

Foreword of “Crystal Souls—Studies of Inorganic Life”

by Ernst Haeckel

*“Was man an der Natur Geheimnisvolles pries,
Das wagen wir verständig zu probieren;
Und was sie sonst organisieren liess,
Das lassen wir kristallisieren!”*

—Goethe

*(The thing in Nature as high mystery prized,
This has our science probed beyond a doubt;
What Nature by slow process organised,
That have we grasped and crystallised it out.)*

—trans. Philip Wayne

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*“If Nature in her lifeless beginnings had not been fundamentally stereometric,
would we have acquired from her an incalculable and immeasurable life?”*

—Goethe

“To whom it never comes into the head, that spirit and matter, soul and body, thoughts and application, will and motion, were, are, and always will be the necessary dualities of the Universe, which call for equal rights for each partner and can both together be regarded as the representative of God,—he who cannot raise himself to this concept, ought to give up thinking and apply his days to general world gossip.”

—Goethe

These studies of “crystal souls¹” extend over a wide domain in which different branches of science and philosophy—crystallography and mineralogy; physics and chemistry; morphology and physiology; zoology and botany; psychology and mathematics, have direct interests. From the enormous span which these divergent branches of knowledge achieved in the course of the nineteenth century and from the far-reaching subdivision of work, which has separated more and more the numerous participants, it is naturally quite impossible that a single worker could master equally all these sciences and acquire a basic and comprehensive knowledge of all departments. Thus every attempt to present the general contact points of the different departments and to extract general results from their combination will, to the specialist, appear the suspect and superficial work of a dilettante. I must make this disclaimer myself, for in most of the fields dealt with I am myself only a “half-educated dilettante”. If I nevertheless undertake this venture, it appears simply that, because I attach a high importance to these general results and my earlier studies in natural philosophy, I can give a rounded conclusion.

“Crystal Souls”? What ought this new natural philosophical concept to mean? Perhaps

a baseless metaphysical speculation? Or a fantastic dream of fiction? Are not crystals and souls two basically different phenomena which have nothing to do with each other?

Crystals serve now at the beginning of our twentieth century as the image of lifeless, rigid natural bodies. Their scientific treatment is the job of physics, chemistry, mathematics and mineralogy. True crystals, which you find by the thousand in all mineralogical collections appear, in fact, as solid “dead matter” without organisation, mostly bounded by flat faces and straight edges which meet at definite angles: they also have a characteristic inner structure which gives them cleavability, deriving from the regular internal ordering of their molecules, the smallest equivalent particles.

That science, which deals with research on “dead” crystals, crystallography, is thus an “exact” science, which moves on the sure rails of mathematics, and has nothing to do with “life” or “the soul”, the most perfect phenomena of life.

Souls, on the other hand, serve generally as indications of organic life, in contradistinction to the inorganic world of minerals, rocks and crystals. Their main characteristics, sensitivity and movement (“feeling” and “willing”) are tied to the organisation of the “living nature”, to the characteristic assembly of organisms from various organs, and on their regular, apparently goal-directed cooperation which life itself is based on.

Thus, therefore, that science which deals with research on the “living soul” is excluded from being a part of organic science or of biology, and for soul knowledge (the obsolete German word for psychology) or psychology, its purposes are in the main so tangled and multifarious, that they appear accessible only partially to “exact” treatment and the reduction to the secure formulae of mathematics. Indeed, the majority of “professional psychologists” maintains the old tradition that the study of the soul (or psyche) is not a “natural science” but is purely a “moral science”.

This deep cleft between “crystals and psyche”, and the great distance between the two sciences concerned with this—crystallography and psychology—existed quite generally up to the beginning of the twentieth century, as any glance into the extensive relevant literature, especially the textbooks and periodicals dealing with their progress, shows. Moreover, because of the traditional division of labour, which increases year by year with the growth of our knowledge, the major fields of work in the two sciences are quite separated. Physicists and chemists, mineralogists and geologists never thought to study psychology. Conversely, the tasks and methods of the psychologists themselves, their tangled problems and far removed goals, were so different from those of the crystallographers, that they felt no pressure to visit their strange and far-distant work.

However, in the year 1904 there appeared a number of highly significant works, which greatly altered this traditional circumstance and brought in a completely new direction of research. The surprising discovery of “liquid, apparently living, crystals” by Otto Lehmann (Karlsruhe), who had worked with dedicated concern for twenty years on this topic, came to fruition as a great work. Then also Richard Semon (Munich) proved “*mnemes* to be the preserving principle in the interaction of organic events” and utilised the unconscious memory of the living substance also for the psychological illumination of the puzzling process of inheritance and as support for the basic *biogenetic* law². At the same time knowledge of the psychic life of plants was firmly established through the experimental investigation of their sense organs (by Haberlandt, Nemec, Francé and others). Other botanists and bacteriologists established the often controversial existence of *cytodes*³ and

monera from cells without nuclei, which still live today in Schizophyta, (Chromacea and Bacteria). Thus the reform of the cell theory and its replacement by the *plastid* theory was accomplished, as I had tried in vain to do myself in 1866. Also the attempt, which I had made in the second book of "Generelle Morphologie"⁴, to explain, by "general investigations on the nature and first origins of organisms and their relationship to the inorganic world", achieved satisfying success through the studies quoted and other similar works in the biological and the physical domains. Thus I was in the position, by compilation and critical evaluation of these new findings, supported by my own long investigations, in my book on "Lebenswunder" (1904), to draft out and finally to deliver, a substantial volume supplementary to the book on the "The Riddle of the Universe"⁵ which had appeared in 1899.

Through this splendid progress in our deep knowledge of nature, of the many-sided significance of which most natural scientists and philosophers are still unconscious, as well as of other important discoveries in different areas, the year 1904 was an outstanding milestone in the history of natural philosophy. As the most important achievement in all this may be counted the definitive conviction of the fundamental unity of all natural phenomena, which finds, in the concept of "monism", its simplest and clearest expression. At one blow the artificial boundaries, which up to now have been erected between life and death, between natural science and moral science, have fallen down. All substances, inorganic as well as organic, possess life; all things have psyches, crystals as well as organisms. There arises, anew and unbreakable, the old conviction of the inner unitary interdependence of all happenings, of the unbounded rule of generally valid laws of nature: "According to great, eternal a priori laws we must all complete our circles of existence!" What Goethe suspected a hundred years ago, with his wonderfully deep understanding of nature, and what he prophetically expressed in incomparable words of poetry in Weimar and Jena, has today emerged to the radiant sunlight of scientific recognition.

Three years ago, I took the opportunity of my eightieth birthday to lay out the results of my "Studies on monist religion"⁶, to summarise them briefly in a small essay "God-Nature" (*Theophysis*), and sought to show how the monist world outlook of our greatest poets and thinkers has found, through the most recent results of modern natural science, a radiant confirmation and enlargement. If Goethe found in a crystal "life and soul" as in the "The Metamorphoses of Plants", if he found in the human skull, the same wonderful structure as in the cranium of another vertebrate, so he prepared 130 years ago for the recognition of those most important outlooks, to whose deep foundations the present sketch on "Crystal Souls" is dedicated. Its goal will be reached if it stimulates further researches on *crystallogics* and *probiontics*, on *radiotics* and on *psychomatics*⁷.

Ernst Haeckel, Jena, 14 September 1917

Notes

1. What Haeckel means by “soul” represents a considerable problem. “Life of the soul” has been glossed as “psychic activity” (Haeckel’s book, *Die Welträtsel* (1899) is largely devoted to the soul, explained in material terms, considerations of consciousness and other problems still very topical). For “soul” we could use Haeckel’s coinage “**psychom**”, but perhaps the more familiar **psyche** is preferable to avoid theological connotations, but it might be useful to bear in mind the modern concept of “information processing”. The Pope (John Paul II) on 23 October 1996, in a statement to the Pontifical Academy of Sciences, drawing attention to the Encyclical *Humani Generis* (Pius XII, 1950), accepted Darwin’s theory of evolution and that the human body is result of material forces, but continued to claim that: “if the origin of the human body is sought in living matter which existed before it, the spiritual soul is directly created by God”. Thus, the dualist view, to which Haeckel opposed his *monism*, continues. The now obsolete word “Seelenkunde” was used by Haeckel for psychology.
2. This was Haeckel’s principle: “ontogeny recapitulates phylogeny”.
3. We will use underlining for words peculiar to Haeckel and his time. Some of Haeckel’s coinages (such as *ecology*, have survived but many have not.
4. “New Year 1867 saw Darwin ‘swearing at each sentence’ of Haeckel’s *Generelle Morphologie*, hoping Huxley would arrange a translation. ‘The German is too difficult for ordinary mortals’, Darwin moaned. Even Huxley, with his fluent German found it ‘uncommonly hard’” (“Huxley”, A. D. Desmond, Michael Joseph, London, 1994, p. 354).
5. Translated by Joseph McCabe as “The Riddle of the Universe”, Thinker’s Library, 1929. This English edition contains a brief glossary. The book sold more than 400,000 copies and appeared in 30 languages. The popular version, “Die Lebenswunder”, was not as successful.
6. In seeking to overthrow established religion, Haeckel called his own world outlook, deriving from Naturphilosophie, a *religion*, like Buddhism in a way, without a supernatural or personal God.
7. Psychomatics: Haeckel was a naturalist or biologist projecting his ideas of the everyday world accessible to the eye down to the level of chemistry with its yet invisible atoms. He was not familiar with atoms and molecules and could only view them as being like organisms. Thus, psychomatics is a preliminary concept relating to the forces between atoms.