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RIDDLE  
OF THE  
UNIVERSE

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THE RIDDLE  
OF  
THE UNIVERSE

BY  
ERNST HAECKEL

*TRANSLATED BY JOSEPH McCABE*

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THE RIDDLE OF THE  
UNIVERSE

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## AUTHOR'S PREFACE

THE present study of the Monistic Philosophy is intended for thoughtful readers of every condition who are engaged in an honest search for the truth. The steady increase of this effort of man to attain a knowledge of the truth is one of the most salient features of the nineteenth century. The fact is easily explained by the history of humanity; by the open contradiction that has developed during the century between science and the traditional "Revelation"; and, finally, by the inevitable extension and deepening of the rational demand for an elucidation of the innumerable facts that have been brought to light, and for a fuller knowledge of their causes.

Unfortunately, this vast progress of empirical knowledge in our "Century of Science" has not been accompanied by a corresponding advancement in theoretical interpretation—in that higher knowledge of the causal nexus of individual phenomena which we call philosophy. We find, on the contrary, that the abstract and almost wholly metaphysical science which has been taught in our universities for the last hundred years under the name of "philosophy" is far from assimilating our hard-earned treasures of experimental research. On the other hand, we have to admit, with equal regret, that most of the representatives of what is called "exact science" are content with the special care of their own narrow branches of observation and experiment, and deem superfluous the

deeper study of the universal connection of the phenomena they observe—that is, philosophy. While the pure empiricists “do not see the wood for the trees,” the metaphysicians, on the other hand, are satisfied with the general picture of the wood, and trouble not about its individual trees. The idea of a “philosophy of nature,” to which both methods of research, the empirical and the speculative, naturally converge, is even yet contemptuously rejected by large numbers of representatives of both schools.

This unnatural and fatal opposition between Science and Philosophy, between the results of experience and of thought, is undoubtedly becoming more and more painful to thoughtful people. That is easily proved by the increasing spread of the course of the last half-century. It is seen, too, in the welcome fact that, in spite of the mutual aversion of the scientific observer and the speculative philosopher, nevertheless eminent thinkers from both camps are making a united effort to attain the solution of that highest object of inquiry which we briefly denominate the “world-riddles.” The studies of these “world-riddles” which I offer in the present work cannot reasonably claim to give a perfect solution of them: they merely offer to a wide circle of readers a critical inquiry into the problem, and seek to answer the question as to how nearly we have approached the solution at the present day. What stage in the attainment of truth have we actually arrived at in this closing year of the nineteenth century? What progress have we really made during its course towards that immeasurably distant goal?

The answer which I give to these great questions must, naturally, be merely subjective and only partly correct; for my knowledge of nature and my ability to interpret it are limited, as are those of every man. The one point

that I can claim, and which, indeed, I must ask of my strongest opponents, is that my Monistic Philosophy is sincere from beginning to end—it is the complete expression of the conviction that has come to be, after many years of ardent research into Nature and unceasing reflection on the true basis of its phenomena. For fully half a century has my mind's work proceeded, and I now, in my sixty-sixth year, may venture to claim that it is mature; I am fully convinced that this "ripe fruit" of the tree of knowledge will receive no important addition and suffer no substantial modification during the brief spell of life that remains to me.

The present work is the continuation, confirmation, and integration of the views which I have urged for a generation. It marks the close of my studies of the Monistic conception of the universe. The earlier plan, which I projected many years ago, of constructing a complete "System of Monistic Philosophy" on the basis of evolution, will never be carried into effect now. My strength is no longer equal to the task, and many warnings of approaching age urge me to desist. Indeed, I am wholly a child of the nineteenth century, and with its close I draw the line under my life's work.

The vast extension of human knowledge which has taken place during the present century, owing to a happy division of labour, makes it impossible to-day to range over all its branches with equal thoroughness, and to show their essential unity and connection. Even the genius of the highest type, having an equal command of every branch of science, and largely endowed with the artistic faculty of comprehensive presentation, would be incapable of setting forth a complete view of the cosmos in the space of a moderate volume. My own command of the various branches of science is uneven and defective, so

that I can attempt no more than to sketch the general plan of such a world-picture, and point out the pervading unity of its parts, however imperfect be the execution. Thus it is that this work on the world-enigma has something of the character of a sketch-book, in which studies of unequal value are associated. As the material of the book was partly written many years ago, and partly produced for the first time during the last few years, the composition is, unfortunately, uneven at times; repetitions, too, have proved unavoidable. I trust those defects will be overlooked.

In taking leave of my readers, I venture the hope that, through my sincere and conscientious work—in spite of its faults, of which I am not unconscious—I have contributed a little towards the solution of the great enigma. Amid the clash of theories, I trust that I have indicated to many a reader who is absorbed in the zealous pursuit of purely rational knowledge that path which, in my firm conviction, alone leads to truth—the path of empirical investigation and of the Monistic Philosophy which is based upon it.

ERNST HAECKEL.

*Jena, Germany, 1899.*



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# CONTENTS

CHAP.	PAGE
AUTHOR'S PREFACE . . . . .	vii
I THE NATURE OF THE PROBLEM . . . . .	I
II OUR BODILY FRAME . . . . .	18
III OUR LIFE . . . . .	32
IV OUR EMBRYONIC DEVELOPMENT . . . . .	43
V THE HISTORY OF OUR SPECIES . . . . .	58
VI THE NATURE OF THE SOUL . . . . .	72
VII PSYCHIC GRADATIONS . . . . .	88
VIII THE EMBRYOLOGY OF THE SOUL . . . . .	108
IX THE PHYLOGENY OF THE SOUL . . . . .	121
X CONSCIOUSNESS . . . . .	139
XI THE IMMORTALITY OF THE SOUL . . . . .	154
XII THE LAW OF SUBSTANCE . . . . .	173
XIII THE EVOLUTION OF THE WORLD . . . . .	191
XIV THE UNITY OF NATURE . . . . .	208

## CONTENTS

XV	GOD AND THE WORLD . . . . .	225
XVI	KNOWLEDGE AND BELIEF . . . . .	239
XVII	SCIENCE AND CHRISTIANITY . . . . .	252
XVIII	OUR MONISTIC RELIGION . . . . .	270
XIX	OUR MONISTIC ETHICS . . . . .	283
XX	SOLUTION OF THE WORLD-PROBLEMS . . . . .	298
	INDEX . . . . .	313
	GLOSSARY . . . . .	321

# THE RIDDLE OF THE UNIVERSE

## CHAPTER I

### THE NATURE OF THE PROBLEM

The condition of civilisation and of thought at the close of the nineteenth century. Progress of our knowledge of nature—of the organic and inorganic sciences. The Law of Substance and the Law of Evolution. Progress of technical science and of applied chemistry. Stagnancy in other departments of life: legal and political administration, education and the Church. Conflict of reason and dogma. Anthropism. Cosmological perspective. Cosmological theorems. Refutation of the delusion of man's importance. Number of "world-riddles." Criticism of the "seven" enigmas. The way to solve them. Function of the senses and of the brain. Induction and deduction. Reason, sentiment, and revelation. Philosophy and science. Experience and speculation. Dualism and monism.

THE close of the nineteenth century offers one of the most remarkable spectacles to the thoughtful observer. All educated people are agreed that it has in many respects immeasurably outstripped its predecessors, and has achieved tasks that were deemed impracticable at its commencement. An entirely new character has been given to the whole of our modern civilisation, not only by our astounding theoretical progress in sound knowledge of nature, but also by the remarkably fertile practical application of that knowledge in technical science, industry, commerce, and so forth. On the other hand, however, we have made little or no progress in moral and social life, in comparison with earlier centuries; at times there has

been serious reaction. And from this obvious conflict there have arisen, not only an uneasy sense of dismemberment and falseness, but even the danger of grave catastrophes in the political and social world. It is, then, not merely the right, but the sacred duty, of every right-minded and humanitarian thinker to devote himself conscientiously to the settlement of that conflict, and to warding off the dangers that it brings in its train. In our conviction this can only be done by a courageous effort to attain the truth, and by the formation of a clear view of the world—a view that shall be based on truth and conformity to reality.

If we recall to mind the imperfect condition of science at the beginning of the century, and compare this with the magnificent structure of its closing years, we are compelled to admit that marvellous progress has been made during its course. Every single branch can boast that it has, especially during the latter half of the century, made numerous acquisitions of the utmost value. Both in our microscopic knowledge of the little and in our telescopic investigation of the great, we have attained an invaluable insight that seemed inconceivable a hundred years ago. Improved methods of microscopic and biological research have not only revealed to us an invisible world of living things in the kingdom of the protists, full of an infinite wealth of forms, but they have taught us to recognise in the tiny cell the all-pervading "elementary organism" of whose social communities—the tissues—the body of every multicellular plant and animal, even that of man, is composed. This anatomical knowledge is of extreme importance; and it is supplemented by the embryological discovery that each of the higher multicellular organisms is developed out of one simple cell, the impregnated ovum. The "Cellular theory," which has been founded on that discovery, has given us the first true indication of the physical, chemical, and even the psychological, processes of life—those mysterious phenomena for whose explanation it had been customary to postulate a supernatural "vital force" or "immortal soul." Moreover, the true character of disease has been made clear and intelligible to the

physician for the first time by the cognate science of Cellular Pathology.

The discoveries of the nineteenth century in the inorganic world are no less important. Physics has made astounding progress in every section of its province—in optics and acoustics, in magnetism and electricity, in mechanics and thermo-dynamics; and, what is still more important, it has proved the unity of the forces of the entire universe. The mechanical theory of heat has shown how intimately they are connected, and how each can, in certain conditions, transform itself directly into another. Spectrum analysis has taught us that the same matter which enters into the composition of all bodies on earth, including its living inhabitants, builds up the rest of the planets, the sun, and the most distant stars. Astro-physics has considerably enlarged our cosmic perspective in revealing to us, in the immeasurable depths of space, millions of circling spheres, larger than our earth, and, like it, in endless transformation, in an eternal rhythm of life and death. Chemistry has introduced us to a multitude of new substances, all of which arise from the combination of a few (about seventy) elements that are incapable of further analysis; some of them play a most important part in every branch of life. It has been shown that one of these elements—carbon—is the remarkable substance that effects the endless variety of organic syntheses, and thus may be considered “the chemical basis of life.” However, all the particular advances of physics and chemistry yield in theoretical importance to the discovery of the great law which brings them to one common focus, the “Law of Substance.” As this fundamental cosmic law establishes the eternal persistence of matter and force, their unvarying constancy throughout the entire universe, it has become the pole-star that guides our Monistic Philosophy through the mighty labyrinth to a solution of the world-problem.

Since we intend to make a general survey of the actual condition of our knowledge of nature and its progress during the present century in the following chapters, we shall delay no longer with the review of its particular



branches. We would only mention one important advance, which was contemporary with the discovery of the law of substance, and which supplements it—the establishment of the theory of evolution. It is true that there were philosophers who spoke of the evolution of things a thousand years ago; but the recognition that such a law dominates the entire universe, and that the world is nothing else than an eternal “evolution of substance,” is a fruit of the nineteenth century. It was not until the second half of this century that it attained to perfect clearness and a universal application. The immortal merit of establishing the doctrine on an empirical basis, and pointing out its world-wide application, belongs to the great scientist Charles Darwin; he it was who, in 1859, supplied a solid foundation for the theory of descent, which the able French naturalist Jean Lamarck had already sketched in its broad outlines in 1809, and the fundamental idea of which had been almost prophetically enunciated in 1799 by Germany’s greatest poet and thinker, Wolfgang Goethe. In that theory we have the key to “the question of all questions,” to the great enigma of “the place of man in nature,” and of his natural development. If we are in a position to-day to recognise the sovereignty of the law of evolution—and, indeed, of a monistic evolution—in every province of nature, and to use it, in conjunction with the law of substance, for giving a simple interpretation of all natural phenomena, we owe this chiefly to those three distinguished naturalists; they shine as three stars of the first magnitude amid all the great men of the century.

This marvellous progress in a theoretical knowledge of nature has been followed by a manifold practical application in every branch of civilised life. If we are to-day in the “age of commerce,” if international trade and communication have attained dimensions beyond the conception of any previous age, if we have transcended the limits of space and time by our telegraph and telephone, we owe it, in the first place, to the technical advancement of physics, especially in the application of steam and electricity. If, in photography, we can, with the utmost ease, compel the sunbeam to create for us in a moment’s