

THE EVOLUTION OF LIFE ON EARTH AND THE SEARCH OF K.E. VON BAER FOR THE ULTIMATE CAUSES; HIGHLIGHTS FROM THE HISTORY OF INTERPRETATION

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Karl Ernst von Baer (1792-1876) was one of the most outstanding biologists of the European continent—if not the most outstanding one. Although one of the leading contemporary biologists, Stephen J. Gould of Harvard, says about him: "his laws, in refurbished evolutionary dress, are now more widely accepted than ever before...and his descriptions mark the beginning of modern embryology"¹ yet, an important encyclopedia for America and England has only a short and somewhat critical article about him.² Most articles about him mention at least some of his discoveries and his important publications. Very little is generally written about his profound fundamental ideas and his observations concerning the evolution of life on this planet. He devoted

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¹ Stephen J. Gould, *Ontogeny and Phylogeny* (Cambridge, Mass: The Belknap Press of Harvard University, 1977), p. 59.

² The article in the *Encyclopaedia Britannica*, 1968 ed., 2:1029-1030 calls him a "...pioneer in comparative embryology...who discovered the mammalian ovum...the influence of Baer's discoveries was far-reaching and abiding...notwithstanding...the 'teleic' idea...possessed Baer to the end of his life, and explains his inability to accept the theory of unbroken descent with modification."

It seems surprising that his Soviet biographer, Boris E. Railkov, in his book, *Karl Ernst von Baer, sein Leben und sein Werk*, trans. Dr. H. Knorre (Leipzig: J.A. Barth, 1968), p. 409, came to a similar conclusion of "...persistent metaphysical prejudices..." with an equally prejudiced metaphysical judgment that "...evidently...no reconciliation is possible between metaphysics and science..."

An article that in the author's view is more objective and correct, by Jane Oppenheimer, appears in the *Dictionary of Scientific Biography* (New York, N.Y.: Charles Scribner's Sons, 1970), 1: 385-389.

years of research and thought to recognize the deeper forces behind all the series of observable developments.

Among his many accomplishments stands out his inquiry about the development of the chick in the egg, which he investigated in a scientific way. He observed and described the process in greatest detail, as it had never been done before, and extended similar research to many other areas of biology with a unique gift to recognize the principles involved. Darwin and many others subsequently used von Baer's carefully documented findings in their own publications³ (in some cases erroneously!).

Von Baer points to the importance of assuming a certain kind of purposefulness (*Zielstrebigkeit*) or drive towards closer and more remote goals in the development of life. "What is repeated again and again cannot be caused by chance or accident, but has to depend upon a necessity (or cause)."⁴ With many scholarly arguments he concludes that in a great many cases some originally hidden purposiveness (teleology) has to be inferred from the observable data. He analyzed nature as to the limits of accidents or chance events in organisms and human life, also recognizing clearly the problems in identifying any direction or trends. A great many repeated observations have to come together in order to enable a scientist to point with certainty to underlying causes. On the other hand, he warns also of fearing to identify deeper and concealed series of causes—a fear which he mockingly calls "teleophobia"—⁵ outlining fully the epistemological

³ This was pointed out by Dr. James A. Rogers in the article, "The Reception of Darwin's *Origin of Species* by Russian Scientists," *Isis* 64, no. 224 (1972): 484-503. "Darwin had actually quoted von Baer in the first two editions, but had attributed the quotations to Louis Agassiz by mistake. After giving von Baer proper recognition in the third edition, Darwin used von Baer's work, or misused it (*sic*), to find in it for the argument from embryonic recapitulation a splendid proof of organic revolution." (In *Origin of Species* XIII, 324-244, Darwin seemed unaware that von Baer had found evidence repudiating the argument from embryonic recapitulation more than three decades before.)

⁴ K.E. von Baer, *Entwicklung und Zielstrebigkeit in der Natur*, ed. v. K. Boegner, trans. Horand K. Gutfeldt (Stuttgart: Freies Geistesleben, 1983).

⁵ *Ibid.*, p. 116. This issue is also discussed by von Baer in greater detail in the beginning of his article "Design in the processes of nature" (*Ober den Zweck in den Vorgängen der Natur*), *ibid.* p. 97 f.

conditions for making a pronouncement. For example, he investigated various organs of human and animal bodies for the usefulness they fulfill, especially the eye, leading to hypotheses about what must have caused their formation. The assumption that later became popular, that simple chance or blind hazard in hereditary mutations and later struggle for survival was supposedly the cause of all perfection in life, appeared absolutely absurd to him. During his entire life he had increasingly recognized order and laws everywhere in nature, especially in all living beings. Von Baer would not deny that chance factors may have been involved, but would never acknowledge these as the only or main causes of evolution.

It seems appropriate at this point to show a few similar lines of earlier thought and some of the later developments.

Long before his time, Aristotle believed in a purposefulness in various areas of life, calling it "entelechy," subsequently transformed into "teleology," from the Greek word *telos*: end or purpose. Later in the scientific world, it was the great Swedish scientist and philosopher Emanuel Swedenborg, (1688-1770), who first outlined an interpretation of nature that included energies of non-material origin, which he called "conatus" (endeavor). He claimed that such structured sets of forces direct particles and beings in a way that often a use, a purpose or meaning for their growth and movements, can be recognized in retrospection. Swedenborg demonstrated this in a great many cases of human anatomy, although he did not point to detailed experimental proofs. Yet, he elaborated a universal view of his theory and gave many indications for it, pointing to a divine initiation as the ultimate source of all cosmological and biological development and laws. There has probably been an indirect influence of Swedenborg extending through two of the teachers of von Baer, to whom he professed admiration and allegiance through his entire life: the professors K.F. Burdach and I. Döllinger, who were deeply influenced by the German philosopher F.W. Schelling (1775-1854),⁶ one of the main representatives of German idealism. It was Schelling who had assimilated many essential ideas of Swedenborg, as this was proved in a doctorate thesis

⁶ Raikov, *op. cit.*, p. 384-391.

by Friedemann Horn.⁷ There is much similarity in the basic ideas about the interpretation of nature between Swedenborg and von Baer, yet it was the latter's concepts that came to gain a somewhat wider influence in various areas on the European continent.

Several schools of thought came up, which maintained and expanded the view that some nonphysical complex of energies must be involved in all life and can be recognized. Notably the French philosopher and Nobel laureate Henri Bergson (1859-1941) gained wide acceptance. He investigated a wide range of indications for the existence of a non-material guiding force for evolution, including even an examination of those animal developments that turned out to be failures and died out after a short timespan. In a careful and comprehensive critical survey, Bergson pointed cogently to the manifestation of a consistent "creative impetus" (*elan vital*). In his most influential book *Creative Evolution (Evolution Creatrice)*,⁸ he asserts: "The impetus of life...consists in a need for creation...it seizes upon this matter, which is a necessity itself, and strives to introduce into it the largest amount of independence and liberty."

Another French scholar expanded and modified Bergson's ideas in a great vision of a development toward a final purpose of creation, the biologist and priest Pierre Teilhard de Chardin (1881-1955), whose works were translated in many languages,⁹ although the Catholic church is critical of his work. De Chardin unfolds a vision of a universal evolution, involving all nature, animate and inanimate, towards a remote union with the Divine. He writes¹⁰: "Because it contains and engenders consciousness, space-time is necessarily of a convergent nature. Accordingly its enormous layers, followed in the

⁷ Friedemann Horn, *Schelling und Swedenborg Ein Beitrag zur Problemgeschichte des deutschen Idealismus und zur Geschichte Swedenborgs in Deutschland* (Schelling and Swedenborg, a contribution to the topical history of the German idealism) (Zürich: Swedenborg, 1954), VII. In his dissertation, Horn confirms the observation of Prof. Benz that Schelling "...resurrected the main ideas of Swedenborg in his metaphysics."

⁸ A. Mitchell, trans., *Creative Evolution* (New York: Henry Holt & Co., 1911), p. 251.

⁹ Pierre Teilhard de Chardin, *The Phenomenon of Man*, 2nd ed., trans. Bernard Wall (New York: Harper & Row, 1965).

¹⁰ *Ibid.* p. 259.

right direction, must somewhere ahead be involuted to a point which we might call Omega..." He specially emphasized the ascent of mankind, although he takes into consideration a great many indications from other areas of nature. He could not believe in the survival of the fittest, but only in the survival of the most complex, which indicated to him a trend towards a goal.

In Germany, the biologist and philosopher Hans Driesch (1867-1941) developed a theory, which came to be known as vitalism¹¹ and became widely influential, supported by many experiments with the blastula of sea urchins. He called attention to the fact that the functions of protoplasm cannot be explained on a mechanical basis alone, for any fragment cut at random in the early phases developed into a complete animal. These observations point to the existence of a spiritual or non-material formative energy that he visualized to the greatest necessary detail, showing how it must work to realize its own purposes.

The discovery of the DNA double helix underlying the nature of genes and chromosomes which determine aspects of biological heredity, explained a few of the phenomena that had been pointed out by vitalists, but also raised an entirely new set of questions. For example, what causes the precision of the complicated movements in a cell during its division, which is occurring in billions of cases? Why do the chromosomes arrange themselves so that they can divide in the proper fashion? Does this not demonstrate a purpose? It seems surprising at times that certain biology books imply some intentionality everywhere by stating that this or that structure serves a certain use. Yet, any approach appearing to define more clearly and generally the concept of "use," or the existence of overall purposes is eagerly and anxiously denied as "unscientific."

Von Baer might have smiled about such detours understandingly, and yet his great ideological opponent Charles Darwin¹² has gained

¹¹ *Encyclopedia of Philosophy* (N.Y. & London: Macmillan, 1967), 8:253-256, observing that this then (in America) "...not a popular theory among biologists..."

¹² Von Baer wrote a scholarly treatise, almost a book, "Über Darwins Lehre" (About Darwin's Doctrine), published in his *Schriften* 370, vol. 2, p. 235, quoted from Raikov, *op. cit.*, p. 368; appeared in St. Petersburg in 1876 posthumously. Cf. the chapter in Raikov "Karl Ernst von Baer und Darwin" p. 364-382. It shows some prejudice of the author, Boris Raikov, who declares that von Baer's reservations against Darwin are "...long ago

much wider acclaim, especially in the Anglo-Saxon world. Here, a set of ideas prevails which is often incorrectly traced back to Darwin and is known as "Darwinian Evolution." Yet, he was not the originator of this explanation. This theory (von Baer called it with good reason only a "hypothesis") has later been expanded on by many others, who combined it with modern observations into what we know today as "Neo-Darwinism." It is not always fully realized to what extent this has become an ideology penetrated with, technically speaking, a radical metaphysical materialism, which claims that matter is the only substance of reality, including all that is conscious or spiritual.¹³ Although this is the foundation of Marxist ideology, such a body of assumptions is now very widely accepted almost without question as "scientific," as if it belonged to the undeniable physical laws of nature. Many are hesitant to ever dispute this view, and it is widely taught in most schools and universities, especially in the United States.

Here, it appears that the only common alternative would be to postulate instantaneous creation ("Creationism"), based upon a literal interpretation of a small selection from the Bible. It does not take much effort to recognize that such a perspective implying immediate appearance of the species of today is refuted by countless findings of fossils and paleontological studies that prove undoubtedly that some forms of evolutionary development have taken place. To deny the entire fossil record must be considered irrational.

In Neo-Darwinism, the main cause in the development of order and life, counteracting the trend towards general entropy (general diffuse distribution of heat energy) is nothing else but pure chance, an age-long series of accidents in mutations (hereditary changes), and subsequent struggle for survival of the fittest. It is certainly conceivable that countless chance mutations have occurred, but too many consistent

refuted by science."

¹³ Von Baer thundered against such a materialism repeatedly, one statement of his: "As if metabolism could not but always obey its own laws, it is self-evident that now people begin to think of themselves as a product of matter, do not want to acknowledge a moral order of the world and begin to adore matter instead of the spirit, through which alone matter becomes efficient. The materialists do not want to accept the thought beyond the sound (of words) nor the melody of a carol beyond the sounds (of instruments). *Op. cit.*, p. 96.

sequences of changes have come about, then under critical examination chance alone would have to appear as an extremely poor explanation for the incredible biological and ecological order everywhere. There is often an impressive degree of interaction and perfection on many levels in many parts of nature, especially in all organisms, including our own body. Many Neo-Darwinists would even have us believe that the human mind and consciousness itself is nothing but a product of a series of blind accidents. If this were true, it appears just as much of a miracle, if not more miraculous, than instantaneous creation! Von Baer lists six points of criticism against Darwin,¹⁴ of which a number still appear relevant: he points to the lack of evidence of transition from one phylum to another, which is still a great problem for Darwinism after over 150 years of scientific research. He argues that it might be conceivable that a primordial creation, which must have happened once, might possibly have occurred once or several times more. He concludes that "continuous changes could have been produced only through some continuous influence, cumulative addition of small changes at random would have produced by necessity a chaos of indefinite forms." He remarks further that for any basic form of animal, any variation produced by external conditions nowadays will generally return back to the original form in a few generations, and that crossings involving considerably changed forms nearly always remain sterile. This speaks clearly against propagation of decisive mutations.

The great problem then becomes a scientific search for the causes of the development of life and of human existence. This may be a greater question than our present science is able and willing to face. Perhaps it might not even be possible to find the answer in a narrow scientific frame alone, which occasionally encourages shortsighted views and often favors only what shows up in immediate observation and experiment. Yet it is of immense value, if properly advanced.

Von Baer was not bound by any of these limitations, for he remained open towards the wholeness of the creation. As he pointed out, and as has been confirmed at present: according to the fossil record, whenever an entirely new species appears, there is hardly any trace of intermediate forms leading up to it, nor is there a long trail of

¹⁴ Raikov, *op. cit.*, p. 378.

a slow and gradual development from one existing species to another. Evidently something new suddenly appears in a relatively short time, and then stabilizes with small gradual variations over very long epochs. This questions the logic and applicability of much of Darwinism. Some authors today therefore differentiate between macro- and micro-evolution. (Such a distinction between decisive and less important transitions is made by Løvtrup, see next footnote).

As recently as at the 110th meeting of the American Association for the Advancement of Science in New York 1984, it was stated repeatedly that "wholesale alterations of the Darwinian theories were demanded," and several papers presented at this meeting pointed toward such needed changes and modifications.

The most recent and devastating criticism is expressed in a scholarly book *Darwinism—the Refutation of a Myth* by Dr. Søren Løvtrup,¹⁵ who declares: "nobody, not even Darwin and his closest friends, ever believed in Darwin's theory of natural selection. Darwinism was refuted the moment it was conceived" (p. IX); and in the conclusion he states: "I believe that one day the Darwinian myth will be ranked the greatest deceit in the history of science...Micromutations do occur, but the theory that these alone can account for evolutionary change is either falsified, or else is unfalsifiable, hence metaphysical theory...An entire branch of science becomes addicted to a false theory..." (p. 422).

The almost sudden transition from one basic form of life to another, as an entirely new form appears, is sometimes accompanied by a rapid dying out of certain former species. It is asking too much to explain every such occurrence through cosmic cataclysms, like a giant meteorite, as it has been theorized for the disappearance of the dinosaurs. Small accidental mutations and their propagation are simply not able to explain what is obvious and undeniable in the fossilized traces. For instance, the development of the eyeball could hardly have presented any immediate advantages before its full functional maturity. A great many profound developments must have occurred, which came together to form an organ capable of vision, uniting a series of different and highly complicated functional parts that are still unequalled by all

¹⁵ Søren Løvtrup, *Darwinism—the Refutation of a Myth* (New York and Sydney: Croom, Helm, 1987).

modern technology. Von Baer points to this as many other examples in the anatomy of many animals.

Struggle for individual survival alone, then, appears a sadly insufficient explanation for most of the decisive and creative lines of evolutionary advancement. Too much cooperation, mutual support and altruism, even self-sacrifice, is repeatedly observed among humans and animals, as with ants. It is perhaps possible to make an additional assumption by accepting an innate drive to maintain the species, as von Baer did with cautious qualifications, and even this cannot be fully explained by Neo-Darwinism.¹⁶ Von Baer maintains: "In the entire nature we see only weak means for the survival of the individual, but the strongest for the survival of the species."¹⁷ But what exactly might then be the underlying energy that drove the great evolution ahead, which has left its traces in all living beings today, in addition to millions of fossilized imprints?

While no comprehensive alternative theory is widely accepted at the present time, it increasingly appears that the entire view of reality and causation of the past is becoming obsolete. A new tradition of physicists, among them the Nobel-prize laureate David Bohm¹⁸ and the leading cosmologist Stephen Hawkins converge in assuming that the ultimate reality might not consist of atoms or quarks or any material complex of particles alone, but of some mysterious fields of energy, to which we may add living energies, as Rupert Sheldrake has done. Although many aspects may still be controversial, they introduce new challenges and new promising avenues of exploration. These approaches also raise the question of how far it might even be possible to determine the ultimate forces driving evolution exclusively through scientific or material sensual investigation alone.

¹⁶ *Op. cit.*, p. 400.

¹⁷ von Baer, *op. cit.*, p. 25.

¹⁸ David Bohm and Rupert Sheldrake, "Matter as a meaning field" in *Dialogues with Scientists and Sages*, ed. Renee Weber (London and New York: Routledge & Kegan Paul, 1986), p. 105.

As recognized by Dr. Willis Harman¹⁹ and others,²⁰ we are involved in a global change, a shift in the basic frames of reference of many assumptions and paradigms. A new holistic view of the world is emerging, which can include hidden spiritual or at least non-material energies that may incorporate purposes of a higher order. Such views also give a greater credit to the human mind as an intelligent and causative agent, and offer freedom from deterministic attitudes that claimed to be exclusively "scientific." Human consciousness and intentionality are increasingly recognized as creative forces in their own right. This expands the concept of some kind of mental or spiritual causation—an anathema to the narrow materialistic purist. Von Baer regarded all "processes of life that surround us, and ourselves with them as thoughts of creation, thought down upon the earth."²¹ His Soviet biographer Raikov declares him to be a "pantheist," yet I am sorry to have to point out his bias and ignorance of metaphysical systems, because von Baer's concept is clearly a Pan-en-theism, in which the universe is thought of as being penetrated by the Divine and appears as a form of objectivation of spiritual energies and Wisdom, a view overarching pantheism and theism.²² While von Baer was critical

¹⁹ Willis Harman, *Global Mind Change* (Indianapolis, Ind.: Knowledge Systems, 1988). The author is an emeritus professor of Stanford University, California.

²⁰ John P. Briggs, and F.D. Peat, *Looking Glass Universe* (New York: Simon and Schuster, 1984). This book documents a series of approaches by modern scholars towards a revision of materialistic ontology.

²¹ *Op. cit.*, p. 88.

²² Cf. "Panentheism" in the *Dictionary of Philosophy*, ed. Dagobert Rumes (Totowa, N.J.: Littlefield, Adams, 1968), p. 223 defines it: The term for the view that God interpenetrates anything without canceling the relative independent existence of the world of entities; moreover, while God is immanent, this immanence is not absolute (as in pantheism); God is more than the world, transcendent, in the sense that though the created is dependent upon the Creator, the Creator is not dependent upon the created. God thus is held to be the highest type of unity, viz., a Unity in Multiplicity. The term is employed to cover a mediating position between pantheism with its extreme immanence and a theism which tends to extreme transcendence. In the German Philosophical Dictionary *Philosophisches Wörterbuch* (Stuttgart: A. Kröner, 1965), p. 441, this view is attributed to a great many authors from Plotinus to Schleiermacher, also to Augustinus and John Erigena. Emanuel Swedenborg influenced deeply a similar synthesis of K.C. Krause (1781-1832), who made the term popular and became widely influential in the Spanish cultural realm.

of traditional religious organizations and deities, he seems to have exemplified a new and deepened devotion to an all-wise creator. Repeatedly, he speaks of Creation with caution and awe, summarizing his views: "Thus our planet is only a seedbed, on which the spiritual heritage of humanity grows, and the history of nature is only the story of continuing victories of the spirit over matter."²³ He extols faith and defines it as "a call to the general source of existence,"²⁴ and conscience as "a call to obligation towards others," accepting it in the same context as a unique prerogative of humanity. We find as a specific "human endowment the more or less intensive feeling (perception) of a higher Being, I mean the need for worship of God."²⁵ This invalidates most decisively the last section of Raikov's otherwise meritorious biography which declares von Baer's belief to be a "kind of pantheism with a heavy dose of agnosticism."²⁶ What stands out in all the work of von Baer is his uncompromising search for scientific and general truth—and this truth not alone, for his life was overwhelmingly filled with love and dedication, especially for his nation, his family, and for children in general. Beyond this he added great achievements and findings pointing towards general usefulness, risking his life in expeditions to explore remote areas.

Although a number of scientists would find it much more assuring to simply question the role of a creator in past and present, or at least to bypass this with silence as a somewhat uncomfortable possibility, it appears that often in mainstream physics and biology something has been missing. Some complex of energies, a great X, which somehow seems to include intentionality or direction towards order and usefulness is frequently needed to explain fully the reality we observe. Many trends in evolution can be accepted as facts, also at times a struggle of survival, but it has to be emphasized that this can never be

Encyclopedia of Philosophy, op. cit., 4:363-365. Cf. also Friedemann Horn, op. cit., p. 127-131.

²³ Raikov, *op. cit.*, p. 394.

²⁴ von Baer, *op. cit.*, p. 95.

²⁵ *Ibid.*, p. 84.

²⁶ Raikov, *op. cit.*, p. 418.

in itself the only cause for the evolution that has taken place. Furthermore, the fact that so far this has not been observable to many scientists, may perhaps be due to their own inability or unwillingness to face the full range of observations. Von Baer never accepted such arbitrary limitations, but tried to see the wholeness of nature and dared to call the necessary conclusions by name. This explains why he was maligned and ignored; yet it also adds to his honor, and calls for a wider reconsideration and rehabilitation.

It seems hopeful that perhaps in the Eastern bloc countries, where dialectical materialism has been an oppressive dogma in the past, there may now come a new openness to creative answers, perhaps along the lines that were pioneered by Swedenborg, Bergson, Driesch and de Chardin. We do not have to look at ourselves as products of blind chance, but may have the dignity to recognize a Higher Wisdom, higher energies and purpose in, around and above ourselves, as this was once profoundly and humbly acknowledged by Einstein, and long ago with great force and universality by a man, often forgotten, whose monument with a thoughtful expression stands in front of the University of Tartu, Estonia. □