

Opinions and Viewpoints

Embryotic evolution

An ancient question, a new answer

Christian Schwabe

Department of Biochemistry and Molecular Biology; Medical University of South Carolina; Charleston, South Carolina USA

Evolution is a complex problem by any standard. In an effort to fit the past events to the prevailing theory of evolution, the natural phenomenon has become so convoluted and polemic-ridden that it has floated clear out of the roam of science. This essay is an attempt to bring all phases of evolution of life in harmony with evidence derived from the fossil record. When a large number of organisms are found all over the earth within a relatively narrow time limit then life had many origins. A large number of different organisms appearing in their final form with all appendages functioning means that all development had occurred before the animals broke ground. That can only mean evolution occurred in a stem cell and that the animal was essentially finished when it appeared in the fossil record. The well-documented inability to discover intermediate forms again points to the stem cell as the evolutionary unit. Finally, the observation that fossils of animals, preserved for millions of years, have not changed supports all conclusions offered in this article.

It is important at all times to recognize the superiority of evidence in scientific accounts of past events and that the narrative, connecting these markers be written in the language of natural sciences, which does not contain chains of fortunate events. *The Genomic Potential Hypothesis of Evolution* includes the concepts discussed in this article.

Contemporary theory of evolution admits one original cell that mutates and adapts to different environments creating as it goes the fauna and flora that we can see around us as well as in the geological strata below. It is a model of beauty and simplicity, but it also is one that epistemology will not support.

The markers of evolution that lie far below in the Hadean rocks, in the Burgess shale of Canada, in the phosphates of southwestern China as well as in every formation between the Ediacaran and the Quaternary, all give an account of the evolution of life that does not agree with the currently prominent model model. Evolution, it says, was not a function of competing and adapting forms of life but rather a period of unperturbed genomic development of each origin

up to the limits of its unique genomic potential. It is the stem cell that evolves and not the phenotype. Here is nature's deposition as it is, written in stone.

From the rudimentary beginnings of carbon chemistry in the early Hadean, on to the appearance of organisms within hailing distance of the Cambrian period, chemistry was the only natural phenomenon that could build structures such as to cause what we term life. Inextricably entwined with that idea is the concept of stem cell or embryotic evolution, a process that is guided exclusively by chemical necessity and is insensitive to biological challenges.

During the Hadean when the dissipating heat of accretion and a slightly reducing atmosphere produced favorable conditions, carbon chemistry began to produce nucleic acids and other bio-molecules. The distribution of the bonding orbitals in the carbon atom was the organizing force, which supported by six members of the first, second and third periods of the table of elements, produced the core molecules of life. The Anlagen for all forms of life on earth were finished at the end of the Hadean about 3.8 billion years ago. At that time any invention or developmental potential that was not clearly written in the nucleic acid language would not become part of living systems of any kind.¹

By the laws of mass action chemistry produced a large number of bio molecules from which an enormous number of single-cellular organisms arose that would have appeared at the end of the biogenic period where, indeed, they are now recognized by the traces of their activity in the rocks of the Hadean formations. These observations constitute hard evidence for the early phases of biological evolution. Every exposure of the ancient rocks anywhere on earth show the traces of microbial activity, and experts in the new discipline of paleo-biology can distinguish at least 300 different forms of micro-organisms that lived on earth 3.6 billion years ago.¹ What made the microbes different when there had been no chance to react to any challenge by a hostile neighbor? The organisms evolved freshly from the chemical mother load at every origin, and at every origin one finds similar bacteria. The eukaryotic organism cannot be recognized at such geological distances but they were there, lest we would not observe them today and nobody would be here to write about them.

Thousands of organisms have been found after eons and that means that billions have been there and that, at the end of the Hadean, the earth was alive! After what appears like a furious start biology apparently fell silent with only a few larger cells identified in 1.5 billion year old formations. No animals with hard parts showed up on earth until she began to stir again, nearly 3 billion years after the Hadean explosion.

Correspondence to: Christian Schwabe; Department of Biochemistry and Molecular Biology; Medical University of South Carolina; Charleston, South Carolina USA; Email: schwabec@musc.edu

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By our records the Ediacaran fauna, the oldest wave of macroscopic forms of life, known as Avalon assemblages, pushed out from under the surface 575 million years ago and lasted about 30 million years, producing leaf-like sessile animals as well as soft-bodied mobile species. For this discussion it is important to note that fossils of the typical Vendobionta (Ediacaran) were found in five widely separated areas on the Ediacaran paleographic map at nearly the same time. The Ediacaran that ended before the Cambrian began is often referred to as a failed experiment, and one notes that with rare exception the Vendobionts are not seen during the Cambrian. This would be difficult to explain for a model of succession with modifications. Nothing discernable before the Ediacaran and a large selection of organism thereafter at many disconnected places; that is nature's unbiased message! It seems to be the consensus of researchers in the field that, except the jellyfish, Ediacaran fauna died out before the Cambrian explosion.

The Cambrian started anew, with very different organisms, which appeared in large numbers and varieties and these animals, like the Avalon assemblage before, did not come from animals in the territory, because there were none! Of course they came from quasi ancestors called developmental and survival units² that had evolved complexity in species-specific stem cells out of sight by the rules of chemistry during the 3 billion years of the pre-Cambrian era. Nature delivers the news dead pan. Take it or leave it she says, evolution of an animal is finished when you see it. Some of the most important phenomena in nature are draped in simplicity.

To the extent permitted by the genomic potential of each unit of the eukaryotic pro-forms, Hadean life forms had organized their genomes to yield very efficiently functioning units that could produce excess energy for maintenance and propagation, for adhesion and signal reception. A tall order and it is no surprise that it took 3 billion years genomic organization before the least complex of these units were ready to step onto the stage above ground. The basic survival functions and the control mechanisms, such as the Hox genes, that had been prepared by the intra-cellular genomic configuration were now ready to guide unfolding of the survival unit into the first larval stages and through metamorphoses to the final phenotype in several steps. The details given here represent those predictions derived from the Genomic Potential Hypothesis of evolution that are subject to experimental exploration or that have already been confirmed in part by paleontologists.³

The primary eggs or embryos that had developed underground from the Hadean origins lived as a prediction of the genomic potential hypothesis for nearly a decade until about four years ago the fossils of species-specific embryos preceding the Cambrian explosion by ~40 million years were actually discovered in the Doushantuo phosphates in southwestern China.³

The Cambrian break in continuity of form occurs without an equal break in genomic development. The reality and the impact of this observation must be assimilated before it is possible to understand the concept of embryotic evolution.²

Crucial is the observation that, save the Tommotian micro fauna, there were no macro-organisms before the Cambrian and there were 30 major forms compressed into in a thin cake of fossils at the mid-Cambrian.⁴

All animals that appeared at the same time were of comparable complexity; were there others? Yes, but they had more complex genomes that were still not functioning well enough to form the

correspondingly more complex organisms capable of living in the open air or water. About 100 million years later, in the Ordovician, diverse animals appeared that were different from the Cambrian group,⁵ and fishes of all forms appeared in the Devonian,⁶ but not the saurian. They showed up in the Triassic and Jurassic, another 200 million years later.⁷ From there it is again about 150 million years until the most complex of them all meander onto the stage in different varieties, Homo sapience among them.⁸

What we see in the fossil layers of the Cambrian is strictly the expression of the different Anlagen that were the product of the organic chemistry of the Hadean period. Each origin evolved a specific stem cell as part of the survival unit until they were ready to morph into the final form. The environment says: live or die, without suggestions how to improve. Biology, written in the vernacular of chemistry, would not understand anyway. Knowledge of the basics, however, lets us expect the length of the embryotic developmental period to be roughly proportional to the complexity of the final product, and the fossil record concurs.

The age of a species is measured from the time of first appearance of the phenotype in the fossil record until extinction or the present and the difference between members of a species when they first appeared and the one we see today tells us how many 'above ground' changes had occurred during its time on earth. The clear answer from the fossil record is that no significant changes occurred once a species was established! Simple animals appear early and stayed simple, and complex ones came up later, smaller or larger, but they remained what they were all along: no intermediates anywhere.

This is not to say that, if apes had postponed their jump into the fossil record just a little, they would have appeared as humans. That is not true because the complexity of the Anlagen makes the difference and that difference dictates the length of the developmental period as much as it limits the attainable complexity of the phenotype. Complex as we are, the hominids appeared in the most recent geological period.

A hypothesis becomes significant when the supportive arguments, based exclusively on scientific concepts, make a nearly seamless contact with observations. To test for harmony between thought and proposal it is most rewarding to examine edge conditions that restrict choices. The most obvious edges are the Hadean and the Cambrian thresholds.

To wit, the Hadean ends with many kinds of cells in widely dispersed places where there were none before. This is one of the edges that curtail argumentation and limits conclusions. No cells before and many thereafter, what can one make of it?

About 3 billion years later the Ediacaran/Cambrian again provides an edge condition that can be used to wipe off all of the 'ifs' and 'buts' of preconceived notions on the goal posts of observation. No organisms on top of the ground or in the water before the edge, and thereafter very many at widely dispersed places such as Canada, China and Australia in similar environs.

The Cambrian produced a significant variety of macro-organisms suddenly and without warning right after a period that was devoid of animals. The number of conclusions supported by such a scenario is very limited, pointing in both cases to a phase transition once from chemistry to life in the Hadean and ~3 billion years later from cellular existence below ground to complex life above ground. In both cases there is life in one form below ground, and thereafter the same life in a different form above ground. In the Hadean scenario

the genome was under construction until the cells became visible. When these cells arrived at the Cambrian the genome had developed for 3 billion years to the level of complexity that would force the embryos or the stem cells of simple species to form macro organism capable of invading the space above ground. Notice that the arthropods of the Cambrian are fully functional miniature specimen of well-known animals, some still with us in a larger versions. They developed in absence of all the formative forces postulated by Darwin. Chelae and armor were produced before the animals saw hostile neighbors! Everything was finished when they entered the fossil beds with nothing left to our fantasy. These observations elicit the conclusion that the formative stimuli from the environment that play such a major role in the old Hypothesis could in reality not have been a factor in species development!

Is that true only for the Cambrian? How about the animals that became prominent in subsequent periods? Did they come from the Cambrian fauna?

The development and survival units for fishes and amphibians among others of similar complexity went underground past the Cambrian, meaning essentially invisible. They were not ready to form macro organisms and that is why we do not see fishes and amphibians in the Cambrian period. But, when at the end of the Devonian all animals of that period, fishes prominent among them, had made their appearance there were a lot of developmental units still not able to live above ground and those persisted out of sight until they too were able to unfold. Thus, in subsequent periods, one sees entries into the "above ground" record of ever increasing complexity with every subsequent geological period. The ripening process of these development and survival units is strictly a matter of stem cell evolution of the functional genome, unperturbed by the surrounding except for the problems of survival.

During more recent periods in the earth history such as the Devonian, about 370 million years ago, sharks were seen in the second half of the period but not in the first. Coelacanth, a deep-water fish, appeared at the same time and is, like sharks, still with us essentially unchanged. Ichtyostega, the first amphibian skeleton was discovered in the Devonian as well and, because of a similar shape of the heads of Coelacanth and Ichtyostega, paternal accusations were leveled at Coelacanth but the charge did not stick because, compared to amphibians, the fluke-finned fish turned out to be a much more "advanced" form which on one hand gave rise to live young, but on the other hand had a soft notochord instead of a vertebra.

The literature abounds with stories and glossy pictures of conversion of deer to whale and conversions of fishes to terrestrial animals. While the skeletons depicted are real, the fleshing out and the "into -- or from --the water" migration are indeterminable functions of the Darwinian hypothesis, not of reality.

No segment of the record provides evidence of succession in the line of a genotype and there is no evidence for adaptation beyond the limits of the species and the variants that already exist. When the original genomic configuration ran out of ways to exist, extinction became inevitable whereas adaptation has never been confirmed. The often-quoted figure of 99.9% extinction of all species that ever lived on earth would be in line with this scenario.

The fossil record of the evolutionary events supports the conclusions that one must draw at the sight of the Cambrian 'edge' with almost derisive clarity. How much better, Nature would ask, can it be

shown that animals do not change appreciably during their existence. Jelly fish are seen in Ediacaran formations dated 600 million years, many arthropods are still alive after 500 million years and modern insects are found frequently as amber inclusions dating back over 100 million years? Are we blindfolded by the paradigm?

Yes, but under the blindfold people will cast an eye onto trees of molecular evolution that cover the pages of our best journals and wonder if all that could be wrong as well. As it is, the sequence data are correct but the evolutionary implications are not. In other words, the molecular trees of evolution show similarity of homologous proteins from different species but not kinship. Within a species proteins are by and large identical, between species they are not. Still, if it happens that a protein (X) in species A is similar to a protein of the same function in a distant species F, lateral gene transfer is invoked to explain this discrepancy with the old hypothesis.

If one observes the biological scene in toto and without a hypothesis as to its development in mind one must be impressed by the appearance of new animals that were small yet anatomically finished. Since chemistry arrived at our planet during the accretion process the credit of anything leading to the first animals goes to organic chemistry. Without trial, it seems chemistry led to the first functioning animals with legs properly articulated for motion, eyes in a useful position, with antennae and armor, all not induced by a threat to their survival, because the first animals came from underground where there was no threat.

On the other hand one must wonder what evidence could be cited for a factor that could induce so called derived or adaptive features in animals as they are established above ground? And how would such a factor influence the genome in an animal to cause changes? The languages simply do not match. Changes in living animals, if such were possible, would have to be induced by nucleic acids, not by the environment. True, the environment can select but as the word implies only if there is a variety from which to select, and that means after the fact. There is selection for speed from a pool of natural variants of gazelles, for example, but that is a matter of the initial genomic configuration and breeding, not of chemistry producing a faster animal under duress. Polar bears regularly eat the seals that have to go for air to their breathing holes in the ice. Seals would be under ample evolutionary pressure to develop gills but none have ever appeared. This conversion would have required a new organ, produced by an infinite number of targeted mutations. So, what is evolutionary pressure if not an illusion produced by the need for an explanation of phenomena that the old model cannot develop from its structure?

A hypothesis built upon phenomenological arguments of a past era may not hold up when science advances far beyond the foundation of the model. Veneration of such a paradigm makes it so resilient, so refractory to new observation that only unequivocal evidence can slowly dilute the old prejudices. Such unequivocal conditions exist during phase changes from chemistry to cells and from cells to multi-cellular organisms. The formation of cells was a massive event that left traces of a large variety of organisms in every exposure of Hadean rocks. The next stage occurred 3 billion years later when the scenery changed dramatically from embryos below ground to large number of life forms of great diversity on the surface. This watershed of evolution leaves no room for conjecture. The argument has been sealed and settled by the discovery of leftover

embryos of the Cambrian explosion in underground layers unearthed by Chinese paleontologists that are up to 40 million years older than the Cambrian fossils.⁹

Nature rarely does major things in different ways. The GPH has led to the prediction that all periods from the Ordovician to the Tertiary had their specific pro-forms metamorphosing and unfolding to yield the animals that we associate with these periods. None of them are converts from previous periods, and that proposal finds support in the fossil record which shows the survivors of almost all periods living through all of these times without conversion. One must remember as well that all paleontologists together have been unable to find one intermediate form to support a paradigm wherein every extinct and extant species must be or has been an intermediate within an endless chain of conversions.

Evolution of complex life was a phenomenal feat of chemistry guided by structure/function relations under the auspices of quantum phenomena, thermodynamics and kinetics. Considering details it is also the most complex process human curiosity has faced since the rather recent begin of the scientific era and it is merely a minor surprise that at first this message is received with difficulties.

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