
Differences of opinion within (neo-)Darwinism: Gould's critical appraisal of neo-Darwinism

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These stories begin from the same foundational fallacy and then proceed in an identically erroneous way. They start with the most dangerous of mental traps: a hidden assumption, depicted as self-evident, if recognized at all – namely, a basic definition of evolution as continuous flux (Gould, 2002:913).

Abstract

The opposition between vitalism and physicalism forms an integral part of the history of biology. Before Darwin entered the scene vitalism ruled the day, coupled with the influence of Plato on idealistic morphology. But even after Darwin published his Origin of Species in 1859 we can observe a proliferation of diverging biological orientations. Nonetheless, this article mainly focuses on the contrast between gradualism and stasis with a view to the underlying philosophical assumptions surrounding this opposition. Within (neo-)Darwinism there is an a priori commitment to the slogan that nature does not make jumps. The effect of pursuing this commitment is that it gets difficult to face the discontinuities of the fossil record. Sterelny confronts the assumed “gradualness of evolutionary change” with the simultaneous appearance of most of the major animal groups in the Cambrian explosion. Recently Denton emphasized that nature is in fact “a fundamental discontinuum of distinct Types and not the functional continuum maintained by Darwinian orthodoxy”. The standard

(neo- Darwinian reaction to the discontinuities in the fossil record is to argue that it is the result of the imperfection of the fossil record. However, Gould and Eldredge pointed out that the dominant pattern of the fossil record is stasis – a type appears abruptly, remains constant for millions of years (stasis) and then disappears equally abruptly. According to them stasis is data. A few textbook cases of alleged transitional forms had to save the day. But against all expectations of the gradualist faith in the presumed continuity of descent, Gould remarks that almost all these famous exemplars turned out to be false on rigorous restudy and that nearly all these classics have since been disproved. The important point made by Gould is that gradualism (the continuity postulate – nature does make jumps) “stood prior to natural selection in the core of his [Darwin’s] beliefs about the nature of things”. How these factual patterns affect the mystery regarding the origin of humans is briefly discussed and then the article is concluded with Gould’s questioning of the idea of progress.

Opsomming

Die moderne biologie (sedert Darwin) word nog steeds deur talle uiteenlopende standpunte gekenmerk. Bepaalde neo-Darwinistiese aannames verrai die invloed van wysgerige sienings wat meestal onbewus op biologiese denkers inwerk. Die bestaande tipe-verskeidenheid, beide in die paleontologiese rekord en die tans lewende “natuurlike sisteem” staan teenoor die funksionalisme van die neo-Darwinisme. In hierdie artikel word grootliks op die skerp kritiek wat Gould en Eldredge op die standaard neo-Darwinistiese opvattinge uitgeoefen het ingegaan. Beide die kontinuïteitspostulaat en die idee van vooruitgang staan op gespanne voet met die natuurwetenskaplike stande van sake.

The past almost two hundred years witnessed an increasing influence of (neo-)Darwinism – not only within the field of biology but in general also within some other natural sciences as well as within some humanities. The “New Synthesis” which took shape about 80 years ago may leave the impression that Darwinism represents a family in which there are not serious quarrels

and differences of opinion. Yet a closer look at what happened since Darwin published his *Origin of Species* in 1859 tells a different story.

We commence by highlighting a number of biological orientations of the 20th century, followed up by investigating the complexity of the Darwinian idea of an “imperfect” fossil record. Although related issues will enter the scene, our main focus will be on the relative critical position assumed by Gould, Eldredge and other biologists in this regard. The major part of this investigation could therefore equally advance under the heading: Gould and neo-Darwinism. But we will not focus on the idea of “punctuated equilibria” [PE] – which could be seen as an attempt to reconcile Darwinism with the paleontological reality (see Gould, 2002:975 as well as pages 833, 856-858, 871, 890, and 997). The same applies to *Intelligent Design* [ID] – both PE and ID exceed the confines of this article. But we shall briefly highlight some implications of our investigation for questions regarding the origination of humankind.

1. Not just ‘evolution’

The first observation is that within the English-speaking world it is customary to refer to the “theory of evolution” as if there is just *one* such a theory around. Particularly in the United States it is also typical to contrast (neo-)Darwinism with *creationism*.

However, at the time when Darwin entered the scene biology was largely dominated by typological trends, such as the idealistic morphology of Ray and Linnaeus with a close ally found in *vitalism* dating back to Greek philosophy. Vitalism recently was revived in theories of intelligent design (ID). Hans Jonas characterized these two extreme positions in a striking way: pan-vitalism and the problem of death – pan-mechanism and the problem of life (Jonas, 1973:19 ff. 22 ff.).

A brief overview of alternative biological theories could be summarized by mentioning the following 20th century biological schools of thought (cf. Strauss, 2007):

The *mechanistic* orientation (Eisenstein, 1975), the *physicalistic* approach (neo-Darwinism), *neo-vitalism* (Driesch, 1929; Sinnott, 1963, 1972; Schubert-Soldern, 1959, 1962; Haas, 1959, 1968; Heitler, 1976; Troll, 1951, 1973); *holism* (Meyer, 1964, 1965); *emergence evolutionism* (Lloyd-Morgan, 1923, Woltereck, 1940; Bavinck, 1954; Polanyi, 1967, 1968, 1969); the *organismic biology* of Von Bertalanffy (1973); and *pan-psychism* (De Chardin, Rensch,

1959, 1968, 1969, 1971, 1973, 1991). More recently, the idea of intelligent design surfaced – not on the basis of lacking sufficient factual knowledge but supported by scholars with highly specialised natural scientific competencies (see Dekker, Meester & Van Woudenberg, 2005; Meyer, 2013). The current theories of intelligent design continue key elements of the vitalist tradition (see Klinghofer, 2010).

2. The 'imperfection' of the fossil record

The idea of a "tree of life", designed by Haeckel, is based upon the assumption that there was a continuity of descent through which all later living entities are connected to a common ancestor. The fact that both the fossil record and the natural system (currently living entities) display a fundamental *discontinuity* is explained away by (neo-)Darwinism as an inevitable feature of the *imperfection* of the fossil record. This escape route is informed by the slogan that nature does not make jumps (*natura non facit saltus*) – originally formulated by Leibniz as his *lex continui* (law of continuity).

This issue relates to the long-standing philosophical controversy concerning the status of what is *universal* – which resulted in the opposition of *realistic* and *nominalistic* orientations.

In the present article we want to focus on a philosophical slogan which has influenced biological thought during the past.

The dominant popular view among those who are influenced by (neo-)Darwinism supports this appeal to *imperfection*. It should be noted here, however, that even most neo-Darwinian scholars within the field of biology and related disciplines are also convinced that if it was not for the imperfection of the fossil record, we would have had sufficient fossils supporting the real continuous line of descent.

Sterelny characterizes this "[c]onventional wisdom" as emphasizing "the gradualness of evolutionary change". According to this common view "new organs – circulatory systems, nerve nets, limbs and tentacles, perceptual organs – are put together bit by bit over countless generations". Dawkins adheres to this Darwinian orthodoxy. "He cannot remind us too often that the power of selection to build our exquisite and intricate biota depends on its slow and incremental operation" (Sterelny 2001:89). However, "[M]ost species come into existence relatively rapidly, having acquired their distinctive characteristics, and do not significantly change thereafter" (Sterelny, 2007:95).

3. The Cambrian explosion

Ironically enough Sterelny adds that this standard story appears “to run slap-bang into a nasty fact regarding the Cambrian explosion” for about

530 million years ago, the fossil record seems to show that most of the major animal groups appeared simultaneously. In the ‘Cambrian explosion’, we find segmented worms, velvet worms, starfish and their allies, molluscs (snails, squid and their relatives), sponges, bivalves and other shelled animals appearing all at once, with their basic organisation, organ systems, and sensory mechanisms already operational. We do not find crude prototypes of, say, starfish or trilobites. Moreover, we do not find the common ancestors of these groups (Sterelny, 2001:89-90; cf. Sterelny, 2007:116).

Note that the duration of the *Cambrian explosion*, which initially was estimated to endure between 20 to 40 million years, is now reduced to a period of 5–6 million years (Meyer, 2013:72). Also remember that the appearance of new animal phyla during the Cambrian explosion derives from epigenetic information. Meyer points out that “genomic studies which reveal that hundreds of thousands of genes in many diverse organisms exhibit no significant similarity in sequence to any other known gene” and that they do not affirm common ancestor genes (Meyer, 2013:215). Also note that so-called ORFan genes (from: “open reading frames of unknown origin”) have “turned up in every major group of organisms, including plants and animals as well as both eukaryotic and prokaryotic one-celled living entities. In some organisms, as much as one half of the entire genome comprises ORFan genes” (Meyer, 2013:216).

In the absence of homologs ORFans cannot be linked to a common ancestral gene. Meyer points out that this fact is tacitly acknowledged by an “increasing number of evolutionary biologists who attempt to ‘explain’ the origin of such genes through *de novo* (‘out of nowhere’) origination” (Meyer, 2013:216 – see Strauss, 2015:9).

4. Distinct Types versus a Functional Continuum

Even though Denton speaks about a “tree of life” he nonetheless accentuates that there “is no evidence to support the Darwinian claim that the tree is a functional continuum. ... On the contrary, all of the evidence as reviewed in these first six chapters implies that nature is clearly a discontinuum. The tree is a discontinuous system of distinct Types characterized by sudden and saltational transitions and sudden origins of taxa-defining novelties and

homologs" (Denton, 2016:112). His general assessment reads: "Nature is in fact a fundamental discontinuum of distinct Types and not the functional continuum maintained by Darwinian orthodoxy" (Denton, 2016:219). Typical of the nominalist assumption of neo-Darwinism Simpson declares: "Organisms are not types and do not have types" (cf. Simpson, 1969:8-9).

Amidst apparently ever-flowing change Denton mentions the striking "near-universal absence of intermediates leading from antecedent structures to the homologs". Moreover, "the homologs in the making", became "fixed for some absolutely mysterious reason at specific points in phylogeny and thereafter remained invariant" (Denton, 2016:113). On the same page he calls this a "a curiously non-adaptive spectre" which is "highly incongruous in the context of a biology wedded to pan-adaptationism and a biological worldview which posits all living forms as part of an ever-mutating continuum". Add to this that for many of the homologous patterns, particularly those *Bauplans* like the tetrapod limb "there is *no evidence* that they are basically adaptive forms and that "in the vast majority of cases, they have never been shown to serve some functional end" (Denton, 2016:113).

Denton employs the term "homolog" to refer to a unique biological characteristic or trait shared by all the members of a particular group such as the pentadactyl ground plan of the tetrapod limb shared by all tetrapods. A homolog is therefore a "taxa-defining novelty". The term homolog is used frequently to describe character traits. In the nineteenth century, Richard Owen termed them "primal patterns" (Denton, 2016:13).

Denton does not hesitate to continue in the same vein by pointing out that "nature is still very much an empirical discontinuum of invariant unique forms, and that there is no *direct* evidence that the 'gaps' were ever closed by the functional continuums demanded by Darwinian theory".

Almost all the authors cited by Denton as scholars confessing to real taxon-defining novelties are "confirmed evolutionists" which are therefore "intellectually predisposed to seek transitional forms". This fact underscores that the homologs are indeed genuine novelties as well as that "the divisions they define are real" (Denton, 2016:59).

Two years after Gould and Eldredge published their first article on *stasis* another palaeontologist categorically stated: "Evolution requires intermediate forms between species and paleontology does not provide them" (Kitts, 1974:467).

In passing we may note that Kropotkin already in 1903 pointed out that Darwin presented a skewed image of nature to us, for it is ignoring the fact that alongside struggle phenomena there are numerous examples of peaceful and harmonic co-existence (symbiosis) (see Kropotkin, 1903, 1995).

5. The philosophical assumption behind the idea of the imperfection of the fossil record

The hidden starting-point behind the claim that the fossil record is *imperfect* derives from the earlier mentioned philosophical *law of continuity* (*lex continui*) as formulated by Leibniz: nature does not make jumps. Sterelny took notice of the constancy displayed by animal lineages. He refers to Stephen Gould: “Gould is equally struck by conservative aspects of the history of life. In their most fundamental ways, animal lineages do not seem to change over enormous stretches of time. There are hundreds of thousands, perhaps millions, of species of beetle. Every single one is built on the same basic plan. They vary in size, colour, sexual ornamentation and much else. But they are all recognisably beetles. The same is true of the other great lineages of animal life” (Sterelny, 2001:11).

6. Stasis versus Change

However, it was Gould who took the discontinuities in the fossil record seriously in an encompassing sense. Since 1972 he and Niles Eldredge pointed out that the dominant theme of the paleontological record is *constancy* (stasis) and not *change*. The general pattern is that a type abruptly appears fully formed, continues to exist for millions of years and then equally abruptly disappears unchanged.

Curtis and Barnes remark that it was Niles Eldredge of the *American Museum of Natural History* and Stephen Jay Gould (from *Harvard University*) who explored the idea that perhaps the fossil record is not so imperfect after all – what we have is the authentic fossil record. Eldredge and Gould have backgrounds in geology and invertebrate paleontology, and they pointed out that they were

impressed with the fact that there was very little evidence of phyletic change in the fossil species they studied. Typically, a species would appear abruptly in the fossil strata, last 5 million to 10 million years, and disappear, apparently not

much different than when it first appeared. Another species, related but distinctly different – ‘fully formed’ – would take its place, persist with little change, and disappear equally abruptly (quoted by Gould, 2002:998-999).

They call *stasis* (constancy) the dominant theme of the paleontological record. Moreover, Gould clearly realized that *stasis* entails a serious threat for the assumed evolutionary mechanism of random mutation and natural selection: “As often emphasized in this chapter, if stasis merely reflects excellent adaptation to environment, then why do we frequently observe such profound stasis during major climatic shifts like ice-age cycles (Cronin, 1985), or through the largest environmental change in a major interval of time (Prothero & Heaton, 1996)?” (Gould, 2002:878).

Gould combines this stasis perspective with his assessment of the role of the classical economic theories of Adam Smith: “In fact, I would advance the even stronger claim that the theory of natural selection is, in essence, Adam Smith’s economics transferred to nature” (Gould, 2002:122). Darwin combined a number of causes which conjointly “must have tended to make the geological record extremely imperfect” (Gould, 2002:758).

Historical philosophical issues influenced Darwin here as well. Just compare with this what is found in a letter of Marx to Engels in 1862: “It is remarkable how Darwin recognizes among beasts and plants his English society with its division of labor, competition, opening up of new markets, ‘invention’, and the Malthusian ‘struggle for existence.’ It is Hobbes’s ‘bellum omnium omnes’ [war of all against all] and one is reminded of Hegel’s Phenomenology, where civil society is described as a ‘spiritual kingdom’, while in Darwin the animal kingdom figures as civil society” (quoted by Gould, 1977:145; see Malthus, 1973).

Furthermore, Gould highlights how the fact of *stasis* challenged Darwin’s understanding of the fossil record, when he writes about Darwin who acknowledged that he only understood the extreme imperfection of the geological record when the “paleontological evidence of stasis and abrupt appearance threatened to confute the gradualism that he ‘knew’ to be true”. He then continues by referring to Darwin who acknowledged:

But I do not pretend that I should ever have suspected how poor a record of the mutations of life, the best preserved geological section presented, had not the difficulty of our not discovering innumerable transitional links between the species which appeared at the commencement and close of each formation, pressed so hardly on my theory (see Darwin, 1859 Chapter X – On the Imperfection of the Geological Record, electronic version, and Gould, 2002:758).

The continuity postulate, once more mentioned on this page, is also known as *gradualism*. The impasse of gradualism is given in its inability to account for the discontinuities in the paleontological record. Ernst Mayr, a key figure participating in the “New Synthesis” of Darwinism, that gave rise to the label neo-Darwinism, said in 1991:

Paleontologists had long been aware of a seeming contradiction between Darwin’s postulate of gradualism ... and the actual findings of paleontology. Following phyletic lines through time seemed to reveal only minimal gradual changes but no clear evidence for any change of a species into a different genus or for the gradual origin of an evolutionary novelty. Anything truly novel always seemed to appear quite abruptly in the fossil record (Mayr, 1991:138).

And the data that should be appreciated, *prima facie*, “as the most basic empirical counterweight to gradualism”, namely the relative frequency of observed instances of stasis and geologically abrupt appearances of fossil morphospecies, are *a priori* interpreted “as signs of an inadequate empirical record” – which causes Gould to ask: “How then could gradualism be refuted from within?”

7. Gould’s challenge to the continuity postulate of neo-Darwinism

At this point we arguably meet the most serious challenge of Gould to neo-Darwinism. The first question asked by Gould is: “How can imperfection possibly explain away stasis? Abrupt appearance may record an absence of information, but *stasis is data*.”

Gould continues: “Eldredge and I became so frustrated by the failure of many colleagues to grasp this evident point that we urged the incorporation of this little phrase as a mantra or motto. Say it ten times before breakfast every day for a week, and the argument will surely seep in by osmosis: ‘stasis is data; stasis is data ...’” (Gould, 2002:759).

Having digested this *mantra* the basic question returns once more: “If stasis could not be explained away as missing information, how could gradualism face this most prominent signal from the fossil record?” (Gould, 2002:759). Before this question is answered by Gould he demonstrates his acquaintance with the main findings of the philosophy of science of the 20th century. It will not help to look for the culprit “in the ineluctable embedding of observation within theory” because facts “have no independent existence in science, or in any human endeavor; theories grant differing weights, values, and

descriptions, even to the most empirical and undeniable of observations” (Gould, 2002:759).

Gould continues his devastating assessment of Darwin's expectations which defined evolution as *gradual change*: “Paleontologists therefore came to view stasis as just another failure to document evolution” in spite of the fact that stasis existed in “overwhelming abundance, as every paleontologist always knew”. How can one publish if the fossil record is defined as an absence of data (imperfection)? The effect was that nothing was published about the most common pattern in the fossil record: “The stasis of most morphospecies throughout their geological duration” (Gould, 2002:760).

The side-effect of this development was that “most nonpaleontologists never learned about the predominance of stasis, and simply assumed that gradualism must prevail, as illustrated by the exceedingly few cases that became textbook ‘classics’” (Gould, 2002:760).

8. Gradualism and textbook copying

The situation is further complicated by the fact that “gradualism occurs too rarely to generate enough cases for calculating a distribution of rates”. As an alternative paleontologists worked with what Gould designated as a “false method of exemplification: validation by a ‘textbook case’ or two, provided that the chosen instances be sufficiently persuasive” (Gould, 2002:762). “And even here, at this utterly minimal level of documentation, the method failed. A few examples did enter the literature ... where they replicated by endless republication in the time-honored fashion of textbook copying.” But against all expectations of gradualists and their faith in the assumed continuity of descent, Gould states that “in a final irony, almost all these famous exemplars turned out to be false on rigorous restudy” (Gould, 2002:762). Two pages earlier Gould already remarked: “Interestingly, nearly all these ‘classics’ have since been disproved” (Gould, 2002:760).

One of the most striking of these ‘examples’ is Simpson's account of horse evolution and the problematic story of the peppered moths in England. Gould quotes Prothero and Shubin regarding the supposed evolution of the horse:

This is contrary to the widely held myth about horse species as gradually varying parts of a continuum, with no real distinctions between species. Throughout the history of horses, the species are well-marked and static over millions of years (Gould, 1996:68; Gould, 2002:846-847).

Gould mentions Hallam who said to him many years ago that “he had disproved the classical story of gradualism in Gryphaea” (Gould, 2002:763). Note that more than 100 further mollusks species were found in Liassic rock layers. But interestingly “no one ever documented the stratigraphic history of even a single one in any study of evolution, for all demonstrate stasis”. Gould concludes: “Scientists picked out the only species that seemed to illustrate gradualism, and even this case failed” (Gould, 2002:763).

The upshot of these remarks is that the continuity postulate of Leibniz actually assumed a core position within the thought of Darwin and neo-Darwinism. Gould is therefore justified in remarking that “gradualism stood prior to natural selection in the core of his beliefs about the nature of things” (Gould, 2002:154). For this reason, “natural selection exemplified gradualism, not vice versa”. The different forms of *gradualism* came together in “a single, coordinated view of life that extended its compass far beyond natural selection and even evolution itself” (Gould, 2002:155).

The core element of *gradualism* is the speculative understanding of evolution as *continuous flux*. Gould refers to “claims for predominant gradualism in the entire clade of planktonic forams may” be exceptional, but then he has to qualify his statement by adding that “although, even here, the majority of lineages remain unstudied, in large part because they seem, at least subjectively, to remain in stasis, and have therefore not attracted the attention of traditional researchers, who wish to study evolution, but then equate evolution with gradualism” (Gould, 2002:78).

Gould’s general assessment of the equation of gradualism and evolution cuts to the core of the issue. He articulates the following penetrating remark:

These stories begin from the same foundational fallacy and then proceed in an identically erroneous way. They start with the most dangerous of mental traps: a hidden assumption, depicted as self-evident, if recognized at all – namely, a basic definition of evolution as continuous flux (Gould, 2002:913).

During a public debate on evolution in 2010 a paleontologist from South Africa (University of Stellenbosch) rejected my explanation of the view of Gould, namely that “types appear, remain constant for millions of years and then disappear”. He recommended that I should consult “Gould’s book: *The structure of Evolutionary Theory*”. From our preceding analysis it is clear that this palaeontologist did not realize that I am right and that he did not understand the basic thrust of Gould’s book.

9. The mystery regarding the origin of humans

Lyall Watson, a former assistant of Raymond Dart, made a significant remark in 1982: "The remarkable fact is that all the physical evidence we have for human evolution can still be placed, with room to spare, inside a single coffin ... Modern apes, for instance, seem to have sprung out of nowhere. They have no yesterday, no fossil record. And the true origin of modern humans ... is, if we were to be honest with ourselves, an equally mysterious matter" (Watson, 1982:44).

In 1990 Richard Leakey, perhaps the most famous paleoanthropologist in the world, honestly confessed that regarding human origins "all we have is a huge question mark" (PBS Documentary, 1990).

The Piltdown hoax obstructed for some time an optimistic interpretation of the status of the *Australopithecines* as the direct ancestors of humans. During the early seventies of the previous century, with the discovery of *Homo habilis* (the fossil which received the registration number 1470), it seemed as if the picture may be captured in the succession of *Australopithecus*, *Homo habilis*, *Homo erectus*, *Homo sapiens*, with the 14 million-year-old *Kenyapithecus* as a probable member of the *hominidae* family. However, the latter turned out to be nothing more than an ape and the tests of Spoor and his friends have shown that *Homo habilis* habitually did not walk upright at all. Eventually also the *Australopithecines* lost the race, because Gould argued for "the removal of the different members of this relatively small-brained, curiously unique genus *Australopithecus* into one or more parallel side lines away from a direct link with man" (Gould, 1992:60).

Gould mentions "two more substantial cases" exhibiting respectively stasis of 0.9 to 1.0 million years in the first well documented hominid species, *Australopithecus afarensis* ('Lucy'). Grine (1993) has also recorded 0.8 million years of stasis in *Australopithecus robustus* from Swartkrans cave in South Africa (Gould, 2002:834; see also page 909). Ten years later Gould expressed his doubts:

Needless to say, no true consensus exists in this most contentious of all scientific professions – an almost inevitable situation, given the high stakes of scientific importance and several well known propensities of human nature, in a field that features more minds at work than bones to study (Gould, 2002:910).

In an issue of *National Geographic*, 22(2):120-133, Josh Fishman wrote an article in which the finding of *Australopithecus sediba* occupies the centre of attention (2009). Fishman remarks that the origins of the genus *Homo* are 'murky' because only "a few scattered and fragmentary fossils older than two

million years have been argued to belong to the genus” (Fishman, 2011:131). He then mentions two to three possible *Homo* species, such as *Homo habilis* and *Homo erectus* (the latter contemporaneous with *Homo habilis*), followed up by the question where did all these characters come from? He writes:

Attempts to look deeper into the past only increase the frustration, says William Kimbel, a palaeoanthropologist at Arizona State University and Director of the Institute of Human Origins there. “There are only a handful of specimens. You could put them all into a small shoe box and still have room for a good pair of shoes,” he says. The biggest problem with *sediba* is timing. “If two-million-year-old *sediba* is indeed the true ancestor of *Homo*, how could it give rise to those even older fossils assigned to *Homo* in Bill Kimbel’s shoe box? A fossil cannot be ancestral to something older than itself any more than a daughter can give birth to her own mother. One possibility is that the Malapa specimens represent a late stage of an enduring species that gave rise to *Homo* at an earlier date. But Berger’s team questions whether that shoe box really contains any *Homo* fossils in the first place – after all, they’re just fragments” (Fishman, 2011:133).

10. The absence of human ancestors

Given the stasis pattern of the paleontological record it is hard to understand why new fossil findings are often immediately seen as “missing links”. When Skull 1470 was discovered in the early seventies of the previous century it received the name *Homo habilis*. As “handy-man”, *habilis* was supposed to bridge the gap between the *Australopithecines* and humans.

However, in an article on human origins Luskin in a subsection deals with “The Demise of *Homo habilis*” (Luskin, 2017:455-457). He points out that *Homo habilis* actually does not belong in *Homo*. The recommendation is that *habilis* should be reclassified as an *Australopithecus* because it differs from “*Homo* in terms of body size, shape, mode of locomotion, jaws and teeth, developmental patterns, and brain size” (Luskin, 2017:456). Luskin continues on the same page by pointing out that like the “australopithecines, many features of *habilis* indicate they were more similar to modern apes than to humans”.

The next step is found in the argument of Lee Berger (University of Witwatersrand) that the earlier mentioned *Australopithecus sediba* was “the intermediate *de jure* between the australopithecines and *Homo*” (Luskin, 2017:459).

After the above-mentioned article of Fishman appeared in 2011 in *National Geographic*, another opportunity for bridging the gap between the

Australopithecines and humans surfaced in 2015 with the discovery of the species *Homo naledi* – interpreted as a new species ancestral to humans. CNN announced: “*Homo naledi*: New Species of Human Ancestor Discovered in South Africa.”

These fossils were immediately interpreted as transitional – between the *Australopithecines* and *Homo*. It is significant that Luskin finds support for his opposing view on this matter in a study from 2016: “A 2016 study found that *naledi*'s place within *Homo* is ‘ambiguous’, and concluded that *naledi* doesn't appear intermediate between *Australopithecines* and *Homo*” (Luskin, 2017:461; see Dembo, Ragovič, Garvin, Laird & Schroeder, 2016).

Kimbel already remarked in 2013: “The evolutionary events that led to the origin of the *Homo* lineage are an enduring puzzle in palaeoanthropology” (Kimbel, 2013).

Then it became clear that the assumed intermediate position of *naledi* was turned upside down when two years after its discovery it was announced to be “startlingly young” – between 236,000 and 135,000 years.

Luskin speaks about the “Big Bang Origin of *Homo*” (Luskin, 2017:463 ff.). The outcome is straight-forward: “the fossil record shows ape-like australopithecines (‘before’), and human-like *Homo* (‘after’), but not fossils documenting a transition between them” (Luskin, 2017:466).

11. Concluding remark

From our argumentation in this article it is clear that the speculative continuity postulate, namely that nature does make jumps, belongs to the core beliefs of neo-Darwinism. This commitment is wedded to another central conviction of Darwinism, the idea that evolution is a *progressive* force affecting ever higher forms of development – from bacteria up to humans. We conclude with two remarks from Gould in which he confesses the inability to come to terms with the fact that Darwin did not incorporate any ideal of *progress* in his 1859 theory.

In a 1996 work on the grandeur of life Gould relates this to the fossil record:

I believe that the most knowledgeable students of life's history have always sensed the failure of the fossil record to supply the most desired ingredient of Western comfort: a clear signal of progress measured as some form of steadily increasing complexity for life as a whole through time. The basic evidence cannot support such a view, for simple forms still predominate in most environments, as

they always have. Faced with this undeniable fact, supporters of progress (that is, nearly all of us throughout the history of evolutionary thought) have shifted criteria and ended up grasping at straws (Gould, 1996:166-167).

In a different context he explains this as a *paradox*:

The problem that spawns this confusion within the Darwinian tradition maybe simply stated as a paradox. The basic theory of natural selection offers no statement about general progress, and supplies no mechanism whereby overall advance might be expected. Yet both Western culture and the undeniable facts of a fossil record that started with bacteria alone, and has now exalted us, cry out in unison for a rationale that will place progress into the center of evolutionary theory (Gould, 1996:136).

The urge to confirm Darwin's expectation regarding slow gradual (continuous) evolution over millions of years was frustrated by *stasis* as dominant feature of the paleontological record. We have seen that on crucial points Gould levelled a solid criticism against the dominant legacy present within neo-Darwinism. The challenge entailed in this analysis is to come to terms with the discontinuities of both the fossil record and the natural system. The crucial question is: How can present-day biology reconcile stasis and gradualism?

The history of the Piltdown hoax, which captured neo-Darwinian thought from 1912 until 1953, is significant in many respects. In December 1912 the finding of human remains was announced. No one noticed that in order to establish a similarity with human teeth they were artificially ground down. In the pit at Piltdown bones and stone tools had been treated to match the colour of the skull. Lubenow remarks: "The lower jaw was that of a juvenile female orangutan. The place where the jaw would articulate with the skull had been broken off to hide the fact that it did not fit the skull. The teeth of the mandible were filed down to match the teeth of the upper jaw, and the canine tooth had been filed down to make it look like heavily worn. ... Orangutans are found today only in Borneo and Sumatra" (Lubenow, 2007:57).

On the twenty first of November 1953 it was announced that this finding was a hoax. The extent to which the 'scientific' world was carried away by a fraudulent fossil finding is perhaps best illustrated by the fact that numerous natural scientists 'explored' this new field of human findings: "It is said that more than 500 doctoral dissertations were written on Piltdown" (see Lubenow, 2007:59).

Bibliography

- BAVINCK, B. 1954. *Ergebnisse und Probleme der Naturwissenschaften*, 10th impression, Zürich: Hirzel Verlag.
- CRONIN, T.M. 1985. Speciation and stasis in marine Ostracoda: climatic modulation of evolution. *Science* 277: 60-62.
- CZERKAS, S. 1999. "It's a Missing Link". *National Geographic*, Nov. 1999, 196(5):100-107.
- DARWIN, C. 1859. *On the Origin of Species by Means of Natural Selection or the Preservation of favoured races in the struggle for life* (1968), Hardmondsworth: Penguin Books 1968. WEB version: Darwin, 2005. Darwin, C. 2005. On the Origin of Species by Means of Natural Selection or the Preservation of favoured races in the struggle for life (1859). WEB version: http://www.infidels.org/library/historical/charles_darwin/origin_of_species/Intro.html (accessed on October 29, 2005).
- DEKKER, C., MEESTER, R. & VAN WOUDEMBERG, R. 2005. *Schitterend Ongeluk of Sporen van Ontwerp?* Kampen: TenHave.
- DEMBO, M., RAGOVIČ, D., GARVIN, H.M., LAIRD, M.F., SCHROEDER, L. 2016. The evolutionary relationships and Age of *Homo naledi*: An Assessment Using Dated Bayesian Phyogenetic Methods. *Journal of Human Evolution*, 97:17-26.
- DENTON, M. 2016. *Evolution: Still A Theory in Crisis*. Seattle: Discovery Institute Press (Initially published in 1985 as: *Evolution: A Theory in Crisis*).
- DRIESCH, H. 1929. *The science & philosophy of the organism*, 2nd edition. London: A. & C. Black, Ltd.
- EISENSTEIN, I. 1975. Ist die Evolutionstheorie wissenschaftlich begründet? *Philosophia Naturalis*, 15(3 & 4):404-445.
- ELDREDGE, N. 1982. *The Myths of Human Evolution*. New York: Columbia University Press.
- FISHMAN, J. 2011. Part Ape, Part Human, A new ancestor emerges from the richest collection of fossil skeletons ever found. *National Geographic*, 22(2):120-133.
- GOULD, S.J. & ELDREDGE, N. 1977. Punctuated equilibria: the tempo and mode of evolution reconsidered. *Paleobiology*, 3(2):115-151.
- GOULD, S.J. 1992. *Reflections in Natural History. Ever Since Darwin*. New York: W.W. Norton & Company.
- GOULD, S.J. 1996. *Life's Grandeur*. London: Jonathan Cape.

-
- GOULD, S.J. 2002. *The Structure of Evolutionary Theory*. Cambridge, Massachusettes: The Belknap Press of Harvard University Press.
- GRINE, F.E. 1993. Australopithecine taxonomy and phylogeny. In: Giochon, R.L. and Fleagle, (Eds.), *The Human Evolution Source Book*. Englewood Cliffs N.J.: Prentice Hall, pp.145-175.
- HAAS, J. 1959. Naturphilosophische Betrachtungen zur Finalität und Abstammungslehre. In: *Die stammesgeschichtliche Werden der Organismen und des Menschen*, Vol. I, Basil: Herder.
- HAAS, J. 1968. *Sein und Leben, Ontologie des organischen Lebens*. Karlsruhe: Badenia Verlag.
- HEITLER, W. 1976. *Ueber die Komplementarität von Leblosler und lebender Materie*, Abhandlungen der mathematisch-naturwissenschaftlichen Klasse, Nr.1, Mainz.
- JONAS, H. 1973. *Organismus und Freiheit, Ansätze zu einer philosophischen Biologie*. Göttingen: Vandenhoeck.
- KIMBEL, W.H. 2013. Hesitation on Human History. *Nature*, 2013 May 30:497(7451):573-4. doi: 10.1038/497573a. <http://adsabs.harvard.edu/abs/2013Natur.497..573K> [visited on 26-10-2018].
- KITTS, D.B. 1974. Paleontology and Evolutionary Theory. *Evolution*, 28:458-472.
- KROPOTKIN, P.A. 1903. *Mutual Aid: A factor in Evolution*. Original Publisher: McClure Phillips & Co. New Edition 1972. New York: Garland.
- KROPOTKIN, P.A. 1995. *Evolution and environment*. Montreal: Black Rose Books.
- LEAKEY, R.E. 1973. Skull 1470, Discovery in Kenya of the earliest suggestion of the genus Homo – nearly three million years old. *National Geographic*, 143(6).
- LLOYD-MORGAN, 1923. *Emergent Evolution*. London: Williams & Norgate.
- LUBENOW, M. L 2007. *Bones of Contention*. Grand Rapids: Baker Books. (Revised and updated edition.)
- LUSKIN, C. 2017. Missing Transitions and the fossil record. In: Moreland et al., *Theistic Evolution. A Scientific, Philosophical, and Theological Critique*. Wheaton: Crossway (pp.437-473).
- MALTHUS, T.R. 1798. *An essay on the principle of population*; Introduction by T.H. Hollingsworth. London: J.M. Dent (originally published in 1798).

- MAYR, E. 1991. *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought*. Cambridge: Harvard University Press.
- MCGARR, P. & ROSE, S. (Eds). 2006. *The Richness of Life, The Essential Stephen Jay Gould*. London: Jonathan Cape.
- MEYER, A. 1964. *The Historico-Philosophic Background of modern Evolution-Biology*. Leiden: E.J. Brill.
- MEYER, A. 1965. Gedanken zur Theorie und Philosophie des Organismus. *Leopoldina*, Volume X 1965 and Volume XI 1966.
- MEYER, S. 2013. *Darwin's Doubt*. New York: Harper Collins.
- MORELAND, J.P., MEYER, S.C., SHAW, C., GAUGER, A.K. & GRUDEM, W. 2017. *Theistic Evolution. A Scientific, Philosophical, and Theological Critique*. Wheaton: Crossway
- POLANYI, M. 1967. Life Transcending Physics and Chemistry. *Chemical Engineering News*, August 21.
- POLANYI, M. 1968. Life's Irreducible Structure. *Science*, Vol.160, June 21.
- POLANYI, M. 1969. *Personal Knowledge*, 3rd impression. London: Harper & Row.
- RENSCH, B. 1959. *Evolution above the species level*. New York: Wiley.
- RENSCH, B. 1968. Discussion Remarks, attached to Von Bertalanffy 1968a: Symbolismus und Anthropogenese. In: *Handgebrauch und Verständigung bei Affen und Frühmenschen*, Stuttgart 1968.
- RENSCH, B. 1969. Die fünffache Wurzel des panpsychistischen Identismus. In: *Philosophia Naturalis*, Vol.11.
- RENSCH, B. 1971. *Biophilosophy*, London: Columbia University Press.
- RENSCH, B. 1973. *Gedächtnis, Begriffsbildung und Planhandlungen bei Tieren*, Berlin: Parey.
- RENSCH, B. 1991. *Das universale Weltbild. Evolution und Naturphilosophie*. Darmstadt: Wissenschaftliche Buchgesellschaft.
- REPORT TO MEMBERS. 2000 (explaining that the "dinosaur-birds" story of 1999 was a fraud). Published in the *National Geographic*, October, 198(4):128-132).
- SCHUBERT-SOLDERN, R. 1959. *Materie und Lebens Raum- und Zeitgestalt*. München: Pustet.

-
- SCHUBERT-SOLDERN, R. 1962. *Mechanism and Vitalism: Philosophical Aspects of Biology*, Edited by Philip G. Fothergill; foreword to the American Ed. by James P. Doll. Translation by C.E. Robin. Notre Dame: Indiana University of Notre Dame Press.
- SIMPSON, G.G. 1969. *Biology and Man*. New York: Harcourt.
- SINNOTT, E.W. 1963. *The Problem of Organic Form*. London: New Haven.
- SINNOTT, E.W. 1972: *Matter, Mind and Man, The Biology of Human Nature*, New York: Atheneum.
- STERELNY, K. 2001. *Dawkins vs. Gould, Survival of the Fittest*. London: Icon Books.
- STERELNY, K. 2007. *Dawkins vs. Gould, Survival of the Fittest*. Second Edition. London: Icon Books.
- STRAUSS, D.F.M. 2007. Did Darwin initially develop a theory of evolution in the biological sense of the word? *South African Journal of Philosophy*, 26(2):190-203.
- STRAUSS, D.F.M. 2015. Between postmodernism, positivism and (new) atheism. *KOERS – Bulletin for Christian Scholarship* 80(1), Art. #2209.
- TROLL, W. 1951. *Biomorphologie und Biosystematik als typologische Wissenschaften*. *Studium Generale* 4:376-389.
- TROLL, W. 1973. *Allgemeine Botanik, revised and extended edition*. Stuttgart: Ferdinand Enke Verlag.
- VON BERTALANFFY, L. 1973. *General System Theory*. Hammondsworth: Penguin University Books.
- WATSON, L. 1982. The Water People. *Science Digest*, May: 44.
- WOLTERECK, R. 1940. *Ontologie des Lebendigen*. Stuttgart: Ferdinand Enke Verlag.