facts in general, can be classed together as a distinct branch of study. But this will lead us but a short way so soon as we rise from the conception of wealth as measurable by money to wealth regarded as comprehending all "social utilities" (as Mr. Hobson calls them), or "essential needs of our nature," as

¹ Chapter vi, entitled "The Transition from 'Is' to 'Ought.'"—ED.

they are called by others. This view of the matter is resented by economists as an intrusion of ethics into their science. But Mr. Hobson remarks with truth and point: "Ethics do not 'intrude' into economic facts: the same facts are ethical and economic." To exclude the moral standpoint is to stop your inquiry into the fact half-way. You sacrifice reality to an abstraction.

Thus the substitution of "social utilities" for marketable commodities is the first condition for rendering economic studies available for the solution of the Social Problem. We have to convert costs and utilities from terms of cash into terms of human life. We have to consider the kind and the degree of the efforts which go to the making of the goods: how far such efforts may be brutalizing; how far, as in the case of lead-workers in the Potteries, or of Sheffield grinders, or of phosphorus match-makers, it may be ruinous to health and life. Again, we have to see how far the effort is distributed reasonably among the workers, so that the length of the working-day shall be tolerable. Yet, further, we have to ask: How far are the commodities produced intrinsically valuable? How far are they distributed among the consumers with relation to their needs? If, for instance, a million Hindu peasants produce so many millions sterling in the shape of wheat, themselves starving on insufficient quantities of millet, a large deduction must be made from the commercial value of the product, estimated as social utility. A final question remains: Who, and what, are the consumers? Many will doubt its relevancy; but Mr. Hobson finds little difficulty in demonstrating that "you may increase the wealth of a nation far more effectively by educating the consumer than by increasing the efficiency of the producer."

Our author's mode of realizing these and similar purposes is, as I have said, Socialistic. In Mr. Hobson's forecast of the future a large proportion of the instruments of production is placed in the hands of the State; reserving for individual management only those industries which contain a certain element of artistic originality, and which, as civilization extends, will form an increasing proportion of the whole. Moreover, Mr. Hobson steers clear of the intolerable tyranny involved in most schemes of Socialism by defining in some detail a sphere of freedom for individual action, a degree of individual possession of the means, not merely of bare subsistence, but of wholesome living, with which the State shall not interfere. While repudiating the metaphysical conception of abstract *right*, he retains the word and conception of *right* socially interpreted. In this respect he is in nearer agreement with Comte

than some of Comte's disciples seem to be aware. Comte's word is, *Nul n'a droit qu'à faire son devoir*.¹ This is a distinct declaration that man *has* the right to do his duty. Yet, apart from the possession of certain means, appliances, and opportunities, he is as much incapacitated from doing his duty as any slave or serf. Comte's scheme for the remuneration of labour, as all students of his writings know, is made up of two elements: the first dependent on the special skill and energy of the workman, and on the profits of the enterprise; the second a fixed element, analogous to the "living wage" of modern trade unionists, rated somewhat higher than the average wage paid to unskilled labour. In addition to this, the labourer's dwelling is secured to him as his own. It is manifest, of course, that such remuneration is impossible under our present industrial system, when so vast a proportion of the proceeds of industry is absorbed by a superabundant army of professional men, commission agents, and retailers, by large masses of non-working shareholders in industrial concerns, by holders of land monopolies, and by organizers of Trusts. The fusion of private industries into joint-stock companies, and of joint-stock companies into gigantic Trusts which aim at a monopoly not merely of land, but of some other commodity—oil, iron, corn, or cotton—essential to life, is perhaps the most portentous political phenomenon of our time. So enormous is the danger that, to those who look beyond it, it suggests its own remedy. That remedy is that the community shall do what individuals cannot do—avail itself of its own vast resources to set itself in competition with the monopolists. Changes of this kind cannot, of course, take place without formidable conflicts, and it is probable that such conflicts will occupy the energies and tax the wisdom of the present² and the succeeding century. Out of it a peaceful solution will ultimately emerge; its main outlines being moulded by the slow and permanent extension of the Religion of Humanity. For, in the last resort, the problem is ethical, as is so clearly admitted in the paragraph quoted at the outset of this paper. It is because Mr. Hobson has so grasped this truth that his survey of the industrial problem is distinguished from that of most of those who have handled it, whether from the Socialist or from the Individualist standpoint, by superior comprehensiveness and insight.

¹ "Man's only Right is to do his Duty." From the title-page of Comte's *General View of Positivism*.—ED.

² Written in 1901.—ED.

CHAPTER IV

ETHICS

I

PHYSICAL, SOCIAL, AND MORAL PROGRESS¹

WHAT is Progress? In the first place it is organic growth—a silent, slow process, as contrasted with noisy agitation, the bitter acrimony of political dispute. These things may be necessary, often are necessary; but they are not Progress. If you are perpetually blasting the rock, or scraping the wall, you cannot expect the lichens to grow on it. Nor will the harvest come if ploughing goes on all the year round. When the land is cleared of weeds and well worked with the spade, and the right sort of seed sown, then for the first time Progress begins. No more torturing of the ground then. Leave things alone. Wait the issue. Otherwise there is no growth.

But what does growth result in? (a) Multiplication of cells; (b) Differentiation, Specialization.

(a) The multiplication of elementary cells is one of the lowest forms of Progress, needful as a basis for the rest, hurtful and destructive when exclusive. Here biological parallels are very instructive to us. Cancer is an undue multiplication of elementary cells at the expense of higher and more complicated tissues. This growth is extremely rapid. Another instance of mere multiplication is that of the rabbit in Australia. Who cannot see that the same thing holds good of men, both in overcrowded communities and in new countries; in England, since the introduction of the steam-engine, with an unbounded commerce; and in the United States with, till lately, a vast area of unoccupied land? It is easy to see that multiplication by itself—the mere increase of numbers—is not Progress.

(b) Now let us come to differentiation. The germ, whether animal or plant, is all of a piece—*homogeneous*. Presently, as cells

¹ A posthumous paper.—ED.

multiply, some of them elongate and harden and become fibres, others join themselves endwise together and become tubes, others remain simple cells. In short, *tissues* form. In animals some of these tissues receive impressions of light and of sound and of smell; others have the functions of contracting themselves, and thereby of propelling the whole animal, or part of the animal, through space. Precisely the same process is observable in every community. Division of labour was observed long ago by Adam Smith—far earlier by Plato and Aristotle. Division or specialization of trades and occupations tends always to become more and more minute. In a great town each profession is sub-divided. In medicine there are consultants and general practitioners, and the former may confine themselves to some special organ—the eye, the ear, or the chest. So in the building trade we have masons, bricklayers, carpenters, painters, etc. In the intellectual functions there is the increasing specialization of science. Division of labour, specialization of functions, is an essential feature of Progress, whether biological or sociological. Is this *the end* towards which we strive, that we should each of us be turned into a wheel or a screw or a plank in the great machine of civilization? Would not this be the most degraded form of slavery? Even the eternal inertia of Paradise would be better.

The Progress we regard as our goal cannot, then, be here. We must look elsewhere. Let us still take biology for our guide so far as it will lead us. Is there nothing that distinguishes the higher organisms from the lower except this division of labour, this differentiation of parts and of functions? Compare a tree with a mass of sea-weed. In the tree a severe injury to the roots or the bark will affect the whole. There is a continuity in the nutritive channels. Passing to higher animal organisms, the contrast is even more striking. Here, there is not merely continuity of blood-vessels, answering to the channels for sap in the plant, but innervation. Impressions of light, heat, electricity, sound, odour, touch, made on any part are conveyed to the centre, and consequent muscular reactions radiate and direct the movement of the whole. In the higher organisms there is greater specialization of parts, but also greater harmony. The parts do not grow upon the organism as mistletoe grows upon an apple-tree; they are bound up with its life. In sociology there is an obvious parallel. A primitive tribe is a loose aggregation of families. There is no census, and small account is taken of those killed in battle or murdered. In a civilized community a murder in a Somersetshire

village, a mining accident in Durham, a speech in Brighton or Midlothian, sets the whole country astir. Railways and telegraphs have hastened this. But the beacon-fires spread the news of the Armada quickly enough through the length and breadth of England, and the Queen's speech at Tilbury was known quite soon enough for all practical purposes.

Here, then, in this highest process of life, this integration, harmonizing all the vital functions into a whole, which characterizes the highest organisms, we seem to have got what we want. This is the Progress which is our goal. Herbert Spencer defined evolution as the passage from indefinite homogeneity to definite heterogeneity. Progress in the Positivist conception is evolution considered from a human standpoint.

There remains one more thing to be added. Sociology is based on biology, not identical with it. It is a characteristic of society that the units in the social state are independent. Hence the problem is to reconcile co-operation with independence. Here we leave biology altogether. The problem presents itself in this way: How to attain that social state in which each member shall freely work for the harmony of the whole? This is a moral problem. Co-operation is so necessary that in early stages of civilization it has to be brought about by compulsion, by slavery, war, conquest, despotism. "The law was our schoolmaster to bring us" to Humanity. There is much compulsion in our own time: military service in some countries; protection of life and property; taxation; compulsory education and sanitation. It is theoretically possible that none of these things should be needed. Imagine a society in which all men were honest, sympathetic, and merciful, and all moderately endowed with cultivated intelligence. Neither police nor soldiers would be needed, nor perhaps rates for the relief of the poor and for education. Government would be necessary simply to direct enterprises in the most effective and economical way.

We come, then, to this conclusion. Ethical progress is not merely the highest and most important kind of progress, but it includes all other kinds. A society of this ideal kind would be perfectly aware of the importance of material wealth, of scientific discovery, of mechanical invention as a means of economizing labour and making the Earth a better dwelling-place for Man. Moral Progress sums up every other kind. Of the four kinds of Progress—moral, intellectual, physical, material—in virtue, in education, in health, in wealth—all are good if regarded as parts and not as wholes; but the first, as we view it, sums up all.

II

ALTRUISM

COMTE'S maxim, "Live for Others,"¹ has been construed by Mr. Spencer and other critics as a condemnation of all action proceeding from self-regarding motives. If it were so, Comte's ethical teaching would be open to the charge of being not merely unreal, but positively misleading and hurtful. But it is not difficult to show that this criticism rests upon an entire misconception of Comte's meaning. Mr. Spencer enlarges copiously on the necessity for the persistence of egoism. Briefly stated, his position is that a creature must live before it can act. The acts by which each maintains his own life are, speaking generally, more imperative than any other. Healthy life, having for its consequence healthy offspring, implies intelligent care for self. By the good spirits that accompany it, it diffuses happiness all round. On the other hand, disregard of self, lowering all vital functions, creates an atmosphere of misery, and disables from the service of others. Again, exaggerated altruism, as shown in unwise and indiscriminate indulgence, promotes egoism in others.

Considerations of this kind, mostly obvious truisms, are dwelt on with what most would think needless length in Mr. Spencer's *Data of Ethics*. They proceed on the assumption that the rule of conduct laid down by Comte implies the suppression of egoism—an error which no serious student of Comte's writings is likely to commit. What Comte urges is not suppression, but subordination. How widely the two differ the following passage from the *Positivist Catechism*² will show:—

The unity of altruism does not involve, as does the unity of egoism, the entire sacrifice of propensities adverse to its principle. It aims merely at wisely subordinating them to its dominant principle. Summing up its conception of sound morality in the expression "Live for Others," Positivism sanctions a reasonable measure of satisfaction to the self-regarding instincts on the ground that they are indispensable to our material existence, the basis on which all our higher attributes are founded. Consequently it censures all practices, however respectable the motives inspiring them, which by excessive austerity diminish our energies and render us less

¹ Comte's moral formula. *Vivre pour autrui*.—ED.

² See p. 39 of the Eng. tr. (2nd ed.).—ED.

fit for the service of others. By giving a social purpose to self-regarding measures it at once ennobles and controls them, steering clear of undue attention to them on the one hand, and of dangerous neglect on the other.

In so far as this orderly discipline of human emotions has been yet realized, how has it come about? Here, as in every other vital process, we have to study the mutual action of organism and environment. In this case the organism is the individual; the environment is the social state. The social state imposes by its two forms of government, civil and religious, a long and laborious training in ethical practice. Government, in its harshness and most rudimentary forms of military and despotic rule, secures the subjection of individual to social will. In its higher forms of equitable jurisdiction, permitting the free action of each within the limits imposed by the due freedom of others, it has, in addition to its direct effects, indirect and wider consequences. Hindering overt acts prompted by selfish emotions—*theft, murder, adultery, and the like*—it tends at the same time to produce strong prejudices and instinctive aversion to the passions from which such acts proceed; prejudices founded not on legislative enactment only, but on the condemnation of fellow-citizens. Meantime religion, from its earliest to its latest phases, makes direct appeal to the most potent of altruistic emotions, reverence for the unseen powers that control human life.

We come back thus to the conclusion reached long ago by Aristotle at the end of his ethical treatise, that to maintain the continuous ascendancy of the higher affections over the lower we need the discipline and training given by a well-ordered society. Ethics are founded on Sociology. We must live by Humanity in order to live for Humanity.

Such are the stimulating influences of the environment. It has now to be remarked that they would be without effect unless a responsive organism were there to answer to the stimuli. As light, heat, electricity, gravitation, acting for boundless periods, will not create the lowliest plant or animal, so with the psychical nature of man. Did it not contain the germs of higher as well as of lower passions, no law-giver, however wise, no government, despotic or republican, could create them. In a community of self-regarding beings no action, useful or injurious, could result from any motive but fear of pain or hope of profit. Theological philosophy, maintaining the total corruption of human nature, turns morality into a paradox; since grace comes as a divine gift from without, no

spontaneous action can be other than vicious. "We doubt not," says the Thirteenth Article of the Anglican Church, "that works done before the grace of Christ have the nature of sin." The demonstration of the fact that the impulse of unselfish love is embodied in the structure of the human brain is a discovery of modern growth. It is one of the corner-stones of ethical science.¹

To Live for Others is thus the final result of the action and reaction of the moral organism and the moral environment. Recognizing what we owe to Family, to Country, to Humanity, we strive, within the limits of our powers, to repay the debt—to react on them for their good. We look on this, if not as the sole object of life, yet as the highest object; the object to which all others are subordinate.

Surveying the course of human history, we cannot but see that the first beginnings of morality are very small, its growth very slow. By what road were these first beginnings reached? By supernatural revelation? If not, how otherwise? Can they be conceived as in any way the result of positive modes of thought? Here an important principle has to be laid down. Comte's law of the three stages, according to which the facts of the world around us and of human life are at first regarded as produced by supernatural agencies, are subsequently accounted for by metaphysical entities, and are finally looked on as processes taking place according to fixed laws, has been often supposed to imply that the positive spirit is a creation of modern times, unknown altogether to the primitive ages of man. But this view is very wide of the mark. The positive spirit has existed from the first; we can trace its workings not in primitive man only, but in the higher animals. In the fourth volume of his *Philosophie Positive* Comte observes (pp. 491-92):—

Theological philosophy, even in the earliest stages of development, individual or social, has never been in the strict sense of the word universal. In every order of phenomena the simplest and most obvious facts have always been regarded as subject to natural laws, and have not been attributed to the arbitrary will of supernatural agents. It was a happy remark in the philosophical essays of the illustrious Adam Smith that in no time or country has there been a god of Weight. We may remark the same thing even in more complicated subjects where the phenomena concerned are so elementary and familiar that the invariability of relations was obvious to the most

¹ Cf. p. 73.—ED.

untrained observer. In the moral and social order, the accessibility of which to positive method is now so often denied, there must have been in every age the notion of natural laws governing the simple facts of every-day life. Without it our ordinary existence, individual or social, would have been impossible. No forecast of any kind could have been made if all human phenomena had been attributed to supernatural agents; since in that case prayer would have been the sole imaginable resource for modifying the course of human action. Indeed, it is this first vague conception of natural laws in individual and social affairs which, transported in imagination to the phenomena of the outer world, has formed, as we have seen, the fundamental principle of theological philosophy. Thus the elementary germ of positive philosophy is undoubtedly as primitive as that of theological philosophy, although its development necessarily takes place so much later. On the perception of this fact the perfect rationality of our sociological theory is dependent. Human life can never present to us any new creation; it exhibits only a gradual evolution. Consequently the final appearance of the positive spirit would be scientifically unintelligible unless we conceived its first rudiments as present from the beginning.

Applying this truth to the early stages of moral science, we shall find that the foundations of ethics, laid down by the primitive astrolatrics and theocracies of China, India, Assyria, and Egypt, and handed down by them to the Western nations, were as completely the result of positive method as the more systematic discoveries effected in our own time. That they were enforced and inculcated by theological methods, that they were bound up with supernatural revelations and theories of the universe, is, of course, certain. Equally certain is it that these early law-givers, penetrated with nobly social passions, saw, with the same inductive instinct that guides a Kepler or a Faraday, that society could be held together, that human life could be raised from a bestial level, only by the recognition of such laws as "Thou shalt honour thy parents," "Thou shalt not commit adultery," "Thou shalt not steal," "Thou shalt not kill."

These truths, discerned by the positive spirit which has always been working from the beginning, were propagated and enforced by theological inspiration. The primitive law-giver, breathing the same intellectual atmosphere as his humbler followers, sharing to the full their theological conceptions of the universe, could only regard these ethical truths as flowing from a divine source; all the more that they came to him in moments of high nervous tension, accompanied by

dreams, visions, hallucinations of every kind. As such they were received by the Hebrews from Moses and Elias; by his first disciples from St. Paul; by the Arabs from Mohammed. When supernatural theories of the world gave way to positive theories, these primitive theories remained unaltered. All that is changed is the basis on which they rest. Is it to be supposed that the removal of theological scaffolding will make the house less stable? Has the sanction for moral action disappeared? It remains substantially what it was: inward peace or inward remorse, strengthened by approval or disapproval of those with whom we live and work. Supernatural terrors have played but a secondary part in the enforcement of duty. At the time of their greatest potency they were powerless to prevent duelling. The maintenance of honour unstained proved itself to be the stronger motive. When stripped of all irrelevant entanglements, and put before us in plain intelligible terms, the ethical problem, though never to be completely solved, is yet brought nearer solution. In the place of the two tables of the Law summing up the ten commandments of Moses—worship of an omnipotent and incomprehensible Power, and love of our neighbour—we have reverent acceptance of the moral and material gifts of Humanity: resolution to devote our lives to the service of others.

III

MR. SPENCER'S THEORY OF BENEFICENCE

POINTS in which Mr. Spencer's scheme of thought and life coincides with that of Auguste Comte are worth noting, since they are both numerous and important. Among the warmer supporters of either philosophy there is perhaps too strong a tendency to dwell upon the points of difference. But such a tendency should be steadily resisted. Cordial recognition should be expressed of those instances in which Mr. Spencer has either adopted Comte's solution, or has developed in explicit form thoughts of which Comte had only revealed the germ; or, finally, in which he has handled successfully problems which Comte had not touched. The points of divergence are also numerous and of great importance, and these should be discussed frankly and loyally in a spirit of which the history of science is not without examples, though these are none too numerous.

It would be discreditable to human nature if the bitterness and want of candour which accompanied the mathematical revolution conducted by Newton and Leibnitz were imported into the far greater scientific revolution which is now taking place in the world—the transference of our conceptions as to right and wrong from a theological to a human basis.

Certain salient resemblances between the syntheses of Spencer and of Comte cannot escape the most superficial reader of the prospectus circulated by Mr. Spencer previous to the publication of his work and prefixed to his volume on *First Principles*. Both begin by defining the limits of our knowledge, by distinguishing what is scientific from what is transcendental. The arrangement of scientific material is, to a large extent, identical in both. Both proceed from the outer world to man, from the macrocosm to the microcosm. If Physics and Chemistry are not formally discussed in Mr. Spencer's synthesis as they are in that of Comte, yet a place is left for them, and a precisely corresponding place. Both proceed from inorganic nature to organic. After Biology Mr. Spencer interpolates Psychology as a distinct science. But the higher Biology of Comte to a large extent covers the same ground. In both cases the synthesis ends with Sociology and Ethics. Finally—and this is a point to which special attention should be called—both philosophers agree in regarding the final part of their work as the most important, as that for which all the rest was written. "This last part of the work it is," says Mr. Spencer, "to which I regard all the preceding parts as subsidiary."¹ "Written as far back as 1842, my first essay, consisting of letters on 'The Proper Sphere of Government,' vaguely indicated what I conceived to be certain general principles of right and wrong in political conduct; and from that time onwards my ultimate purpose, lying behind all proximate purposes, has been that of finding for the principles of right and wrong in conduct at large a scientific basis."² The student of Comte's early works (written from 1818 to 1826, and republished in 1854 as an appendix to the fourth volume of the *Politique Positive*)³ will note that this was precisely the purpose with which Auguste Comte began his career as a thinker, the purpose to which the *System of Positive Philosophy* (published in successive volumes between 1830 and 1842) was subsidiary.

Thus it would appear that Auguste Comte's attempt to construct a scientific synthesis as a basis for human conduct preceded that of

¹ Preface to *Data of Ethics*.

² *Ibid.*

³ See p. 95 (note).

Mr. Spencer by more than twenty years. That there are wide differences between the two constructions need not be said, nor is it the intention of this paper to dilate upon them. As everyone knows, the principle which guides Mr. Spencer throughout his long elaboration is that of Evolution. Alike in the formation of a solar system from uniform nebulous matter diffused through space, in the development of the higher forms of life from primitive protoplasm, in the growth of a complicated civilization from rudimentary savage customs, he endeavours to trace the evolution of the complicated from the simple, and to show that with greater complexity there goes more perfect interdependence and more complete unity. Fully to discuss the points of agreement and of divergence between Comtian progress and Spencerian evolution would demand a treatise. A large part of such a treatise would be concerned with the question whether a canon is provided by the evolutionist for deciding in each case where the process of evolution ends and where that of dissolution begins; and to the further and more vital question how far human effort may be efficacious in modifying either process. But though these large questions cannot be dealt with here, it seems worth while to note that in the two final portions (parts v and vi) of the ethical treatise,¹ dealing with Negative Beneficence and Positive Beneficence, Mr. Spencer himself appears to have some doubts how far the theory of Evolution is any longer of practical service as a guide. In the preface to vol. ii he remarks that "these new parts are less definite in their conclusions than I had hoped to make them." After explaining that in part iv, which deals with Justice, the conclusions are in large degree definite, and that in dealing with "right relations between individuals, irrespective of their natures or circumstances, there enters the ruling conception of equity or equalness—there is introduced the idea of *measure*," and that "the conclusions reached acquire a certain quantitative character which partially assimilates them to those of exact science," he goes on to speak of the remaining divisions—Negative and Positive Beneficence. "Here," says Mr. Spencer, "we enter a region in which the complexities of private conduct are involved with the complexities of relations to the no less complex conduct of those around, presenting problems for the solution of which we have nothing in the nature of measure to guide us, and must commonly be led by empirical judgments." He still thinks, however, that the doctrine of Evolution helps us "in general ways, though not in special ways"; especially

¹ *The Principles of Ethics.*

in this—that, “for certain modes of conduct which at present are supposed to have no sanction if they have not a supernatural sanction, it yields us a natural sanction; shows us that such modes of conduct fall within the lines of an evolving Humanity, are conducive to a higher life, and are for this reason obligatory.”

It is time, however, to describe Mr. Spencer's theory of Beneficence more in detail. Beneficence is, in his view, the second of the two great divisions of altruistic conduct, the first and more important division being Justice. “Justice implies a sympathetic recognition of others' claims to free activity and the products of free activity.” Beneficence “implies a sympathetic recognition of others' claims to receive aid in the attainment of these products and in the more effectual carrying out of their lives.”¹ Mr. Spencer points out with overwhelming force, though sometimes in too sweeping a way, the importance of keeping these two spheres of action distinct, and the modern danger of confounding them. “On the one side the many eagerly expecting good, and on the other side the few anxious to do good to them, agree in practically disregarding the line of demarcation between things which are to be claimed as rights and things which are to be accepted as benefactions; and, while the division between the two is being obliterated, there is ceasing to be any separation made between means appropriate to the one and means appropriate to the other. Hot-headed philanthropy impatient of criticism is, by helter-skelter legislation, destroying normal connections between conduct and consequence.”²

The first broad distinction to be made between the spheres of justice and beneficence is that the enforcement of the first is a public function; of the second, a private function. State beneficence—beneficence enforced by the collector of rates and the policeman—entails evils which most thoughtful people recognize. No one has pointed them out with greater clearness than Mr. Spencer, though, as most thoughtful people also agree, with some exaggeration in the details. State-managed charity, he says, discourages the energies alike of the charitable and of the needy; it tends to deterioration of the community by giving the worthy and the unworthy the same chance of perpetuating their stock; by leading men to regard government as responsible for every kind of misery, it promotes discontent and disorder; finally, it has not the moralizing effect of true beneficence, blessing him that gives and him that takes.

We are reminded in this part of Mr. Spencer's work of the

¹ *Ethics*, § 389.

² *Ibid.*

distinction which is so fundamental a principle of Comte's social philosophy—the distinction between the temporal and the spiritual sphere; between the pressure of public opinion acting on each individual will, and the pressure of legal obligation enforced by the magistrate. To draw a sharp line between these two spheres is not always possible. When the spiritual power, the power of opinion, is at a low ebb, it becomes needful for the temporal power to supply its place and to do the work in a clumsy, inadequate, often mischievous, way. Many people before Mr. Spencer have pointed out that the relief of suffering should, in principle, be effected by private rather than by public agencies. But in practice to dispense entirely with the latter has been found impossible. Mr. Spencer himself, who is for reducing State action within the narrowest limits, admits a plea for the English Poor Law on the historical ground of the "entire usurpation of the land by the landlord and entire expropriation of the labourer." And he goes on to remark: "Not improbably the relative stability of English institutions during later times has been indirectly due to absence of that disaffection which results where the classes having no property are wholly at the mercy of the classes who have property."¹

A like relativity seems called for in dealing with State education; though the evil results which are likely to follow from the usurpation of spiritual functions by the temporal power are in this case even more dangerous and subtle. It would be hard to say whether Comte or Mr. Spencer has insisted on them with greater emphasis. Nevertheless, most people remain of the opinion that, in the present state of social evolution, the State must intervene both in primary and in technical education; were it only as a matter of police in the one case, and of mercantile self-preservation in the other. The teaching of Comte in this matter is more relative, and therefore more real, than that of Mr. Spencer.

Benevolence in Mr. Spencer's treatise is dealt with under two heads, Negative and Positive, occupying respectively parts v and vi of the work. By the first is meant "that species of beneficent conduct which is characterized by passivity in deed or word at times when egoistic advantage or pleasure might be gained by action."² Under the second "are dealt with all actions which imply sacrifice of something actually or potentially possessed, that another or others may be benefited."³ Abstinence for the sake of others from the use of advantages which fortune or nature may have put within our power

¹ *Ethics*, § 453.

² *Ibid.*, § 394.

³ *Ibid.*, § 394.

comes in the first class. Charity, in the common use of the word, or, again, endeavours to reform laws and manners, would come under the second head; always provided that such action or abstinence from action be consistent with justice and conducive to the well-being of Humanity. Perhaps the distinction between these two modes is less fundamental than Mr. Spencer thinks. Both seem included in Duclos's description of ethical conduct: *un effort généreux contre soi-même en faveur des autres*.¹ This, however, is a criticism of no great importance. Let me hasten to offer grateful recognition of the clear and forcible illustrations of moral conduct with which the chapters of each division are filled. No attempt can here be made to do justice to them. Under the head of Social Beneficence, Mr. Spencer deals with many of the minor moralities of life—such as irrational conventions or frivolous expenditure on superfluous and unmeaning decorations. Readers may smile at the homeliness and apparent triviality of some of the examples given, but the smile will be followed by acknowledgment that "the rationalization of social observances" is very far from being unimportant. On far graver matters—on the treatment of weaker races by the stronger, and on the aggressive war in which we are now engaged²—it is well to feel that Mr. Spencer and the Positivists are entirely at one.

Of especial importance is the final chapter of the treatise, entitled "Beneficence at Large." Much of it reads like a commentary on Comte's well-known maxim, *Remedies for social evils cannot be at once immediate and radical*. We must have before us, says Mr. Spencer, as a guiding principle the conception of an "evolved Humanity," and our aim must be to further this evolution. Auguste Comte, in even clearer and stronger language, has said the same thing. In the details of Mr. Spencer's forecast of evolution, in his appreciation of the history of Western Europe, there is certainly room for serious difference. But surely there can be none in these words, taken from the concluding paragraph:—

Hereafter the highest ambition of the beneficent will be to have a share—even though an utterly inappreciable and unknown share—in "the making of Man." Experience occasionally shows that there may arise extreme interest in pursuing entirely unselfish ends; and, as time goes on, there will be more and more of those whose unselfish ends will be the further evolution of Humanity.

¹ Duclos, *Considérations sur les Mœurs de ce Siècle*, 1751, ch. iv. "A generous effort over oneself in favour of others."—ED.

² Written in 1901.—ED.

We share the hopes expressed in these noble words; though to some of us it may seem that the teaching of Comte points to them in clearer words, and in a less vague and remote future.

IV

RIGHT AND WRONG

A BOOK recently published by M. Lévy-Bruhl, with the title *La Morale et la Science des Mœurs* (Ethics and the Science of Conduct),¹ raises the question how far, and in what sense, Ethics can be regarded as a science. M. Lévy-Bruhl, as readers of the *Positivist Review* may be aware, has done much to stimulate the study of Comte's philosophy in France, not merely by his edition of the Correspondence of Mill with Comte,² but by a special work devoted to the subject.³ In the present work there are many points of agreement with Comte; there are many also of grave divergence. The following remarks will not aim at presenting a full description of the author's principles, for which the limitations of the *Positivist Review* would hardly supply space. All that can be attempted is to call attention to certain fallacies which, if accepted, might affect Positivist action injuriously.

On one fundamental principle M. Lévy-Bruhl is at one with Comte. There can be no rational Ethics apart from Sociology. Ethics deals with the conduct of an individual relatively to the social organism, be it a family, or a tribe, or a State. Apart from the society to which he belongs, a man's conduct has no meaning—indeed, no existence. Remove a plant or animal beyond the limits of the atmosphere, it ceases to exist; its very elements are scattered into space. So it is with moral life. Duties imply a person, or a collection of persons, to whom they are due. As the social state changes, so will the nature of the duties change. The most elementary knowledge of the history of the human race reveals to us a wonderful variety of changes in the structure of society at different periods. Equally obvious are the variations in contemporary societies. In the Australian tribes, in the negroes of the Congo valley, in the highly-organized societies of Brahminical India,

¹ Paris: F. Alcan; 1903.—ED.

² This work is reviewed in the paper on "The Correspondence of Mill with Comte" in Part V.—ED.

³ See *The Philosophy of Auguste Comte*, by L. Lévy-Bruhl. Tr. by K. de Beaumont-Klein. (Sonnenschein; 1903.)—ED.

of China, of Mohammedan nations, of Eastern and Western Christendom, we see the widest differences of social structure; and corresponding with these differences in the social organism are differences in the standard of individual obligation. Tradition, religious belief, custom, law, institutions of every kind, modify the sense of obligation in countless ways. Even in the same community it may be changed from one year to another. In a time of war the duties of a citizen are not the same as in a time of peace.

Considerations of this kind have led M. Bruhl, as they have led many others (among whom the present writer would wish to be included), to a keen sense of the barrenness of most disquisitions on the principles of morality in the abstract. From Plato and Cicero down to the present day, men have disputed whether the test of right conduct was the greatest happiness of the greatest number, whether man was endowed with an intuitive sense of right and wrong, whether virtue constituted the highest happiness, and so forth. Very little fruit so far seems to have come from such discussions during the last two thousand years; nor does there seem much promise of better results in the future. Eloquent literary essays we may have in abundance, as we have had before; but very little practical guidance. What is wanted, as Comte pointed out in his earliest writings, is that the study of moral questions shall take its place among the "sciences of observation," among the inductive sciences; that it shall not depend on people examining their inner consciousness, and saying: "By an introspective process I have examined the workings of my own mind, and I find it says, So and so"; that it shall depend rather on observation of conduct, individual and social, directed towards the question: "By what line of action shall I best serve the community of which I am a member?"

Now, it is abundantly evident, as we have seen, that the standard of obligation for the individual varies with the variations of the community to which the individual belongs. This being so, it follows that, if our knowledge of right and wrong is to have a scientific foundation, we must know something of the laws regulating the formation, preservation, and growth of social organisms. In a word, there must be a science of Sociology.

So far, then, we are able to proceed in almost complete agreement with M. Bruhl. But at this point we find we are compelled to part company. His view is that Sociology is at present in so infantine—nay, in so embryonic, a condition as to be quite incapable of helping us to a scientific standard of right and wrong. It is for him a science of the future, which at some extremely distant

period may, and probably will, result in great advantage to mankind, but which at present should be cultivated, like geometry, physics, or biology, in a spirit of entire detachment from any social or political aspirations. We have not, he considers, nearly completed the preliminary process of collecting materials for it. The work is so vast that it will need even minuter division of labour than already exists. It must be taken up in detachments. Religions, languages, traditions, institutions of all kinds, must be examined by their own set of specialists. The domain of social facts (*la réalité sociale*) is as vast as was the domain of physical facts when Galileo, Descartes, and Newton began to subject it to scientific treatment. To find the scientific laws by which this mass of facts is co-ordinated will need the efforts of many men and of many centuries. When the principal laws have been found it will be time enough to begin thinking of their application to human uses. Science is disinterested; she does not consider what ought to be, but what is and will be. A time will doubtless come when applications of sociological laws to human action will present themselves, just as we have found to be the case with the laws of geometry, mechanics, and physics. But we are not in a condition at present to foresee what such applications will be, or how they will be effected. That is for a distant future.

Here M. Lévy-Bruhl is at once confronted, as he fully admits, by the question, What is to happen to the moral and social interests of mankind while this assemblage of specialists is thus engaged in preparing the ground for the scientific ethics which, in the course of the next few centuries, may perhaps dawn upon the world? This question he does not shirk. Our present social state, he explains, has its own standard of moral obligations, as have all other social states in the past or present, European, Asiatic, or African. During the long period of incubation which must elapse before the laws of sociology have attained such fullness of maturity as to admit of useful application to practical conduct, we shall go on living with the morality appropriate to our existing stage of social development. *Notre société continuera de vivre avec la morale qui lui est propre.*¹ There is no danger, he thinks, of this morality being weakened, at least for the present. The social forces which tend to maintain it are too strong.

Words are not needed to show that M. Lévy-Bruhl's point of view implies a very different conception of life and of duty from that which, for the last half-century, has held the Positivist Society

¹ Lévy-Bruhl, p. 290.

together. Without for the present discussing it further, I pass to a few considerations which may induce us to believe that Positive Ethics—in other words, a scientific basis for judging of right and wrong—is not a far-off ideal to be reached in some dim and distant future; that it exists already; that it supplies guidance for the action of men and nations in this twentieth century.

Facts relating to man's moral life have been accumulating from the earliest ages of which we have any knowledge. A wrong inference is often drawn from Comte's discovery of the law of the three stages—theological, metaphysical, and positive. These stages refer, not to man's knowledge of facts, but to the theories or general conceptions by which man sought to correlate the facts. In one sense, and that a very true one, as Comte has been careful to point out, man has always been a Positivist.¹ The prehistoric maker of a flint weapon acquired a large stock of knowledge as to the choice of suitable flints, and the direction of their cleavage. In pursuit of game, or of an unseen foe, the savage draws inferences from bent twigs, or crushed grass, that would do honour to a detective. A meteorologist might have many things to learn from him as to the signs of the weather. Examine the origin of what science you please (geometry, astronomy, biology), you will find it in the practical arts of life—field-measurement, brick-work and mason-work, regulation of festivals, care of diseases—each and all of which implied the working of the positive spirit through all the phases of fetichist or theocratic belief.

And so it was with moral facts even more evidently than with physical. They forced themselves on the notice of primitive man from the beginning; they formed, indeed, the earliest foundation of his physical theories. Within the narrow range of his family or tribe, the savage discerns character, infers inward motive from outward sign, discerns which man will be brave in battle, who will shirk the struggle, who will endure, who will be the true friend or the disloyal traitor. Superposed on all this practical knowledge is the tangle of fable, traditional customs, wild beliefs, terrors, and hopes that govern his life. Such theories of the world around him as he frames are based on what he knows and feels of his own passions, or his own inward experience of sleep and dreams. Thunder is the sign of wrath in a being mightier than himself; bountiful and fertilizing rain is the marriage of earth and sky; sleep and nightly visions bring him into touch with a spirit-world.

¹ See pp. 124-25.—ED.

But always the positive spirit has been at work gathering in facts; what his theory of nature did, whether it was fetichist or theological, was to put them together, co-ordinate and explain them. When the great theocrats, whether kings or priests, or both in one, revealed the will of gods to men, they gave authority and consistence to the views which their own clear insight into moral and social relations had revealed to them. To look on these ancient law-givers as more or less benevolent impostors is the profoundest of misconceptions. They believed in the gods as fully as the humblest of those around them, and uttered the outcome of their insight into the facts of life as the will of the gods. Indeed, this is an under-statement of the truth. I take it that no one believed in the gods so devoutly as those who proclaimed themselves to be the revealers of their will to their fellow-men. It is the best and the wisest of men who have been the subject of these sublime hallucinations. No one has ever had such faith in the Christ as St. Paul. Allah was more to Mohammed than to any of the followers of Islam. Let us be very sure that the fabric of morality growing from age to age has not been built upon imposture.

What is the ethical problem actually before us in this twentieth century? Morality exists; it has been brought before us, pressed upon us, by the teaching of Moses, and by teachers many centuries older than Moses, set in a framework of beliefs and customs which has varied with social changes and has undergone many revolutions. The problem for us is not how to create it, but how to enlarge and strengthen it. We cannot feel satisfied, as M. Lévy-Bruhl advises, with the prospect of living on *avec la morale qui nous est propre*. That seems a slender reed to lean upon. But we may well take that morality as a starting-point. To quote from Pierre Laffitte's manual of Ethics, of which I spoke in the March number of the *Positivist Review*¹:—

Following the advice of Descartes, we may take the existing standard, as recognized by sensible men, for our point of departure. We accept the habits and prejudices which have come to us from the series of our ancestors, and which have served in the bringing up of countless generations. It will be our pride to preserve from injury no less than to increase this moral inheritance, which is the most precious and the rarest portion of our wealth. Respect for continuity, especially in the process of innovation, being the most fundamental condition, the moral problem presents itself as the work of co-ordinating,

¹ See the last paragraph of the paper on "Pierre Laffitte's Teaching" in Part V.—ED.

and at the same time of developing, the rules which already exist, and which have been empirically consecrated by the good sense of men.¹

We have seen that positive truths have been hitherto held together and gathered into a controlling system by theological faith. That faith having served its time and undergone spontaneous decay, its power to govern the souls of men has diminished year by year. Through a gradual process of growth due to many minds in many ages, and culminating in the genius of Auguste Comte, we are brought face to face with a new controlling influence based on the actual realities of man's nature and of his position on the planet. Men of science, from Thales and Pythagoras to Galileo and Newton, have shown us where he stands in the world around him. Other inquirers have disclosed his physical structure. Yet more essential has been the knowledge gained of his moral nature. By thinkers of the eighteenth century—Hume, Leroy, Cabanis—it was shown that man was spontaneously a moral being. Hume, in his essays on the principles of morality, proclaimed the great truth that unselfish love was innate in man and in the higher animals. Admitting, as was evident, that it was feebler than the passions of vanity or greed, it existed, he maintained, universally; and we must look to it as the foundation of morality, of every system of regulating human action.

With Hume and those round him these views were vague because they were not incorporated into the science of living bodies, which was founded fifty years afterwards by Bichat. Bichat's work was followed by that of Gall, who, in his studies of the nervous system of man and the higher vertebrates, proved these unselfish affections of friendship and love to be functions of the brain. All the hazardous scaffolding of craniology by which Gall forced his principles on the notice of the world may be swept away. What survives is the deep and pregnant truth that altruistic instincts enter, along with self-love, into the nature of uncivilized and pre-historic man. To the facts accumulated by Gall have been added in after years stores of similar facts by Darwin and other naturalists.

Comte has told us that his aim from an early period in his career was to combine the teaching of Condorcet with the teaching of Gall; the conception of the gradual growth of Humanity with that of the social nature of the element of which Humanity was compounded. We have, in the first place, primitive man, first of the vertebrates, with social and intellectual attributes somewhat

¹ *La Morale Positive*, pp. 68-69, or p. 67 of the Eng. tr.—ED.

higher than theirs, but dormant and undeveloped, entering into communities little better—sometimes it may be even worse—than those of other races, but gradually handing on, through the institution of language, an increasing stock of skill and knowledge as time went forward. We have, in the second place, the gradual rise and unfolding of Humanity prepared and personified by collective beings of narrower range—the tribe, the country, the Roman Empire, the Church, and, finally, by the great conception of the West, the community of advanced nations handing down the tradition of Græco-Roman civilization—art, science, law—to the modern world.

As the final result we have Man, at once the creature and the willing servant of Humanity, receiving the tradition of right and wrong doing from the family into which he is born, the country in which he lives and acts as a citizen, and repaying the vast benefits which he receives by such willing service as his lot in life may make it possible to render. He lives at once by, and for, his Family, his Country, and Humanity. We thus reach the positive meaning of the word *duty*—a social function performed by a free organ. *Nul n'a droit qu'à faire son devoir*.¹ A man's sole right is to do his duty. This is not, as some supposed, a denial of the existence of right. What the saying implies is that there must be a sufficient margin of independence to make it possible for the citizen to render free service. In the absence of such independence he is but a slave. A sempstress bound to intolerable hours of work in order to save herself and her children from starvation cannot be called a free agent. She is a slave as much as if she worked in chains or under the lash. And if we willingly acquiesce in the existence of such a class among us, we are subsisting to that extent upon slave labour; we are in a true sense slave-holders. So long as such a class is to be found, the time is out of joint, and needs setting right. As the social order evolves it becomes more complicated, more differentiated. Every year the need becomes greater of an integrating function; of a process which shall restore the balance, and recall us to our dependence on and our duty to the whole. That process is the work of religion, whether it be called the service of God, as in times past, or the service of Humanity, as in times to come, bringing about convergence of individuals to a common purpose, and harmony of contending passions in each separate life. Like every other function, it needs a special organ. Hence the position assigned in Comte's scheme of society to a body of moral and intellectual teachers

¹ See p. 118 (note 1).

standing wholly apart from the official world, and occupied in maintaining the level of comprehensive thought and generous sympathy on which the order and progress of society will in every age depend. Positive principles are by this time very largely accepted when presented in the abstract. What is needed to make them valid is that they should be applied to each social problem as it arises by men of intellectual and moral competence, prepared for the analysis of social facts by training in the less complicated facts of the physical world. They must not be, like Catholic priests, set apart as a separate class from early youth. They must have reached maturity, and have given proof of civic and domestic worth and upright character. They must renounce wealth and official position, and be content to depend for support on those who accept their teaching. In the establishment of such a body lies the principal hope of making the Religion of Humanity a practical reality in the world.

There seems little in common between a body of men animated with these hopes and purposes and the academic specialists from whose passionless investigations M. Lévy-Bruhl hopes that in the course of centuries a scientific ethic will result. He remarks, indeed (p. 253), as a strange fact that Comte himself found it possible to maintain at the same time the religious and the scientific attitude. But with Comte's followers, he says, the case has been otherwise. "The adepts of his religion have taken little interest in the progress of sociology. Students of sociology, the inheritors of his scientific thought, have shown themselves wholly indifferent to the Religion of Humanity." This remark is unhappily true of many students of Comte, but not of all. It is eminently untrue of Comte's principal disciple, Pierre Laffitte. In his ethical writings, in his careful analysis of Chinese civilization, in his remarkable treatise on the *First Philosophy*, still so strangely ignored by his countrymen, the religious and the scientific spirit are as intimately combined as they were in Comte himself.¹ In the interests of truth and of progress, it is to be hoped that a sufficient number of men will arise to follow his example.

V

ORDER

WHAT is meant by Positivists when they repeat the second clause of their formula,² *l'Ordre pour base*—the foundation or basis of

¹ See the paper on "Pierre Laffitte's Teaching" in Part V.—ED.

² See p. 39 (note).

their system is Order? Do they mean something arbitrarily established by the society to which they belong; or are they speaking of something having an independent existence outside them, whether they will or not? Perhaps both of these meanings are intended; and in that case it may be profitable to inquire the way in which each is related to the other.

A similar doubt arises as to the analogous word *law*. Here, too, we have on the one hand the expression of the will of a supreme ruler, and on the other the statement of a process followed by the facts of the world around us—a uniform, orderly sequence.

The thing meant, apparently, is that our conduct should conform to law. And thus the first aspect of the problem before us is that we should find out what this law is and the grounds upon which it rests. In other words, we have to find a scientific foundation for moral action. The first condition for this result is that we should become possessed of a scientific theory of human nature. Such a theory must include the principal truths of man's physical, biological, and sociological environment. We are tied to a single planet, and to a special portion of that planet's surface. We share with the higher animals a definite physical organization. We are born members of a special political society, and grow up with the beliefs, customs, and traditions with which that society endows us. We find ourselves under the dominion of a moral code; of a moral standard of duty accepted by current opinion to which we give assent. It changes with the course of ages, but in its essential features remains the same. We have to examine the roots from which it springs; we have to take our part in promoting its growth, in removing superfluities and obstacles.

On inquiry we find that this code, like all other human conceptions, has passed through various stages of evolution. It began with supernatural beliefs, it issues at last in positive beliefs, and the intermediate stage has been occupied by various metaphysical abstractions. We find the origin of the moral law in the ancient theocracies of Egypt and Assyria. Its precepts, not to kill, not to steal, not to violate the marriage bond, not to treat others as we would not ourselves be treated, were revealed to the practical wisdom of men whose mental powers and vigour of character raised them above their fellows.

But, though these theocratic precepts may be looked at as so many scientific discoveries reached by prolonged observation and thought, they would have missed their mark unless those who laid them before their fellow-citizens had regarded them as emanating

from the great superhuman powers that governed the world. St. Paul and Mohammed were discoverers of moral truth. But they shared the belief of those around them; they had even a more profound conviction than others as to the government of the world by supernatural powers. Their own high thoughts were conceived by them as issuing from these powers as revelations. From insincerity and hypocrisy these men were wholly free. On Positive truth, then, regarded as revelation, the Christian Church was founded.

With the downfall of the Church at the close of the thirteenth century the metaphysical stage of morals began—the stage of private judgment, of the law of nature. The revolt of the Templars, issuing from the contact of Mussulman and Christian creed, marks its first period; it was promoted by the interminable discussions of the Schoolmen; it was continued and expanded by the Protestant insurrection; it ended with the revolutionary deism of Voltaire and Rousseau.

But throughout this revolutionary and destructive process the germs of reconstruction were everywhere penetrating. Moral rules once regarded as of divine origin were beginning to be consecrated, if not in the name of Humanity, yet on human grounds and from human motives. Precepts of personal hygiene, rules of temperance, of cleanliness, laid down in old times under sacerdotal and theological sanction, became inrooted prejudices, practices of common observance, without any guarantees other than those of kindness and of duty of man to man. The worship of the tomb, the most ancient of human institutions, has again shown itself as the elementary basis of universal religion. The marriage bond has survived all attacks on the theological safeguards with which it was once surrounded. Reverent gratitude is shown to the great benefactors of our race, to those who have striven against its dangers, who have uprooted injustice, who have loosened thought from trammels, who have established tolerance, who have brought down to men the illuminating fire of new knowledge or beautiful imaginations. What is all this but to say that the reign of Humanity has begun?

Humanity represents for us the Order of the world which we speak of as the foundation of our faith. The laws of matter, the laws of life, the laws of social cohesion and succession, are summed up in the great Being that governs our individual life. Man, like many other animals, is a social being. Isolated man is an imaginary and unreal entity. There is no such being in existence. "I have seen," said Joseph de Maistre, "Frenchmen, Italians, Russians—Montesquieu has told me of Persians; but as to the being called

Man, I have never met him ; if he exists it is entirely outside my knowledge."¹ Apart from some mode of social life, be it a family, a tribe, or a nation, there can be no conception of duty. What do we understand by the word *duty* ? A function performed by a free organ. By the word *function* is implied an action or series of actions which co-operate in maintaining the existence of a collective being. It has been said that the Dead acquire a constantly increasing dominion over the Living. But it is only through the living that they can act. These co-operating actions or functions are of various kinds and degrees ; they imply inequality ; they imply willing subordination of directed to directing actions. As social life evolves these inequalities become more marked. Until some one or more of them become preponderant, and until this preponderance is willingly accepted, there can be no social force. Consequently, in the performance of every duty the social instinct—love in its widest sense—must be at work. Love must be the principle. But love, feeling, social enthusiasm, does not suffice. There must be a frank recognition of the necessity of inequality, of the different lots that fall to each fellow-worker, determined not so much by intrinsic fitness as by the accidents of birth, of clanship, of fortune, of experience. To place each member of each generation as he grows to maturity in the precise niche for which his natural powers adapt him, to subject each and everyone to a competitive examination and regulate the position of each by the number of his marks, is a wild and hopeless chimera.

We come, then, to this conclusion. Man's duty consists in working for the maintenance of a series of collective existences—the family, the fatherland, and Humanity. Between each of these come intermediate stages. Between the family and the country there is the village or township. Between the fatherland and Humanity there is the Occident—the group of Western nations which, in spite of many conflicts, have shared a common destiny, and to whom it has fallen to take the leading place in guiding the destinies of our planet. By the Order which we speak of as the foundation of our moral life we mean the establishment of harmony between these living aggregates. Such a purpose implies the restriction of the monstrous accumulations of territory commonly called empires. It implies a metropolis surrounded by a sufficient territory on which live a number of families and groups of families

¹ This was written with reference to the *Declaration of the Rights of Man* issued by the Constituent Assembly in 1789.—ED.

with common antecedents working for a common posterity. It implies complete uprooting of the pride and greed of Imperialism, incompatible with individual freedom, ruinous to the patriotism of surrounding nations. Such fatherlands exist already around us. Denmark, Sweden, Norway, Holland, Switzerland, afford us examples. Scotland, Ireland, Sicily, many provinces of France and Germany, are approaching the same goal in a more or less distant future. Vast aggregations like the Canadian Dominion, like the Russian Autocracy, like the Bureaucracy of Hindostan, are not destined to endure. Nor, again, is there any hope of realization for the fantastical dreams of gathering into one dominion those who look on themselves as belonging to the same race, or who speak the same language. Pan-Germanism, Pan-Slavism, Pan-Anglicanism, Pan-Latinism, are hopeless hallucinations.

Order as the foundation of life implies peaceful industry, implies an education through which we shall gain clear insight into our position as members of Humanity. The first condition involves a multiplication of centres; the practical activity of many free republics. The second implies the union of all round a common ideal, the Religion of Humanity. For this latter purpose multiplicity is not necessary. The most effective way of fulfilling it would be for those engaged in it to rally round a single centre. Whether this mode be adopted or not, whether the groups who take part in it be united in a single organization or otherwise, the essential point is that the principle which they propagate should be one. There are not two religions of Humanity. What is needed is that there should be a class of men devoted to the study of the Order of Humanity; engaged in the discovery of moral and social laws, our knowledge of which will never be fully equal to our practical requirements. Such a corporation will concentrate itself on theoretical and moral questions. "It can only maintain its position as the recognized organ of social sympathy by invariable abstinence from political action"—*i.e.*, from the details of political controversy. The primary condition of the authority of the future spiritual power is exclusion from political power, as a guarantee that theory and practice shall be kept systematically apart.

In building up the universal Order such men will avail themselves of the resources of Art no less than of Science. What Art could do in the brightest days of ancient Hellas is but a faint foreshadowing of the splendour of its future, when it has been dedicated to the Religion of Humanity. The material power of Humanity, and the successive phases of her physical, her

intellectual, and, above all, her moral progress, will each in turn be depicted. The history of universal Love, the soul by which this Great Being is animated—the history, that is, of the marvellous advance of man, individually and socially, from brutish appetite to pure unselfish sympathy, is of itself an endless theme for the poetry of the future.

Not until the Order of our world has been seen to be beautiful as well as true, until it rouses our enthusiasm, as well as enforces our intellectual submission, can it become the foundation of our moral life.

VI

PROGRESS

NEARLY fifty years ago there appeared in the *Westminster Review* an article on "Progress: Its Law and Cause,"¹ which roused the attention of many thoughtful readers. It contained one of the first instalments of the philosophic system of Mr. Herbert Spencer. Its main purpose was to indicate that in every department of nature, inorganic or organic, there was a continuous tendency to pass from a state of simplicity, uniformity, and homogeneity to a condition of complexity, multiformity, and heterogeneity. In the organic world this tendency had been already recognized by philosophic naturalists in Germany, notably by Goethe and von Baer. Tracing any plant or animal to its origin, it was easy to see that its earliest condition was uniform and almost structureless; that, as the vital process went on, different parts took on distinct functions; reception and assimilation of food, circulation of nutritive fluid, excretion of useless material, locomotion, response to incidence of external forces, were each connected with appropriate organs, and in this way what was originally simple became highly complex. All this was recognized early in the nineteenth century. Mr. Spencer went on to demonstrate that the same tendency was perceptible throughout the universe. At some far-off time the space now occupied by the solar system was pervaded by a nebulous and homogeneous fluid. By the mutual gravitation of its particles rotation of the mass began—the outer layers gradually separated from the inner, and gradually shrunk into spherical bodies revolving round the central mass. The outer crust of these,

¹ 1857

losing heat and shrinking, caused mountain-chains, valleys, seas, and rivers, and step by step the earth's structure assumed the varying forms which geology describes. If from geology we pass to the other end of the scale of being, we again find in sociology a similar transition from elementary and simple forms of social life to highly elaborate and complex forms. The passage from the primitive tribe, in which each individual performs nearly identical functions, to the fully-formed nation with its various classes, occupations, institutions, and authorities, presents obvious analogies to the passage from the primitive and nearly structureless germ to the fully-formed plant or animal composed of multiform tissues and organs. This process of differentiation from simple to complex constitutes what Mr. Spencer, in the article referred to, defined as Progress.

Evidently this process of spontaneous evolution going on independently of man's activity, impossible to define beforehand, and ending in an infinite ramification of change, does not bear any very close relation to what Comte, in common with most men, understands by the word *Progress*. When Comte speaks of Order as the foundation of man's life, and Progress as the end to be kept constantly in view, he implies a definite goal towards the attainment of which man should concentrate his energies. Supposing, for instance, it should be proved that the natural tendency of civilized human society is towards a more and more minute division of labour, each workman spending his life in making the fractional part of a pin, it would hardly be maintained that such a result, hopelessly degrading as it would be to those engaged in it, narrowing, stupefying, and enslaving to every moral and intellectual faculty, is an ideal end towards which to strive.

It is well for man to know the external fatalities in the midst of which he has to live and act. To resign himself to them so far as they are insurmountable, to modify them to his advantage so far as they are amenable to his agency—here lies the sphere of his duty. He cannot control the sun's path round its sidereal centre, nor the path of his planet round the sun, nor the velocity of its rotation, nor the inclination of its axis to its orbital plane, nor the rate at which it cools. He has no power over the currents of air and water that move over its surface, over the moisture of its clouds, over the electricity with which they are charged. All these things he may foresee, and he may so guide his action as to receive the good they bring and avoid the evil. In the world of life he can do more than this: he can adapt the soil to the seed sown upon it,

he can supply the growing plant with food and water, he can select the most hopeful variations and permanently improve the stock. He can subdue the nature of animals to his service. By the foundation of societies he multiplies his force; by storing up the results of each generation in language, in industrial products and constructions, in institutions and laws, he creates a Providence which sways the lives of men with ever-increasing power.

To direct the agency of this Providence towards the elevation and perfection of his own nature—in other words, to bring man under the control of Humanity, to render him more reverent of what is highest, more sympathetic, more social, more loving—this it is which, in the true sense of the word, constitutes Progress. In this sense, and in this sense only, can it be said that Progress is the end of life. Progress is not a spontaneous process of evolution that will come of itself as the inevitable outcome of mutual strife, as the survival of the fittest, as an automatic result of natural selection. It implies continuous effort, long-enduring struggle with self for the sake of others. Ours is not a world in which all is of necessity for the best. It is well that from time to time we should look upon ourselves as in imminent danger of moral decay and death. The record of the past is not merely a story of brave and heroic deeds. It tells another tale sometimes—a tale of dissolution, decadence, cowardly self-abandonment, of sons degenerate from their parents, of the torch of noble tradition well-nigh extinct and snatched from hands unworthy to bear it by those who knew better how to nurse the fading sparks and fan them into flame.

How did the conception of Progress first originate? We find no trace of it among the thinkers of antiquity. Aristotle's treatise on *Politics* offers us profound observations and thoughts on the Order of society, on its permanent features and institutions. In his discussions of the family, of the division of labour, of government, he laid down the fundamental conditions of social equilibrium. But we see no recognition by him of any tendencies in Greek society towards attainment of a higher standard than that which he saw around him. He found war and slavery established as social institutions, and apparently he saw no prospect, however distant, of a transition to a social state of peaceful industry and free labour. His survey of the past history of mankind was too limited to admit of any far-reaching thoughts of the future. He saw the marked superiority of the Hellenic race to the barbarous tribes that bounded it to the north and east, or to the effete theocracies of Asia. He had, so far as we can see, no conception of a time when Greek

thought and culture would permeate the non-Hellenic nations and lift them to a higher level. During the three centuries that followed, Greek language and literature were widely spread through the Western world. But, though the area of civilization was enlarged, and though a splendid Order was established from east to west through the Mediterranean coasts, yet the conception of Progress did not even then arise among men. The various nations of the Empire were knit together in a *genus humanum*—the thought of a *polis*, a *civitas*, was enlarged into the thought of mankind. But mankind remained stationary, unprogressive—in danger always of decay and destruction, unkindled by any principle of growing life.

It is to the mediæval Church that mankind owes its first conception—vague, but very real—of social progress. Augustine's *City of God*¹ revealed to men a higher stage of life than had been reached by Greek, Roman, or Jew. Feudalism, with all its barbaric shortcomings, opened a prospect of energy and freedom of far wider scope than peaceful but barren subjection to imperial bureaucracy. Compared with the past, then, Catholic Feudalism was preferable; but what of the future? In the earthly horizon no prospect of a nobler future was visible—nothing but death, the day of judgment, and celestial life for those who had earned it. Then came the fatal decay of mediæval belief, and a violent and blind reaction against all that it involved. The higher life seemed for a time to lie behind men, and not before. Growth indeed there was in science, in art, in industrial invention, in knowledge and mastery of new continents. But none of these things sufficed to give sure promise of a nobler standard of life.

For a clear conception of Progress three terms are needed; as yet there were only two—the Græco-Roman and the Mediæval. In the eighteenth century the dawn of a new epoch slowly appeared. Men began to be conscious of the coming of a time when the tyranny of both temporal and spiritual government should disappear, when men should act for themselves and think for themselves, and when the reign of justice should arrive. This was the work of the audacious band of thinkers who, availing themselves of the science and philosophy of the previous century, of Bacon, of Descartes, of Hobbes, Spinoza, and Newton, prepared the way for the French Revolution. Though the name of that mighty crisis is identified with a single country, because it was in that country that the most strenuous efforts were made to translate theory into practice, ideas

¹ *De civitate Dei*, composed A.D. 413-426.—ED.

into realities, it must never be forgotten that the spiritual force which underlay these efforts was common to the whole Western world. Among the impulses at work one of the most prominent came from beyond the Atlantic. Nowhere has the ideal that captured the souls of men been so vividly portrayed as by our own poet Wordsworth:—

Bliss was it in that dawn to be alive,
But to be young was very heaven!

Nevertheless, a further step was needed. In the spasm of revolutionary fervour the second term in the progressive movement of Humanity—the Middle Age—had been forgotten, or, rather, it had been wholly misinterpreted, and denounced as a time of stagnation, reaction, and darkness. Until the violent onslaughts on Catholic Feudalism had been resisted, until mediæval society could be seen with other eyes than those of Condorcet, and regarded, not as an unloosing of the powers of evil, but as an essential in the evolution of mankind, the very principle of Progress fell to the ground. Hence the paramount importance of the counter-revolutionary school of thinkers that arose when the destructive fury of the revolution had spent its force. De Maistre, the retrograde defender on philosophical and historical grounds of the mediæval system, must take rank with Diderot, Voltaire, and the Encyclopædists as the contributor of thoughts indispensable to any sane theory of progress.¹

The doctrine of the revolutionary leaders implied a rupture of human continuity. It was based on a theory of Progress disconnected altogether from any pre-existing Order. We must remember that the retrograde doctrine traced back to its origin was no less incoherent. Catholicism implied a similar breach of continuity. It was an attack on pre-existing polytheism. St. Augustine's denunciation of Greek and Roman divinities may be set against Voltaire's denunciation of the Catholic creeds. "The rational view of human affairs," says Comte, "is to look on all their changes not as new creations, but as new evolutions. And we find this principle fully borne out in history. Every social innovation has its root in the past, and the rudest phases of savage life show the primitive trace of all subsequent improvement. Progress, then, is in its essence identical with Order, and may be looked upon as Order made manifest."²

¹ See *New Calendar of Great Men*, p. 532.—ED.

² *General View of Positivism*, 2nd ed., p. 77.—ED.

Viewed thus, we begin to understand in what sense Progress is set forth as the end of human effort. "The one great object of life, personal or social, is to become more perfect in every way—in our external condition first, but also and more especially in our own nature."¹ Progress presents itself to us not as an external process which we stand by and watch, and which will go on spontaneously whether we will or not; it is recognized as a definite system of human effort, in which each one of us is called on to take part. Evidently it is a word with many meanings—as many meanings as there are different characters among men and different fields of energy. They fall under one of two heads—improvement of our surroundings, improvement of our own nature. With the first, unsatisfying though it be, we cannot dispense; it is the starting-point for the second. Cheap travelling, cheap printing, are not culture, but they bring the highest thoughts within reach of the humblest; they enable the poorest to visit the shrines of heroes and the scenes of great events. In themselves cheap trains and cheap books are neither good nor bad; the passengers and the books may be alike worthless. So, for the end of action, we have to turn to the other division of Progress—the progress that concerns our nature. This may be physical, intellectual, or moral. That health, temperance, freedom from painful or enervating disease, are blessings far surpassing all material luxuries or comforts would be admitted by all. Nor would there be much difference of opinion in regarding intellectual progress as even more important than physical. Intellect reveals to us the Order of the external world, and, when our conception of that Order is completed by the laws that govern the growth of human society, intellect takes its proper place as the servant of the social sympathies. Here we come at last to the central mode of Progress, that to which all lower forms are subordinate. The end we set before us—the end which constitutes Progress—is the permanent preponderance of social feeling over self-love. Progress means that we live by, and for, Family, Country, Humanity.

¹ *Ibid.*, p. 78.—ED.

PART II
PHILOSOPHY

CHAPTER I

SCIENCE AND PHILOSOPHY

I

FACT AND THOUGHT IN SCIENCE¹

IT is one of the principal laws of mental health that inward workings of the mind, what we may call ideas, should be subordinated to outward impressions. A man who mistakes day for night, who has visions of armed men or dragons in his house, who hears voices in the room when all is silent, is said to be of unsound mind. It is clear enough that if men are to work together the same outward impression must affect all of them alike, or at least nearly alike, or their working together will be impossible. The man who differs so widely from his fellows in these matters as to be unable to work with them is rightly said to be of unsound mind. In the French language such a man is called *aliéné*—alienated from his fellow-men, standing apart from them. It is most essential to recognize at the threshold of this subject that mental health cannot be looked at apart from citizenship and fellowship. For observe that there is no absolute unchanging standard of accuracy in this adjustment of inward mental working to outward impression. The standard has undergone profound though very gradual changes from century to century. It has altered with the growth of society.

Some few centuries ago, if a man said, "Last night I saw a bright golden dragon fly across the sky," he would not have been held out of his mind; on the contrary, the chances are that several other men would at once have said, "We saw it also." The passage of a shooting star larger than common was enough to set their minds at work in this way. The conviction that there were such things as dragons being deeply rooted in their minds, the impressions of brightness and swiftness printed upon their retina very easily formed themselves into the shape and fashion of this airy prodigy. Let us put ourselves in the state of society painted by Homer. If Achilles or Ajax, or any other of his heroes at any important

¹ A posthumous paper.—ED.

moment of their lives, said that Pallas, Athene, or Hera, or Poseidon had come to warn them of some danger that was coming, or to tell them of victory in to-morrow's battle, he would not have seemed to anyone to be wandering in his wits. Others would at once have believed him, and some would have said they saw a stranger of more than mortal stature in converse with him. Call back to mind, and try to realize, the times in which every casual event that happened in a time of crisis—the flight of a bird, the organs of an animal killed for sacrifice, a voice suddenly heard on the high road, the position of the planets in the sky—was all full of meaning, of divine monition to men. It is quite clear to anyone who looks at what we may call the mythological or theological stage of civilization that the subordination of the inward mental working to the outward impression was very much less complete in earlier times of human life than it is now. The judgment formed of the order of the world was widely different. All *phenomena*—*i.e.*, all visible, audible, or tangible facts, at least all those that were at all startling or out of the common way—were looked at as resulting from emotions or caprices of beings of like passions with ourselves. At the present day we are content simply to watch how these events happen; to gather together as well as we can all the general facts or regularities that we can observe in them; to see where it is that two facts always go together, or always follow one another; and in this way we arrive at the possibility of foretelling whenever we see one of the two facts that the other will follow. In other words, the scientific, or positive, state has followed upon the theological.¹

But here lies the danger of a vast and mischievous error to which our age is peculiarly prone. It is commonly said the business of the scientific thinker is to leave off theorizing and betake himself entirely to the collection of facts. In other words, of the two factors of human knowledge—the mind working within, the impressions pouring in from without—he should as far as possible suppress the first and recognize the second only. But a little thought will show us that to do this is to reduce ourselves to the condition known as idiocy. The idiot is a being in whom the senses are as active as in other men. Impressions of sight, sound, touch, smell crowd in upon him from birth to death, leave perhaps some trace of themselves on his imperfect brain; but there they remain undigested, unworked, without the least influence on his life or actions, like so much raw material brought into a cotton-spinner's warehouse,

¹ See p. 90 (note 1).

which, because the machinery was out of order, or the spinner was idle, or his men refused to work, was allowed to rot there unused. Now, this really is the condition into which a certain part of the scientific world is at the present time tending to lapse. They think they are doing something good and satisfactory by simply heaping up huge masses of observations of facts, quite regardless as to whether any use is to be made of them. Those piles lie one upon the other, and the lowest are so deeply buried by those that have been thrown over them that they will require as much labour to unearth when they happen to be wanted as though they had never been discovered at all. It is as though the colonists who go out to a new country and fix upon the site for their capital city should all turn themselves into brickmakers and cover the whole ground with such vast piles of bricks that the builder has no room to build on. As though observations were not accumulating fast enough, observing machines have been devised which act automatically, so that the force of the wind, or the movement of the mercury in a barometer or thermometer, or the motion of the heart in some animal, shall register itself on a roll of paper moving forward by clockwork. Now, these things are good and useful just so far as there is some mind at hand to make use of them, *and no further*. Otherwise they may be not merely useless, but worse than useless, by cumbering the ground and bewildering the investigator.

It is not difficult to see that, if observing power very greatly outruns thinking power, the progress of discovery will be, not promoted, but rather hindered. Suppose, for instance, that just while Kepler was making his wonderful discoveries of the motions of the planets round the sun, that they moved in ellipses, that the sun was in one of the foci, that they described equal areas in equal times, and that the squares of their periods of revolution were as the cubes of the mean distances—suppose that some minute and accurate observers had shown that none of these things were precisely true, that the orbits were not precisely elliptical, and so on, what would have been the effect of this but to retard discovery? All great discoveries imply a certain setting aside of irrelevant facts, subject, of course, to taking them up afterwards if need be. In pure mathematics the elimination of such irrelevancies is of the essence of the highest and most fruitful methods. Newton had to work out his mechanism of the solar system without taking into account the influence of the planets upon one another, which would have interfered with his own discoveries, and which he had to leave to his successors.

I take the mind of the scientific discoverer as the type of the healthy mind working on a large scale. Mere reception of impressions will carry us no way at all. There must be a choice; a reaction of the mind upon those impressions. Consider it again; there are men who devote their lives to the discovery of new planets. But we know now that the solar system is stuffed full of planets, large and small, and even professed astronomers are now beginning to think that they have had enough of them. Leaving the solar system and passing to the Universe, we find that, beyond the myriads of stars visible through our largest telescopes, photography reveals to us countless multitudes hitherto invisible; and some improved process of research perhaps may uncover yet more, the whole count of which are yet, mathematically speaking, *nothing* compared with Infinity. We come back, therefore, to this, that among all this labyrinthine wilderness of impressions there must be a choice, and a principle of choice.

I have been speaking of scientific discovery—of the infinite universe without us, of the limited human faculty in which little parts of that universe are mirrored. To come to any practical result, I say, we must be guided by some instinct or principle which will impel us to look at some things and to pass other things by, to dwell upon one or two of the myriad impressions that crowd in upon our senses, to allow one or two of these to reproduce themselves in memory as ideas, and to leave all the rest alone.

II

ORDER AND PROGRESS IN SCIENCE

DOES Comte's well-known motto, Order and Progress,¹ hold good of science as well as of politics? Many will doubt; some will scoffingly deny, and will sniff the taint of obscurantism. "As if science needed any restraint on its growth," they cry; "as if its progress could ever be too rapid." And then they let fall a word or two of satire at the Positivist who, as some of them think, is striving to stop the dial of time and let the world sink into mediæval darkness.

Positivists, in their turn, would hardly think it worth while to

¹ Comte's political motto—*Ordre et Progrès*. See *General View*, pp. 76, 281.
—ED.

refute so foolish a charge. The founder of their school gave a meaning and a purpose to science that had never been recognized before, from the days of Archimedes and Galen to those of Harvey, Newton, Lavoisier, and Helmholtz. Building the new science of sociology upon the science of life, which, in its turn, rests upon the inorganic sciences, he showed that man's life and conduct, when based on positive knowledge, had a firmer foundation than could be found in the quicksands of theological controversy. If the list were drawn up of the new researches which he suggested in almost every department of science, it would be a very long one. The last work¹ of his life he did not live to complete. The first volume of it—the only volume published—was a mathematical treatise.²

Brushing these cobwebs aside, let us see precisely what the words *Order and Progress* mean. They mean, among other things, growth in accordance with law, as contrasted on the one hand with stagnation, on the other with anarchy; they mean evolution, as distinct alike from revolution and from dissolution. Progress, Comte was wont to say, was the development of Order³—the continuous growth of something that had substance and life already. He remarks, in the opening sentence of the third volume of his *Positive Polity*, that "the distinctive feature of the present age will be the importance it assigns to History: by the light of which philosophy, politics, and even poetry, will be henceforth pursued." History is used here in its broadest sense as synonymous with evolution—a word which some students of Darwin and Spencer may be surprised to find that Comte used frequently, in opposition to the theory of special creation, long before the appearance of *The Origin of Species*. Comte's whole work, indeed, was an Evolution-Philosophy, though doubtless differing in many fundamental respects from that of Mr. Herbert Spencer, which in other respects owed so much to it.

Science, then, like other departments of human life, presents, on the whole, and when looked at broadly, a continuous growth from the days of Thales and Pythagoras to those in which we are now living. Even with the qualifying words here used, this will sound paradoxical; there are such apparent breaks in the continuity, such "faults" (to use the geologist's word), such shuntings of the train

¹ *Synthese Subjective*.—ED.

² *Système de Logique Positive ou Traité de Philosophie Mathématique*. 1856. The Introductory Chapter of this work, tr. by R. Congreve, was published by Messrs. Kegan Paul, Trübner, and Co., in 1891.—ED.

³ See *General View*, p. 77, and *Positivist Catechism*, p. 162.—ED.

from one set of rails to another, so many stoppages, so many retrograde motions. But astronomers know well—and knew it centuries before Copernicus—that motions of the planets which seem retrograde are not so in reality. And so it will be found here if we look into it closely, and if we follow Comte in that wider and deeper conception of science that he was the first to teach. During the darkest of the Dark Ages the science of human life, wrapped, like all nascent sciences, in the needful shelter of theological husks, was making that kind of marvellous progress that the leaf-bud makes in winter. Such men as Benedict, Gregory, Bede, Boniface, and Isidore were as truly the representatives of progress as any thinker or statesman of ancient or modern times. And even if we take science in the unhappily narrow acceptance in which it is still used by Academies and Royal Societies, we shall find two things which are well known to the few who have cared to study the subject, and which would be known universally if history were not studied in so narrow a spirit. The first is that in the Christian world from the sixth to the twelfth century, to say nothing of the splendid burst of intellectual life in the thirteenth, there was somewhat more scientific culture than is commonly supposed. Boethius in the sixth century, Isidore and Bede in the seventh and eighth, Alcuin in the ninth, were possessed of much mathematical and astronomical knowledge of which Pliny, the great Roman encyclopædist, was probably quite ignorant. But what is more important is the far deeper and more progressive culture of science carried on from the eighth century to the twelfth in the Arab schools of Bagdad, Cordova, and Toledo, which in the thirteenth shed its full lustre on the Western world. The current that transmitted Greek science to the Benedictine monasteries, though at no time wholly arrested, was always sluggish. The living waters of progressive thought were supplied by such men as Tobit ben Korra, Avicenna, Albatgenius, Alhazen, and Averroes.

Continuous, then, the history of science from Thales onward has undoubtedly been. But in this continuity we find very varying degrees of vigour and vitality. Like other organic growths, it is liable to disease: it is susceptible of modification for good and for evil by human action. Are there any features of scientific culture at the present day that indicate the evil and suggest the remedy?

Both were indicated by Comte when he began, more than seventy years ago,¹ the famous course of lectures which resulted in his

¹ Written in 1899.—ED.

System of Positive Philosophy.¹ The danger to science lay, he said, in the increasing mass, and the increasing speciality, of scientific research. And, nevertheless, division of labour was as needful in science as Adam Smith had shown it to be in industry. Without it all progress was impossible. Comte's words may be quoted here with advantage:—

While we recognize the amazing results of this division of labour, while we feel it to be the foundation on which the organization of the scientific world must henceforth rest, it is impossible not to be struck by the serious evils following from it in the present day owing to the extremely small range of ideas with which each individual mind is exclusively occupied. Doubtless, up to a certain point this result is inevitable. We cannot put ourselves back in the position of the scientists of antiquity; their advantages even in this respect were simply due to the limitation of their scientific field. But I believe that measures may be taken which will remove the worst evils of exaggerated specialization without injury to the stimulating influence of individual research.

"The evil," he goes on to say, "should be remedied at once, before it becomes more serious. There is a real danger lest man's intellect should end by losing itself in a mass of detail. Let it not be forgotten that here is the one weak side on which Positive Philosophy may still be assailed by theologians and metaphysicians with some hope of success."²

What the measures to be taken were is well known to students of Comte. Dismiss from your minds, he said, the idle and mischievous dream that you can repress research. Instead of attacking the division of labour in science, carry it one step further. Let there be one more speciality—the study of the leading principles of each science, and the relations of the sciences to one another. From this starting-point the whole Positive Philosophy followed as a corollary. It was seen that the most natural classification of the sciences was that which ranged them in relation to the science of Humanity and Man. For further remarks on this subject I may refer to the paper on "The Ladder of the Sciences."³

Few have any conception of the waste of effort that goes on continually in the scientific world for want of some general guidance of this kind—guidance, be it understood, of principles

¹ *Cours de philosophie positive*, 6 vols. ; 1830-1842.—ED.

² *Phil. Pos.*, vol. i, ch. i, pp. 26-27; p. 31 of the *Fundamental Principles*.—ED.

³ See the next paper.—ED.

rather than of men, though men also are indispensable; the world will never grow so wise that ready-made philosophers will spring up from the ground without the need of teachers. It is in abstract science rather than in concrete that the evil is most prominent. In applied science the practical object aimed at, be it the invention of a new explosive, the improvement of electrical communication, or a new treatment of disease, is itself a controlling influence, implying, as it does, concentration of purpose and admitting of rigid tests. But in abstract science researches are carried on without any thought of immediate application. These may either be the most valuable of all or the most valueless. Here it is that waste of intellectual force is most liable to occur, and here it is that a wiser economy would reap its richest harvests. For want of such economy the self-love of each explorer leads him to overrate the value of his own discovery and make little of those who have gone before him. Bystanders eager for novelty applaud; the latest result is taken as necessarily the truest; and thus it not seldom happens that important truths are forgotten and have to be re-discovered many years after. For want of due guidance, again, wrong applications of new knowledge are frequently made. The passage from the abstract to the concrete is always beset with dangers. In no field of knowledge, if politics be excepted, have these dangers been so disastrous as in the art of medicine. During the nineteenth century biological science has been pursued separately from the practice of medicine, which, nevertheless, aims more and more distinctly at securing a sound biological foundation. The separation was needed; but it has its own special dangers. The latest outcome of the biological laboratory is hastily applied to the treatment of disease, often with ludicrous, sometimes with pernicious, results. Stores of practical knowledge gained from the life-long study of disease in man are hastily set aside for new conjectures founded on a few doubtful experiments on a dog or a rabbit. Of all the witnesses called by the Vivisection Commission of 1876 few spoke more to the purpose than G. H. Lewes, an experimental biologist and a trained thinker. His conclusion was that, of the influences retarding the growth of science, the most injurious was the multiplication of experiments made by men of slender capacity and wholly untrained in the art of thinking. A striking illustration of what may be called the laboratory fallacy may be found in the Harveian Oration given in 1898 by Sir Dyce Duckworth:—

Of some laboratory experiments it may be said that they fail *primo visu* to commend themselves to our common sense.

I will support this assertion by a reference to some recent laboratory researches undertaken in America. With a view to determine the influence of alcohol in morbid conditions certain rabbits were inoculated with streptococci and other microbes, and then kept daily in a state of acute intoxication by alcohol. These animals showed the effects of the inoculation earlier and more severely than animals that were similarly infected but not alcoholized. On the strength of these and similar phenomena we are gravely warned from the laboratory that it must be disastrous to employ even moderate doses of alcohol in inflammatory conditions of disease in the human subject..... The practitioner who could allow the teaching of such experiments as I have quoted to influence his bedside treatment of patients suffering from acute disease would in my opinion possess neither clinical instinct nor knowledge.

Quoting from Professor Kanthack, the lecturer adds :—

Paracelsus is not yet dead. He snatches incomplete researches out of the laboratories, and applies them in the treatment of diseases the pathology of which he does not understand, and his influence makes itself felt in laboratories to the discredit of medicine.

Think of the solemn and pedantic folly of the whole proceeding ! How utterly wanting in the most rudimentary principles of reasoning the experimenter must have been who, from the effects of an *intoxicating* dose of alcohol or any other drug upon a rabbit, could infer the effects of a *moderate* dose upon a man ! Where was the need of this ignorant display of learning ? Had it not been known for centuries, not merely to doctors, but to every man and woman of common sense, that excessive doses of alcohol were hurtful to bodily tissues ? It will be noted that it is no opponent of experimental research who calls attention to this case, but a scientific physician anxious to promote such research, and convinced that the practice of his art should be modified by it.

The foregoing illustrations have been taken from applied biology. But the same truths hold good in other departments of science, from astronomy to politics. General principles of the kind that Comte called for are urgently needed in sociology and ethics no less than in biology, not for the discouragement of exact research, but for its wise guidance, to ensure that the passage from the abstract to the concrete is made with full knowledge of the complications of the problem, and to avoid that confusion of plausible conjecture with positive knowledge which in our time has often been carried so far as to make science a byword for uncertainty.

III

THE LADDER OF THE SCIENCES

WHAT is the relation of the lower, simpler, and more general sciences to the higher, more complex, and more special? On this primary principle of Positive Philosophy, the social and ethical bearings of which are fully as important as its intellectual aspects, a few words of explanation may be usefully subjoined.

Sciences are said to be lower, more simple, and more general when they deal with properties common to all facts or objects known to us, or with a large proportion of the whole. They are called higher, more complex, more special when they relate only to a small proportion of objects. Thus Geometry, dealing with the laws of magnitude, is the most general of the sciences; for all objects possess magnitude. It is the simplest, since the magnitude of an object can be considered independently of its heat, gravity, electricity, vitality, or wisdom; and it is the lowest, in the sense of being the foundation on which the other qualities rest. The various branches of Physics, again, dealing with the phenomena common to all matter, dead or living, are more general and less complex than the study of bodies possessing life; and they are lower than Biology in the sense of forming its foundation and starting-point. And in the same way, proceeding up the scale, we find in certain classes of animals the phenomena of social life which in the case of one species have become so prominent and preponderant as to form the subject of a distinct science—Sociology. This rests on Biology, as Biology on Chemistry and Physics, but requires its own separate inductions and methods of treatment. Finally, the study of the institutions and evolution of social life prepares us for the most special and complex study of all¹—that of the effect of the social state on each man's life and his duties and responsibilities with respect to it.

Now, this Scale of the Sciences,² as Comte called it, using the word *scale* in Bacon's sense as a ladder for the understanding, does not pretend to offer any complete picture of universal truth. Mr. Herbert Spencer has found fault with it because, as he says, the

¹ Ethics.—ED.

² Comte's scale of the *abstract* sciences is as follows: Mathematics, Astronomy, Physics, Chemistry, Biology, Sociology, Ethics. For further details see Table B in the *Positivist Catechism*.—ED.

sciences in their rise and progress do not follow one another in a straight line, but branch out from a common stock like the branches and twigs of a tree. But the truth is that Mr. Spencer and others have wholly misunderstood Comte's purpose in bringing forward this ladder of the sciences. They have supposed that he wished to present a complete picture of the evolution of truth. They pointed out truly enough that the growth of knowledge is like other evolutions. Like the sprouting seed, like the fertilized germ in the egg, it begins from something very simple and goes on getting more and more complex till it becomes the collection of academies, universities, publishing offices, laboratories, and scientific memoirs that we now see around us. All this is true enough, though perhaps not very useful. But it has very little to do with what Comte proposed to himself in arranging the sciences. Comte was not trying to present a complete picture of nature or of the evolution of ideas, as though we were superior beings standing on another planet and looking down upon this. His purpose was more humble and more practical. He wished to make it easier for man to understand his own nature and to guide his own life. As a help to doing this he constructed a ladder leading from the lower and simpler truths to the higher, or from the higher; for men go down a ladder as well as up. All constructions of this kind, when efficient, rest on a natural order, though not blindly conforming to it. The position of the sciences in the scale corresponds in general, though not in detail, to the order in which they appeared as bodies of abstract truth dissociated from immediate practical utility. Geometry and Astronomy were fully recognized as abstract sciences by the Greeks; Physics not till the time of Galileo; Chemistry in the middle of the eighteenth century; Biology at the beginning of the nineteenth; Sociology not for a generation later. But this is only true in a general way. The secondary reactions between each science and any and all of the rest are very multifarious and intricate.

Now, in studying the history of any science we note two distinct and opposite errors that are often made. Men have tried to deal with it by the methods of a science higher in the scale or by those of a lower science. Biology supplies many instances of both errors. Thus at one time life was explained by a vital principle; or an animal or vegetative soul, or both, were supposed to pervade the bodily frame and to regulate digestion, circulation, muscular motion, and sensation. These principles were imported into biology from metaphysical theories of the constitution of human nature. The opposite error, that of explaining the facts of the higher science by

the laws which have been found valid in the lower, is even more common. An instance of this is Condorcet's singular attempt to explain social and political events on mathematical principles. After Harvey's discovery of the circulation of the blood systematic efforts were made to explain all the functions of life as matters of mechanical arrangement; and a rich crop of errors resulted, which it took a long time to uproot. In the century after Harvey chemical science arose under the hands of Priestley, Cavendish, and Lavoisier; and again there was a tendency to explain the facts of life by chemical methods. Many years passed before it was seen that, though without chemistry the first step could not be taken towards giving a rational account of life—since each act of life is accompanied by a chemical process—yet that in the sum of events taking place in a living organism there was something wholly different and apart from what takes place in a laboratory.

And as with Biology, so with the science that follows it in the ascending scale—Sociology. As the growth of the plant or the feelings and motions of an animal cannot be accounted for by any play of the electrical, thermal, or chemical forces, though they rest upon these and have no existence apart from them, so it is with the instincts, desires, passions, laws, language, traditions of such a society as man has established on this planet. These involve problems for the solution of which the naturalist supplies valuable and indispensable material, but which the methods used in his own sphere of study are wholly powerless to solve. The wants and passions of animals underlie the whole fabric of human life. But the foundation of a fabric is one thing; the superstructure is another. It is very possible—it quite accords with what we see going on around us in the animal and plant world and among the rudest tribes of man—that human progress began with competition and internecine struggle among rival races. It may be admitted that the tendencies which led to this life-and-death competition will never wholly disappear. But these biological facts do not account for the chain of events that we call human civilization. This has to be studied independently, like the facts of mechanics, the facts of chemistry, the facts of life, by direct observation and induction.

In the course of civilization—that is to say, in the process of converting man from a wild beast to a citizen—principles have to be reckoned with of a totally different kind from those considered by Darwin. To go no farther back than the time of Cicero, we find throughout his writings the conception of *Genus Humanum*, of

Mankind, into which all tribal differences were to merge. With the later Roman Stoics this conception of a common Humanity, a corporate existence of which all were members, became far more prominent. It was emphatically enforced by St. Paul and by other leaders of the Christian Church; though in this case partly neutralized by a narrow doctrine which has left a fatal legacy of prejudice behind it, that Christian nations have a natural and prescriptive right to domineer over nations and races of other creeds. With many drawbacks, many counter-currents, many relapses into the old competitive piracy and savagery, the world has nevertheless been continuously tending towards an ideal of universal peace, to be attained not by the predominance of a single race—be it Anglo-Saxon or any other—but by the establishment of friendly relations between all. Observe that this ideal is something quite different from the vague philanthropy which just now is very popular. Such philanthropy has often been in the past a cloak for aggressive purposes, and now more so than ever. Under the specious veil of pity for the subjects of a Government not more imperfect than our own was in the Middle Ages, ambitious crusaders, with ends of their own to serve, have been able to drag their countrymen into schemes for depriving backward nations of their freedom and keeping them in perpetual tutelage. The ideal here spoken of is the adoption of the principle that the weaker tribes of men as well as the stronger should be maintained in their own corporate existence, and that patriotism should not be the monopoly of those who can defend it by the engines of scientific warfare.

Such an aim may seem hopeless amid the scramble for the newly discovered continent which is now stimulating the rapacity of every Western nation.¹ But we may remember that it was in the worst time of the religious wars that Henry IV of France and Grotius put forth, each in his own way, their schemes of international obligation, and that the atrocities of the Thirty Years' War ended with the great treaty² which for the first time laid it down that the weaker Powers of Europe should be placed under the protection of the strong. We who live in the light of that great truth can defend it to better advantage, seeing it to be in conformity with scientific law, a component part of the universal order which rules our planet. Above the brute forces of inorganic matter and organic life, resting upon them but rising above them, we see the social order, common to men of every creed and every colour, and

¹ Written in 1894.—ED.

² Treaty of Westphalia, 1648.—ED.

framed of the three stages of collective life—the Home, the Country, and Humanity.

IV

LAWS OF NATURE

IT is very commonly said and thought, even by those who look favourably on Positivism, that, although Comte speaks of his system of principles as a philosophy, yet in no part of his works does he touch on the points which are commonly regarded as specially distinctive of philosophy—namely, those most general and abstract truths which apply equally to all departments of thought, and which form at once the frontier and the foundation of our knowledge. There is a popular impression that all such questions were regarded by Comte as falling into the shadowy and evanescent region of metaphysics. And since in his law of the three stages¹ the second stage is commonly spoken of as metaphysical—a temporary and equivocal transition between the theological stage in which speculation commonly begins, and the positive stage in which it ends—inquiries into the foundation and limits of knowledge have been supposed to be discouraged by the Positive school of thought. Young minds of great power and promise have been, I believe, frequently deterred from the serious study of Positivism by the belief that it gave no assistance or encouragement to studies which yet have occupied the mental energies not merely of the greatest thinkers of antiquity, and especially of Aristotle, but of almost every speculative intellect of modern Europe, notably of those whom all regard as specially imbued with the Positive spirit—Descartes, Hobbes, Locke, Hume, Kant, Mill, Spencer.

Had those objectors studied Comte's writings with more attention, they would have found that the gap which they have been deploring has no existence. It must always be borne in mind that Comte died prematurely, leaving much projected work undone. The work which absorbed the greater part of his life was the creation of the science with which his name is specially identified, the science of sociology, and the application of it to the most urgent problems of our time. At the time of his death he was meditating his treatise on Human Nature, to be followed by a treatise on

¹ See p. 90 (note 1).

Education, by which he meant the management of life appropriate to each of its seven stages, from the cradle to the grave. In the first of these two treatises, of which we possess the division into chapters, and the title of each chapter, the problem of man's intellect would have been fully treated.¹ Meanwhile we are not left in doubt as to the general lines of that treatment, and as to the importance attributed to it by Comte in his system of education. In the third chapter of the fourth volume of the *Politique Positive*, Comte lays down the universal principles, fifteen in number, on which the Positive doctrine rests; summing up these principles under the title of *First Philosophy*.² Before laying down those principles he insists on their abstract character. A few words, therefore, on the question of abstraction.

Every object that we contemplate is a collection of various attributes. A stone has a certain shape, a certain colour, weight, temperature, chemical constitution, and so on. The distinction between objects and their attributes is called by Comte the distinction between beings and events. We may either consider the mass of events—*i.e.*, actions or attributes belonging to any being—or we may dwell on some special event or attributes common to many distinct beings. The former process is called concrete contemplation; the latter is called abstract contemplation. These correspond, as Comte considered, to entirely distinct functions of the brain; and in his table³ of these functions he has allotted to them distinct organs. What takes place is of this kind: Impressions received by the organs of sense from the outer world are stored up in the nervous ganglion situated in the base of the brain connected with each sense-organ. The organ of concrete contemplation collects those impressions and combines them into the image of a being or object, this or that particular stone, tree, or dog. The images just formed are dealt with by the organ of abstract contemplation. They are taken to pieces, analysed, and each property common to several objects is regarded separately. Both kinds of contemplation go on in every stage of human development. Both, indeed, may be observed in animals. Obviously, animals, like children, soon learn to distinguish one being

¹ See *Pos. Pol.*, vol. iv, pp. 203-216. The plan of the treatises will be found in the following pocket edition of Positivist tables: *The Positivist Calendar and Other Tables*. (London: William Reeves; 1905).—ED.

² See p. 47 (note).

³ This table occurs in the Appendix to vol. i of the *Pos. Pol.*, and in the *Positivist Catechism*. It will also be found in *The Positivist Calendar and Other Tables*.—ED.

from another. But not less certainly do they soon become capable of abstraction—that is, of distinguishing different events or attributes common to various objects. It was pointed out more than a hundred years ago by Georges Leroy that a dog warned off a field of corn will, supposing him trained, avoid in future similar fields. He has formed in his own way the abstraction of the cornfield. Similarly he has formed a clear and definite abstraction of the odour of game, and of many other facts connected with his daily life. From Leroy's immortal *Letters on Animals*, which are a storehouse of facts relating to animal intelligence, a single quotation may be made: "Animals, like ourselves, are forced to make abstractions. A dog which has lost his master runs towards a group of men by virtue of a general abstract idea which represents to him the qualities possessed in common by those men with his master. He then experiences in succession several less general, but still abstract, ideas of sensation until he meets the particular sensation which he seeks."¹

The foregoing remarks will prepare us for considering the subject of this paper. What do we mean when we talk of a Law of Nature? There is a sense in which the thought is old as well as new. There has never been a time when men failed to recognize certain uniformities and regularities in the world in which they lived, and in their own souls, and the souls of those about them. Long before the life of men began, such things have been recognized by organisms far lower in the scale. The succession of day and night, of summer and winter, the qualities of water and grass, the odour of friendly or hostile races—these and countless other things, that made up the environment of their lives to which they had continually to adapt their actions, were implicitly recognized by them as constant. Any marked departure from the uniformity was a source of surprise and terror.

We have got so much into the habit of regarding Positivism as a new thing peculiar to the last few centuries that we forget the very real sense in which man has always been a Positivist. The common course of daily life was a continual compliance with laws instinctively perceived and obeyed. To hurl a stone or a javelin against his foe he must nicely adjust his muscular force to a given weight, a given distance, a given direction. To prepare his food he must choose the seed of a certain plant in faith that

¹ *The Intelligence and Perfectibility of Animals*, p. 107. This is the Eng. tr. of Leroy's *Lettres*, which was published in 1870.—ED.

it will reproduce after its kind—must place it in given conditions of soil and moisture and sunlight. In building a house, stone must fit itself to stone in conformity with the laws of geometry; wall and pillars must be adjusted to continuous downward pressure; in sailing a boat near the wind the play of the wind on the sail and the water on the keel are arranged in conformity with the law of equal action and reaction; and so onwards through each one of the arts of life. No arts could be learnt, no life maintained, except by constant obedience to mathematical, mechanical, astronomical, and physiological laws. And it is not merely in things outside man that uniformities are taken into account. Men soon find out that there are uniformities in character as well as in stone and timber. A brave man will be brave always, and may be trusted. A coward will always act like one, and may be thrust aside. Mankind has not waited for the science of sociology to arise before forming societies. The institutions of Religion, the Family, the Government, Property, arose thousands of years before men set to work to observe and analyse them.

It was when man stepped out of the region of practical life, when he began to form ideals, to construct theories about his position in the world, that the reign of fiction began. Two classes of facts called it into being—events that were uncommon and terrible; events that were inaccessible to human action. When men living on a mountain-side felt the ground shake, heard rumbling underneath them, and saw flames issuing from the summit, these things had to be accounted for; and there was no way so simple as to endow the mountain with human passions, and thereon followed the appeasing its wrath by sacrifices and prayers. Again, when men looked at the vault of heaven revolving round them daily, bearing with it bright bodies, some of which shifted their places from week to week in ways apparently capricious, the simplest hypothesis was to attribute human feelings and volitions to the sky and the planets; and thus side by side with the positivism of practical life grew up the theism of religious life by which all the critical periods of man's destiny were governed. As man's powers of abstraction grew so did his deities multiply, until, as we see in the religion of ancient Rome, there was hardly an attribute or a quality that was not provided with its special god. So the religions of the world arose. In every department of life that rose above the commonplace dead level in which daily wants were satisfied, in all dangers and perplexities, all meetings of the ways, all struggles of duty with passion, those higher powers intervened.

Such was the mental condition of Greece when Thales, Pythagoras, and a few others, brought into the world the new and momentous conception of abstract Laws of Nature. Let us try to define this conception more precisely. We may define a law of nature as the way in which the variations of one phenomenon, or event, are governed by the variations of another. Mathematically speaking, a law is an equation. Thus, when two variable quantities, x and y , are connected by an equation, if we make x vary in any way we please there will follow certain variations of y . In mathematical language y is said to be a function of x ; the equation takes the form $y = fx$. Now this is a perfect representation of what we mean by a law of nature. Take as an illustration the relation between the radius of a circle and the circumference. Whatever length we may choose to assign to the radius, the circumference will always be equal to this length multiplied by twice the quantity known as π . Similarly, the spaces described by bodies falling in a vacuum vary as the squares of the times, $s = \frac{gt^2}{2}$: g standing for the final velocity acquired in unit of time, a quantity which has to be found by experiment, and which varies at different points of the earth's surface.

A Law of Nature may be described in another way. We may speak of it as the discovery of constancy in the midst of change. Take, for instance, the law of Thales: the sum of the angles in any triangle is equal to two right angles. The variations in triangles are infinite: the sum of their angles is constant. This second form can, in simple cases, be reduced to the first: thus we may say any angle in a triangle is equal to the difference between the other two angles and two right angles. But this reduction is not always or often possible in practice. The two important points to bear in mind are: first, that laws deal with phenomena, or, as Comte expresses it, with events, and not, in the first place, with beings. A being, or object, is far too complicated, is the meeting-point of so many attributes or events, that it cannot form the direct object of scientific treatment. Each attribute must be considered singly. The second point is that each phenomenon may, and usually does, depend not on one, but on many others. In other words, the dependent variable is a function not of one independent variable, but of many. In this case what is done is to suppose all but one of these to be constant, and to solve the equation—*i.e.*, to find the law with regard to each in turn. A striking instance of this, pointed out by M. Laffitte in his admirable discussion of this subject,¹ is to be

¹ *Philosophie Première*, vol. i, p. 172.—ED.

found in Cabanis's treatment of the relation between the moral and physical nature of man.¹ Moral ideas are influenced simultaneously by age, by climate, by sex, by temperament, by disease, by the mode of living. To consider these simultaneously would lead to inextricable confusion, and would be utterly barren of result. Each variable has to be dealt with separately, the others meanwhile being supposed to be constant.

The lesson to be drawn from all this is twofold: the extreme importance of the discovery of Laws of Nature and also its extreme insufficiency. We have seen that to find a law of nature we have to leave the ground of reality, the region of concrete things, and find relations between abstractions. Fortified by the discovery of those relations, we have to pass back to the land of concrete reality with all its infinite complexities. Something more than science is needful here. We need the art of life. *Pour compléter les lois, il faut les volontés.*²

¹ *Rapports du physique et du moral de l'homme*, 1802.—ED.

² Comte, *Appel aux Conservateurs*. "To complete laws, we need wills."
—ED.

CHAPTER II

COMTE AND SPENCER

I

MAN AND THE UNIVERSE

LORD SALISBURY'S address to the British Association at their meeting in 1894 raises the question by the answer to which Comte's philosophy will stand or fall: Can we know the universe, or must our scientific knowledge be for ever limited to man and his environment? Comte maintained not merely that the universe was unknowable, but that the conception denoted by it was futile and incoherent.

His point of view is best explained by a familiar instance. We know that the law of gravitation holds good throughout our own solar system. If we ask ourselves how we know this, the reply of ordinary men is that the position of the moon and the planets as indicated by this law is predicted a year or many years beforehand in almanacs, and that no complaints are made by sailors and others to whom the accuracy of such almanacs is a matter of great importance. If there be an error in the statement of the law or in the calculations founded on it, men have the strongest possible interest in finding it out; but no such error is observable. So much for our own solar system. During the present century a slight knowledge of a few neighbouring systems has been attained. So far as it goes, that knowledge is consistent with the supposition that the bodies composing them gravitate in accordance with the same laws that prevail in our own world. But the evidence is hardly such as would have satisfied Newton, who, it will be remembered, set aside the theory of gravitation for many years on the ground that the data for it were mathematically inadequate, and that mere probabilities were worse than useless in such matters. As to the physical constitution of sidereal systems, considering that the nearest of them, if we take the solar distance as unity, is a hundred solar distances away from us, and that our knowledge of the constitution of the sun is still of the most rudimentary kind, it does not seem probable that we shall know much for many centuries

to come; possibly never. Assuming, however, that we possessed the data for calculating with mathematical precision the motions of many thousands of double stars; assuming that by methods as yet inconceivable we gained some knowledge of the numerous bodies which have ceased to radiate light; assuming that we could determine exhaustively their chemical elements; assuming, as an extreme hypothesis, that we could achieve this result for all the stars which photography could reveal to us—the obvious fact would remain that our knowledge of the universe would be mathematically overstated by regarding it as a wineglassful of water compared with the Pacific Ocean.

Observe that no attempt is being made to discourage the study of sidereal astronomy. Man is by nature curious, and he will strain his powers of knowing to the utmost. There will always be a small number of men who, having wealth and leisure, and not being pressed by urgent social sympathies, will devote their lives to travelling in untrodden paths; *Avia Pieridum peragrant loca, nullius ante trita solo*.¹ It is conceivable that some of their pursuits may be found a thousand years hence to throw unsuspected light on some problem affecting man's welfare. Others, perhaps most, will be barren. Yet the most fruitless need not be valued lower than the insatiate pursuit of comfort and enjoyment which engrosses the lives and thoughts of the unoccupied rich. All that is here contended for is that, if the study of sidereal astronomy is held up in popular scientific lectures as a stepping-stone to the comprehension of the universe, a fraud is committed on the public. The universe is unknowable, as unknowable as the Athanasian Creed.

Some centuries ago the universe was looked on not as infinite, but finite. It was regarded as a vast sphere containing other concentric spheres, the central kernel being the earth. From Aristotle to Galileo this view was held by the large majority of educated men. Dante's *Vision* shows how real the belief was. Beatrice leads Dante from the earth to the sphere of the moon, thence to those of Mercury, Venus, the sun, Jupiter, Saturn, and the fixed stars. Beyond this last there is nothing; space and time cease to exist. God is described as a luminous point radiating force and motion throughout the universe. Giordano Bruno and Galileo impressed on the European mind what Lucretius and his teachers had dimly suspected, that the universe was not finite, but

¹ Lucretius, *De rerum natura*, prologue to bk. iv. "[They] traverse the pathless haunts of the Muses, never yet trodden by the foot of man."—ED.

infinite. The discovery gave a shock to the Catholic faith from which it has never recovered. But, apart altogether from this momentous consequence, the acceptance of the Copernican system opened out two paths of scientific thought between which a definite choice had to be made.

One was the path chosen by Descartes. His celebrated theory, which dominated European thought for nearly a century, was an attempt to explain the universe on scientific principles. Given the elementary laws of motion, given a homogeneous ethereal substance pervading space, Descartes endeavoured to show that, by a gradual process of differentiation and evolution, the world must have come to be something very much like what we now see that it is. This was a very high mountain to climb, and it is needless to say that Descartes never reached the summit. But the effort was stimulating and bracing, and it had for a time the great advantage of co-ordinating intellectual effort and of showing the unity of method by which nature was to be investigated. In the hands of Descartes it yielded great results.¹

The second path taken was to abandon all attempts to explain the universe, and to deal specially with each class of phenomena as it came under review, with much concern for its relations to other classes. This was the course followed by Sir Isaac Newton and the other founders of the Royal Society and by many similar institutions with such splendid success. These societies have achieved great things. Almost all scientific discoveries, if not made by their members, are at least published through their agency. They form a channel through which inquirers into nature may communicate with each other; and thus they prevent the waste of time and energy which comes from doing the same thing twice over. What more can be wanted?

Yet it has been felt with increasing force during the present century that something more is wanted. The multiplication of scientific memoirs has been such as often to produce darkness rather than light. No one in any branch of science can possibly acquaint himself with all that has been done before him; for his purposes, therefore, it is often the same as though the work had not been done at all. In some cases it would seem to be the main object of the investigator to upset what has been done before him, repeating an observation of small importance with some slight

¹ See Dr. Bridges' biography of Descartes in the *New Calendar of Great Men*, pp. 482-85.—ED.

addition of accuracy. The sense of proportion is lost. The attempt to estimate the relative importance of discoveries is abandoned, with the inevitable consequence that immediate application to the industrial arts becomes the sole test of their value.

Yet, if science is to play the part which early in the nineteenth century Comte and others had assigned to her; if she is to supply the foundation on which human institutions are in future to rest; if she is to supersede theological faith as the source of those common thoughts and convictions by which men are henceforth to direct their common action—something more is needed than the heterogeneous medley of scientific memoirs which are poured forth every year in the proceedings of academies and of scientific congresses. There must be some binding, co-ordinating principle, something in the nature of a synthesis towards which all this analytical work, however freely and spontaneously conducted, shall be seen to converge. The question is, What form shall such a synthesis assume?

There are two kinds conceivable, though one only can effect the purpose. First, there may be a renewal of Descartes's attempt to present a picture of the universe. Humboldt's *Cosmos* and the first volume¹ of Mr. Spencer's *Synthetic Philosophy* are examples of what can be done in this direction. Humboldt's work is little more than a picturesque description of external nature by a man of vast knowledge; it is now nearly forgotten. Mr. Spencer's effort is more ambitious and far-reaching. He lays down, like Descartes, principles of action which have operated from the beginning of time, and which continue to the end—such as the persistence of force, the passage from the homogeneous to the heterogeneous, and so on. He undertakes to show that on these principles gradual differentiation and integration of a homogeneous medium pervading space would proceed, and would result in the solar and sidereal system that we see around us, and that the continuous operation of the same forces will result in final dissolution—that is to say, in reversion to the uniform ethereal medium from which evolution originally started. This alternation of evolution and dissolution is to go on for ever. Few, or none, are the recognitions to be found in this series of speculations that it lies hopelessly beyond the sphere of our knowledge. Constantly it is repeated that beyond the sphere of the Knowable lies the sphere of the Unknowable—a sort of passive Deity, who, like Atlas, bears the world on his shoulders

¹ *First Principles*.—ED.

without interfering with it. But the speculations I have been speaking of are regarded by Mr. Spencer as falling within the sphere of the Knowable.

This, then, is the first kind of synthesis, technically called Objective. The thinker stands outside the universe, looks on it as it were from a distance, and informs his fellow-men how it arose and grew and how it will one day disappear. Unhappily this implies such an approach to omniscience as we do not appear likely to obtain. Take, for instance, one of the simplest facts in nature—the fall of a stone to the ground. How it falls Galileo and Newton have told us; why it falls we are as ignorant as in the days of Aristotle. Physicists are unwilling to believe in forces acting at a distance, in a pulling force exerted by the earth on the stone, or by the sun upon the earth. A force of pressure from without is the only alternative; and this was the supposition of Descartes in the seventeenth century. It may be so, only we are not in a position to measure this pressure. We cannot get outside the world so as to test it. And if we cannot understand so simple a thing it is not surprising that we should not understand how it was that life came upon the earth, or what were the forces which in a million centuries transformed a speck of jelly into a fish, a bird, or a man.

It would seem beyond the power of the physicist or the biologist to frame a synthesis of scientific conceptions except by the use of suppositions as hazardous and undemonstrable as the cosmogony of Moses or the Brahmins. It remains to be seen whether a better co-ordination may not be effected on a wholly different plan—the plan of regarding man's social and moral life as the central object of intellectual effort, and of ranging other branches of knowledge—biological, physical, or mathematical—in relation to this centre. Cosmic Evolution as it is called—the attempt to conjecture how the universe came into being and what will happen to it a million centuries hence—does not offer any principle of coherence. Such conjectures are the fireworks of what is sometimes, though wrongly, called the scientific imagination; they occupy a sort of mid-region between science and poetry, in which the best qualities of both are usually lost. The test of poetry is that by choice words, rightly ordered, it shall widen and deepen our sympathies, that it shall lift us to a higher spiritual atmosphere, and thus make us fit to discern those fine shades of character and circumstance which mark the difference and also the kinship between man and man. The test of science is that it shall enable us to predict, within certain limits, the natural course of events, with the ultimate purpose of modifying

these events when modification may be possible, of wise adaptation to them when it is not. Measured by such tests, the cosmogonies of Haeckel, Spencer, and other imitators of Descartes seem to me failures, whether as poems or as scientific memoirs. They neither stir man's soul nor guide his judgment.

In contrast with attempts to explain the origin of the universe or of life, which may be conveniently classed as *Objective* syntheses, is the *Subjective* or human synthesis proposed by Comte. Assuming the knowledge of man as the central field of inquiry, and the service of man as the highest object of desire, it ranges the truths of science according to their nearer or more distant relation to man's social and moral life. Comte's meaning and purpose may be best grasped if this synthesis is regarded as a scheme of education framed with the view of rendering intellect subservient to the highest interests of man.

The only valid objection to such a synthesis is the doubt felt by many whether, if adopted, it might not be too restrictive of scientific research. It is an objection of grave moment. If sustained, it would be fatal to all hopes of rallying the best intellect of Europe to the cause of social regeneration. If exact science were to be thrust into the background, if the only intellectual pursuits held in honour were the more or less useful collections of historical or industrial facts dignified with the title of economic and social sciences, physicists and biologists might well shrink from a scheme of higher education which led to such a result. Let us see if this be so.

The first condition to be fulfilled by a Synthesis is that it shall rest on a satisfactory groundwork of Analysis. An impression has been widely spread that the acceptance of certain principles at which Comte arrived dispenses his disciples from following in his footsteps, from patiently examining the laws of nature for themselves, from closely scrutinizing the methods followed by the great masters in each leading branch of science, and from making any attempt at further progress along the same or similar paths. Honestly examined, the whole tenour of Comte's writings from first to last is alien to this view. A bare reference to his political maxim¹ should be decisive. Order without Progress is as inadmissible in science as in politics. And Synthesis dissociated from Analysis means Order without Progress.

Of course, there is another side to this matter. The ethic of

¹ *Ordre et Progrès*. See p. 156 (note).—ED.