The century-and-a-half failure in the quest for the source of new genetic information

Jerry Bergman

The major attempts to explain the source of new genetic information, including, Lamarckianism, pangenesis, orthogenesis, creative evolution, hopeful monsters, panspermia, quantum evolution, and symbiogenesis are reviewed. No theory has survived scientific scrutiny. The most widely accepted theory today is mutations and natural selection (neo-Darwinism), a mechanism that is widely acknowledged as inadequate.

The major failure of evolution, even before Charles Darwin (1809–1882) proposed his theory to the world in 1859, has always been the lack of a viable mechanism that can produce new genetic information. It is well documented that some animal types have lost in the struggle for life, and thus have become extinct. Darwin, in his *Origin of Species,* presented much evidence for natural selection (*survival* of the fittest) but 'ironically never explains where new species come from' in the first place—the problem of the *arrival* of the fittest.[1] All of the many attempts since Darwin also have failed.

Although scientists today disagree about the viability of the various methods that could possibly produce increased genetic information, Darwinists agree that macroevolution occurred (and many actually try to argue that *how* the genetic information originated is a 'minor' issue). Lack of a viable mechanism is, in fact, a critical problem for Darwinism that calls into question the whole theory.

Lamarckianism

One of the earliest theories developed to explain the origin of new biological structures was called Lamarckianism, named after French biologist Jean-Baptiste Lamarck (1744–1829). This theory taught that if an animal strived in a specific direction, such as a giraffe to reach leaves on a high tree, the constant stretching would lengthen its neck and this trait would be passed on to its offspring.[2] Also called the 'use and disuse hypothesis', it postulated that the changes in anatomy that occurred during an animal's lifetime could be passed on to its offspring. In other words, the theory teaches that evolution occurs due to 'the inheritance of modified phenotypes'.[3] Lamarckianism was a dominant theory of evolution for decades; in fact, even Darwin based his theory partly on it, and used it to 'explain' human evolution:

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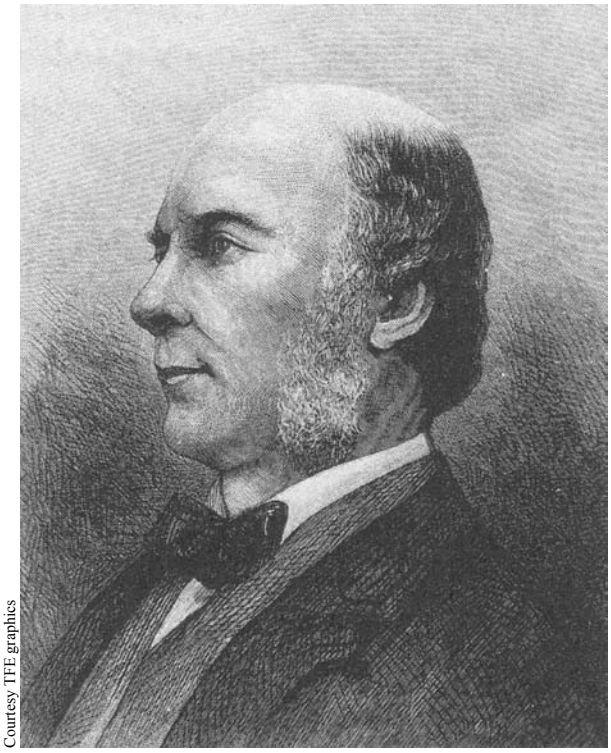
Jean-Baptiste Lamarck (1744–1829)

> 'The early male progenitors of man were ... probably furnished with great canine teeth; but as they gradually acquired the habit of using stones, clubs, or other weapons, for fighting with their enemies, they would have used their jaws and teeth less and less. In this case, the jaws, together with the teeth, would have become reduced in size ... a closely-parallel case ... [is] ... the reduction or complete disappearance of the canine teeth in male ruminants, apparently in relation with the development of their horns; and in horses, in relation with their habit of fighting with their incisor teeth and hoofs.'[4]

Lamarckianism has now been refuted by numerous empirical studies, including the finding by biologist August Weismann (1834–1914) that cutting off of the tails of 901 white mice produced no change in the tail length of the progeny, even after 19 successive generations.[5] Another example is circumcision in humans, which, although practiced for 4,000 years by Jews, has produced no change in the foreskin traits of males. These and other studies, including those of water fleas and radishes, have resulted in the formal abandonment of Lamarckianism by all working scientists.[6,7]



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Francis Galton (1822–1911)

Darwin's theory of pangenesis

Charles Darwin is often credited with formulating the modern theory of biological evolution. One of the earliest ideas explaining the arrival of the fittest (and thus a source for new genetic information) was Darwin's theory of pangenesis.[8] Pangenesis is based on the idea that all somatic cells produce 'gemmules' or gene material that is 'thrown off' into the body's circulatory system.[9] These gemmules multiply by dividing, and eventually collect in the organism's eggs and sperm (the gametes). Consequently, the experiences of their bearers are imprinted in the gemmules, and then can be passed on to the organism's offspring. Darwin discussed his pangenesis idea in great detail, and felt confident that it would provide a feasible mechanism to produce new genetic information. This idea was not totally new and was actually very similar to that proposed by ancient Greek philosophers.[10]

Pangenesis is actually a Lamarckian idea because it teaches that changes in body cells due to such factors as exercise or learning can be passed on to one's progeny. In other words, in harmony with Lamarck's teaching, Darwin taught that 'acquired characteristics' *can* be inherited. Darwin even believed that the gametes 'contained only the characteristics of the living body brought to them from the somatic cells'. Zirkle concludes that Darwin's 'famous chapter on Pangenesis ... showed that he had developed into a complete Lamarckian'.[11] And, like the Lamarckian theory, pangenesis was soon proven wrong by laboratory and field research.[12]

In the late 1860s, Darwin's cousin, Francis Galton (1822–1911), had undertaken a series of complex, well-designed experiments to scientifically evaluate Darwin's pangenesis theory. Specifically, Galton tried to test Darwin's idea that every element of the body produced its own gemmules. Galton hypothesized not only that combinations of gemmules might be passed on to the reproductive organs (thereby passing these characteristics to the next generation), but that gemmules also must be conveyed by the body's circulatory system to the gametes. He saw no other way that they could be physically transferred. He concluded that if pangenesis were true, the results of his experiments would be 'of no small practical use; for it would become possible to modify varieties of animals by introducing slight dashes of new blood, in ways important to breeders'.[13]

In order to test this theory, Galton transfused blood between different rabbits to determine if the transfused blood could accelerate the appearance of inherited characteristics in their offspring. If pangenesis was valid, the gemmules in the rabbits would become part of the heredity of the rabbit into which its blood was transfused. He transferred the blood of black rabbits to white rabbits, for example, to see if the offspring of two white rabbits were white, gray, or black. By the early 1870s, he was forced to admit that no evidence of alterations as a result of transfusions in successive generations of rabbits existed (1871). In Galton's words, the experiment produced 'definite results', proving 'beyond all doubt' that the pangenesis theory was false.

All attempts by others to demonstrate pangenesis have likewise failed. In spite of the devastating case against pangenesis, Darwin stubbornly held to it. He tried to discredit Galton's work by claiming that other means existed of transferring the gemmules from the somatic cells to the gametes. In fact, movement in the circulatory system is the *only way* it could work, because no other physical route exists from body cells to the gametes in the gonads. Darwin may have irrationally clung to pangenesis because he realized that there was no known alternative for creating new information from which nature could select. As Margulis and Sagan concluded:

> 'Surprisingly, when all was said and done about "grandeur in this view of life" (one of Darwin's last phrases in the great book), it was abundantly clear that in 500 pages of closely spaced type the title question—on the origin of species—had been entirely circumvented—abandoned, ignored, or coyly forgotten.'[14]

They then quoted Australian biologist George Miklos who 'so appropriately put' the situation as follows:

> 'The "struggle for existence" has been accepted uncritically for generations by evolutionary biologists with the *Origins of Species* quoted like so much Holy Writ, yet the origin of species was precisely what Darwin's book was about.'[14]

Many biologists at the turn of the last century also recognized this major shortcoming with Darwinism, and switched their support to other theories, such as orthogenesis

and creative evolution. Several of the new theories that opposed orthodox Darwinism were variants of vitalism, the belief that an immaterial force is required for evolution and life.

Orthogenesis

The term orthogenesis was coined in 1893 by biologist Wilhelm Haacke, and was popularized by various researchers, including German biologist Theodor Eimer, professor of zoology and comparative anatomy at Tübingen University, Germany. His popular 1890 book, *Organic Evolution as the Result of the Inheritance of Acquired Characters According to the Laws of Organic Growth,* became a leading text of the movement.[15]

Orthogenesis theory taught that evolution progressed in a straight line from ancestors to descendants with no side branches.[16] Its supporters also concluded that evolution occurs due to the influence of internal organismic forces that drive organisms to perfection—a theory similar to vitalism. Evolution thus follows a predetermined path that eventually will lead to humans, and natural selection does not significantly regulate this predetermined path because evolution does not result from external factors, such as taught by Lamarckianism or natural selection theories.[17] The orthogenesis concept also taught that evolution would continue until a maximized developed structure evolved.

This once-popular, hypothetical evolutionary mechanism cited the now extinct Irish elk as a prime evidence, because the antlers evolved so large that the animal became extinct.[18] Supporters of orthogenesis reasoned that the antlers would not have grown as large as they did if this trait was not preordained. Natural selection could not have caused this growth because their size was detrimental to the animal. Horse evolution was another prime example used to support the theory. Among the variants of orthogenesis was the theory developed by leading evolutionist and long-time head of the American Museum of Natural History, Henry Fairfield Osborn, called 'aristogenesis'.[19]

The orthogenesis theory has now been abandoned, largely because no plausible mechanism has ever been proposed to explain it, and because the examples used to support it have been shown to be better explained by other theories. In spite of a lack of evidence, though, the idea has persisted for decades, and is still ingrained in both 'modern scientific thought and in everyday society in general'.[20] It was most recently resurrected by Howard Van Til of Calvin College in Grand Rapids, Michigan in his theory of 'complete initial creation', and what he calls 'robust foundational formational economy'. This theory teaches that built into the non-living building blocks of the universe are the innate properties necessary to bring about 'all of the diverse physical structures and life forms that have appeared in the course of time'.[21] This form of vitalism credits God with constructing the seeds of life in the early universe.

Creative evolution

'Creative evolution' is a theory developed by French philosopher Henri Bergson (1859–1941).[22] The theory proposed a mechanism that produced new genetic information which allowed Darwinian mechanisms, including natural selection, to function.[23] Bergson's theory was actually a teleological view[24] that appealed to a non-material *élan vital* (vital impetus) that guided evolution in a specific direction.[23] In short, Bergson viewed all life as resulting from a vital impulse that caused evolution, much like human creativity resulted in works of art.[25] Bergson used 'detailed scientific arguments as well as philosophical ones', but never gained many followers among biologists, and his idea has now been abandoned largely due to lack of evidence for the theory.

Among the many problems with the theory was the fact that it was unclear why evolution would take the path that it does and not merely a chaotic path. Nonetheless, his book *Creative Evolution* (1911) was a bestseller, and was reprinted many times until recently. This could be partly because Bergson was 'the most important French philosopher of his time'.[26]

Theistic evolution

The belief that God caused evolution by guiding its steps or by building into the universe the mechanisms that would in time produce life and eventually humans is called theistic evolution. Theistic evolution was widely believed by scientists even before 1859, but by the end of the 1800s, the theory was 'largely discredited at least within the scientific community'.[27] One of the last attempts by mainline scientists to support this view was penned by George Argyll in 1893 but 'by that time the theory's supporters were far more worried about the new generation of alternatives' to Darwinism, which they saw as causing serious problems for their theory.[28] Even outside of science, theistic evolution was recognized by many as insignificant. At the turn of the century, educator John Dewey ridiculed theistic evolution as 'design on the installment plan'.[29]

The fall of theistic evolution was documented by Bowler in a chapter titled 'The Decline of Theistic Evolution'. Today, aside from persons trying to accommodate Neo-Darwinism within a theistic world view, no major academic advocates the theory. Furthermore, few, if any, of those who advocate this view have tried to articulate an empirically based, detailed biological theory of theistic evolution. Most accept purely naturalistic evolution and use theistic terminology to explain, or at least to claim in general terms, that God is behind evolution. This allows them to accept both theism and evolutionary naturalism. They have 'theistized' naturalism, often in an effort to maintain a theistic world view while holding on to pure Darwinism (or some version of it, such as Neo-Darwinism). The orthodox science establishment has 'ruled' that 'God may not intervene in nature' and even theistic evolution is

considered creationism (or, worse, stealth creationism) by orthodox evolutionists.[30]

Macromutations

Another major theory of the source of variations is the theory of macromutations. Hugo Marie De Vries (1848–1935) demonstrated from his research on the evening primrose that new varieties and traits can arise suddenly without explanation. These abrupt changes he called 'mutations'. He and others believed these mutations finally gave evolutionists a mechanism for producing new genetic traits in plants and animals. Unfortunately, it was later found that De Vries

> '… had misinterpreted his own experiments. Darwin's theory of minute changes, acted upon by natural selection, was not to be disproved by De Vries's experiments or by artificial selection. As it turned out, the evening primrose had unequal chromosome numbers, and this contributed to a peculiar genetic mechanism in the hybrid plants. We know now that macromutations can be artificially induced in living organisms by high-energy radiation, for example X rays, and that De Vries was not dealing with macromutations at all.'[31]

Although De Vries had not actually discovered mutations, he (ironically) concluded that the 'variation' he saw was the result of a change in something that we later found really did exist—namely genes. A similar idea was George G. Simpson's 'quantum evolution' concept, which was another failure.

From hope*ful* monster to hope*less* monster

The idea of macromutations was briefly resurrected in the 1940s by University of California Berkeley geneticist Richard Goldschmidt.[32] Stephen J. Gould called Goldschmidt 'one of the world's greatest geneticists', and noted that he introduced his idea 'after decades of strife and fruitless disagreement within evolutionary theory' about the problem of the origins of biological information.[33] Goldschmidt's idea was that the origin of major animal and plant groups, such as phyla, classes, or orders, was due to

> '… single mutations involving large and complex changes that happen to be successful. Such creatures [were] called by Richard Goldschmidt "hopeful monsters".'[34]

In Goldschmidt's words, a

> 'monstrosity appearing in a single genetic step might permit the occupation of a new environmental niche and thus produce a new type in one step. A Manx cat with hereditary concrescence of the tail vertebrae, or a comparable mouse or rat mutant, is just a monster. But a mutant of *Archaeopteryx* producing the same monstrosity was a hopeful monster because the resulting fanlike arrangement of the tail feathers was a great improvement in the mechanics of flying.'[35]

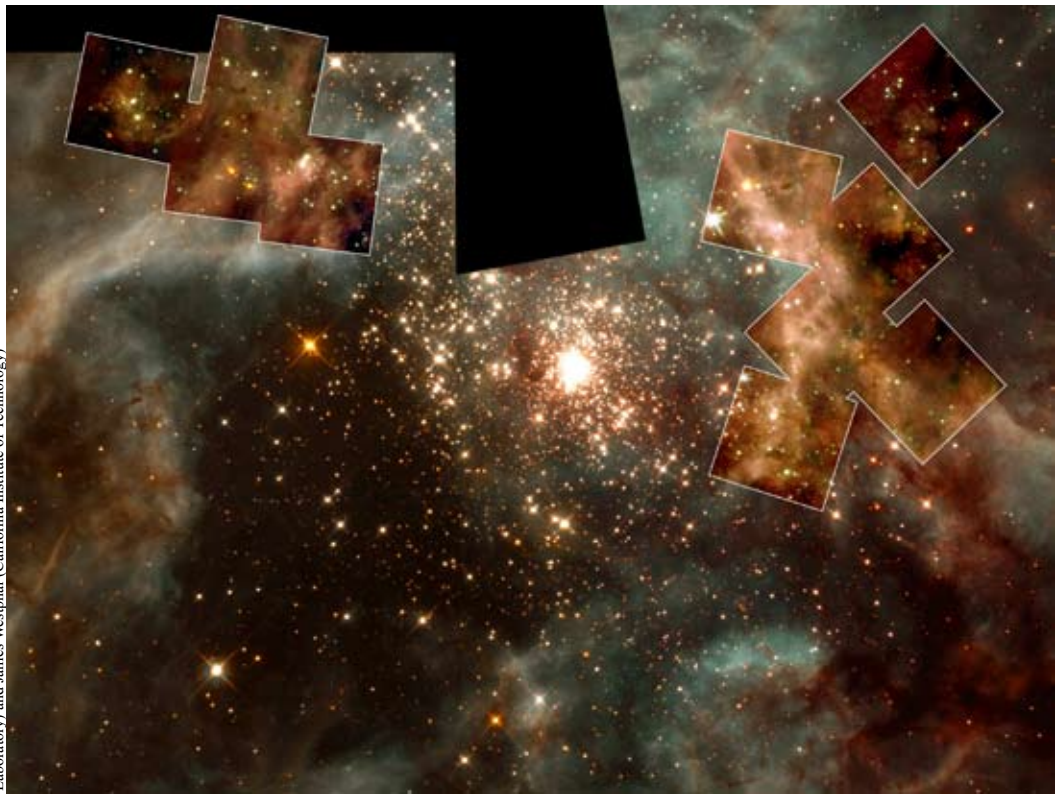
After realizing the deficiencies with the slow-and-gradual model of evolution, Goldschmidt proposed that evolution may have occured in large steps (saltations). However, saltational evolution has many problems. For example, macromutational changes in sexual organisms require parallel changes in both sexes at the same time, as well as compatibility with the biology and behaviour of parents and siblings!

We now know that much more than one mutation would be required to produce the changes needed for the evolution of a new animal order—indeed hundreds or thousands would be needed. The hopeful monster idea is now almost universally regarded as false.

> 'The occurrence of genetic monstrosities by mutation ... is well substantiated, but they are such evident freaks that these monsters can be designated as only "hopeless." They are so utterly unbalanced that they would not have the slightest chance of escaping elimination through stabilizing selection. Giving a thrush the wings of a falcon does not make it a better flyer. Indeed, having all the other equipment of a thrush, it would probably hardly be able to fly at all. ... To believe that such a drastic mutation would produce a viable new type, capable of occupying a new adaptive zone, is equivalent to believing in miracles.'[36]

As Eaton notes, the advance of knowledge resulted in the realization that Goldschmidt's 'monster is far more likely to be hopeless than hopeful'.[37] Since then, no satisfactory mechanism for viable macromutations has been proposed by modern Neo-Darwinists, although the macromutation concept has been discussed by others (such as Gould).

Today, many evolutionists assume that a large number of small mutations (not macromutations as De Vries and Goldschmidt tried to prove) can account for evolution. The empirical evidence, however, is clear—neither macromutations nor micromutations can provide a significant source of new genetic information: 'Many ways to induce mutations are known but none leads to new organisms. Mutation ac-



NASA/Nolan Walborn (Space Telescope Science Institute) and Rodolfo Barba' NASA/John Trauger (Jet Propulsion Laboratory) and James Westphal (California Institute of Technology)

Some evolutionists realize that chemical evolution will not work on Earth, so they move the problem to somewhere else in the cosmos. They hope that conditions will be more favourable elsewhere, but in vain. It is the ever-present laws of chemistry (polymerisation, chirality, etc.) and information theory that speak against life forming from innate chemicals.

cumulation does not lead to new species or even to new organs or tissues.'[38] What it leads to is sickness, death, and deficiencies. Furthermore,

> ' … this Darwinian claim to explain all of evolution is a popular half-truth whose lack of explicative power is compensated for only by the religious ferocity of its rhetoric. Although random mutations influenced the course of evolution, their influence was mainly by loss, alteration, and refinement. One mutation confers resistance to malaria but also makes happy blood cells into the deficient oxygen carriers of sickle cell anemics. Another mutation converts a gorgeous newborn into a cystic fibrosis patient or a victim of early onset diabetes. One mutation causes a flighty red-eyed fruit fly to fail to take wing. Never, however, did that one mutation make a wing, a fruit, a woody stem, or a claw appear. Mutations, in summary, tend to induce sickness, death, or deficiencies. No evidence in the vast literature of heredity change shows unambiguous evidence that random mutation itself, even with geographical isolation of populations, leads to speciation.'[39]

Panspermia

Another theory of the origin of genetic information is panspermia, the belief that life (or life's seeds) came somewhere from outer space.[40] The lethal problem with this view is that it only moves the origin of life problem elsewhere, and does not explain how (or even where) life originated. Other problems with panspermia include the difficulty of DNA surviving cosmic rays, heat, and time in its long travel in outer space to Earth. This view has been promoted by many respected scientists, including Sir Francis Crick,[41] Armand Delsemme,[42] and the late Sir Fred Hoyle,[43] because they realized the serious problems involved in early life forms evolving on Earth. Their work has eloquently documented the problems with abiogenesis (and all naturalistic theories of the origin of genetic information), including the theory of change resulting from by micromutations.

Quantum evolution and punctuated equilibrium

Quantum evolution involves rapid 'all or none' evolution caused by large, contrasting differences between adaptive zones in temperature or other environmental conditions. The postulated source of genetic variety is mutations, often macromutations called 'key mutations'.[44] Punctuated equilibrium (developed by the late Stephen J. Gould and Niles Eldredge) is a similar idea. Niles Eldredge said that punctuated equilibrium theory essentially says that 'once a species evolves, it will usually not undergo great change as it continues its existence—contrary to prevailing expectation that indeed does go back to Darwin'.[45] Deloria, in response to this summary of punctuated equilibrium, concluded that it is not fundamentally 'different from the creationist contention that species were created and did not thereafter experience significant change .... The empirical evidence is the same; the difference is one of vocabulary'.[46]

Of course, differences in the various quantum evolution theories exist, but so do many major similarities. These ideas may help 'explain' the lack of transitional forms in fossil record and the Cambrian explosion,[47] but they do not explain the *origin* of the large amount of genetic information needed to produce the 'rapid bursts' of evolution postulated to have occurred in the past.

Symbiogenesis

One of the newest hypotheses that attempts to explain the origin of new genetic information is symbiogenesis, the theory that the source of genetic variety is from gene, cell, and organelle exchanges and cooperation. In other words, evolution occurs mainly as a result of 'the inheritance of incorporated parts of genomes'. In Margulis and Sagan's words, the 'source of genetic novelty' is 'usually symbiogenesis' which they define as the 'acquisition of new traits by inheritance of acquired genomes'.[48] This still does not explain the *source* of new information, but actually only postulates that its *spread* was important in evolution. The *origin* of the new information is the concern that needs to be explained by Darwinists, not its spread.

Most of the examples used by Margulis and Sagan to prove their theory are pure symbiosis—bacteria that live in cows, in termites, or in legumes in gall tumors. Other examples include lichenized fungi (a symbiosis between a green alga or cyanobacterium and a fungus) and other life that exists in a symbiotic relationship. Another problem is that life forms most active in exchanging genes are supposedly the most primitive (such as bacteria). We would expect, if the basis of evolution was the exchange of genes, then those life forms most active in exchanging genes would evolve faster. Bacteria are by far the most active known gene exchangers, yet are considered by evolutionists among the most primitive, lowest evolved, life forms known.

As a result of this problem, symbiogenesis has been widely criticized—even in the introduction to the major recent work on symbiogenesis.[49] Furthermore, there is no evidence that many animals such as 'the 10,000 species of birds or the 4,500 species of mammals originated by symbiogenesis'. Symbiosis not only does not solve the origin of genetic information problem, but creates major new problems for Neo-Darwinism. The theory is a major admission that all other mechanisms proposed to explain the origin of new genetic information, including mutations, are either inadequate or totally without factual support. The works of Margulis and Sagan contain insightful critiques of the most widely currently accepted theory of the major source of new genetic information among Darwinists, the micromutational selectionist theory (Neo-Darwinism).

Summary

Darwin was aware that his idea was merely 'a provisional hypothesis or speculation', but believed it was the best available theory to explain the origin of the species, and, 'until a better one be advanced, it will serve to bring together a multitude of facts which are at present left disconnected by any efficient cause'.[50] In the decades around 1900, a number of new hypothoses were developed to explain the origin of new biological information, all of which have been now rejected. In the past century, no better theory has been developed, which is why Darwinists still hotly debate the source of new genetic information that they believe propels evolution.[51]

This state of affairs has not been due to a lack of hypotheses. Hypotheses such as 'creative evolution' by Henri Bergson, and others, which received wide support were soon abandoned as untenable when carefully examined. The hopeful monster was yet another idea that was proposed, and it, too, was completely discredited. The most common basis of the new information required for evolution is currently believed to be natural selection acting on beneficial mutations (those that confirm an advantage to an organism compared to its competitors). Even the beneficial mutation solution is now viewed by many biologists as inadequate.[52] No theory has yet been able to successfully replace these failed ideas. Darwinists often argue that they agree on the fact of evolution, but disagree only about the method. Without a viable method, though, evolution cannot take place. This problem is widely recognized, and some are even proposing a new theory called 'post-Darwinism'. Bagemihi argues for this new theory as follows:

> 'Survival of the fittest, natural selection, random genetic mutations, competition for resources—we all know how evolution works, right? Not quite. Over the past two decades, a quiet revolution has been taking place in biology. Some of the most fundamental concepts and principles in evolutionary theory are being questioned, challenged, reexamined, and (in some cases) abandoned altogether. A new paradigm is emerging: post-Darwinian evolution. "Heretical" ideas are being proposed by post-Darwinian evolutionists, such as the self-organization of life, the notion that the environment can beneficially alter the genetic code, and suite of evolutionary processes to accompany the once hegemonic principle of natural selection. Moreover, many of the developments in this theorizing reflect surprising convergences with another "new" science, chaos theory.'[53]

These 'new ideas' are in part a resurrection of discarded ideas, and no post-Darwinian theory has been able to widely challenge Neo-Darwinism. Some are even trying to resurrect some type of Lamarckianism.[54]

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