Should Creationists Rely on Natural Selection?

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Abstract

A recent long-term population study finds no evidence for "directional selection," but plenty of evidence for "fluctuating selection." These findings present a serious challenge to the traditional assumptions that variations in biological traits are random and that adaptation results from an external mechanism. Though several kinds of selection are invoked to explain observed population dynamics, evidence for non-random variation renders the concept of selection unnecessary. Instead, observed adaptation is better explained by distributed problem solving. This mechanism also provides a plausible explanation for the post-Flood rapid diversification of life. It is time for creationists to discard natural selection.

Simple Summary

This article argues that creationists should stop relying on natural selection as the main explanation for how organisms adapt. Recent long-term studies, including one on water fleas (Lynch et al., 2024) and others on fruit flies (Machado et al., 2021; Rudman et al., 2022), have found no strong evidence of natural selection consistently pushing traits in one direction over time. Instead, these studies show traits rapidly changing back and forth, or "fluctuating," in response to environmental shifts, which previous studies often missed by looking at too long a timescale. This finding challenges the traditional view, held by both evolutionary biologists and creationists, that adaptation comes from natural selection acting on random variations. The article suggests that the generation of adaptive variation is by design, where organisms have an inherent, engineered ability to quickly and purposefully adjust to their environment. This mechanism, a form of "distributed problem solving," allows populations to rapidly find and share adaptive solutions to environmental challenges, which provides a more plausible explanation for the rapid diversification of life after the Biblical Flood.

Introduction

A recent long-term study (Lynch et al., 2024) on *Daphnia pulex*, the most common species of water flea, draws some surprising conclusions regarding natural selection. The study authors report the results of a 10-year (about 35 generations) population-genomic study, which revealed "no evidence of consistent directional selection." Instead, the study findings were consistent with a scenario in which the population experienced "selection coefficients close to zero, while experiencing significant random variation in selection pressures across generations." In other words, the authors found that natural selection had little to no long-term effect (Figure 1).

To explain their unexpected findings, the authors attribute the observed back-and-forth oscillations in the frequency of trait variations among the population to "fluctuating selection." They then point out that "most empirical studies in molecular population genetics implicitly assume that fluctuating selection is of negligible significance," but their study undermines that assumption. Instead, their findings call into question the results of hundreds of studies that claim to observe the operation of natural selection. This is a shocking conclusion, and it presents a serious challenge to the traditional creationist view of biological adaptation.

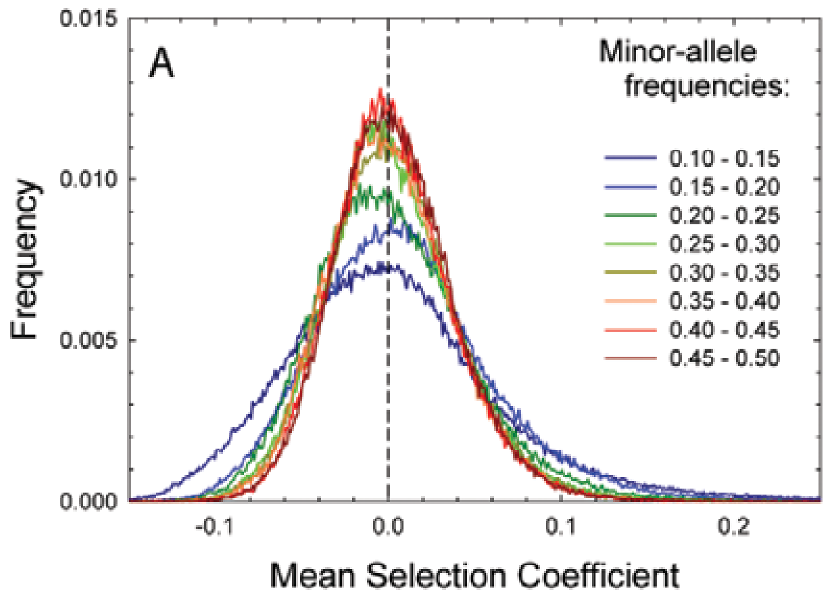

Figure 1. (A) from Lynch et al (2024). Averaged over time, seven of eight alleles (i.e., genetic variants) showed no net change in frequency. The frequency of the rarest allele decreased slightly. The variants are listed from least to most common in the line color key on the right.

The Challenge for Creationists

To understand the significance of the challenge presented by the Lynch et al. (2024) study results, it must be remembered that the majority of both evolutionary biologists and creationists have traditionally made the same two foundational assumptions regarding adaptation: 1) variations in biological traits are random, and 2) adaptation results from an external, selective mechanism (i.e., natural selection) which preserves favorable variations and discards unfavorable ones.[1] Thus, it is not natural selection alone which is thought to explain adaptation, but natural selection *acting on* random variation. Put another way, a selective mechanism is necessary to convert random variations into adaptive variations. This is true whether variations are thought to arise from random mutations (as in the neo-Darwinian model of evolution) or from random expression of pre-existing genetic diversity (as in the creationist Heterozygous Fractionation model).[2] Absent a strong selective mechanism, the random variations plus natural selection model of adaptation cannot account for the diversification of organisms over time. With very weak selection (i.e., "selection coefficients close to zero"), it is difficult to imagine how significant change could occur. This problem is particularly acute for creationists, who need to explain how the mind-boggling diversity of life arose in just a few thousand years. Further, with very weak selection, the relative frequency of variations cannot be strongly tied to environmental cues and thus cannot be adaptive even on shorter timescales; biological variation would remain essentially random. How, then, did populations of organisms become so well-adapted to their environments, and how do they continue to adapt today?

What Kind of Selection?

The key takeaway from the Lynch et al. (2024) study is that stronger-than-expected "fluctuating selection" negates the expected directional influence of

1 For example, the blind cave fish exhibit at the Institute for Creation Research museum for decades included the following statement:

> As genetic information is copied and passed on generation after generation, occasionally there are copying "mistakes" known as mutations…When a mutation occurs in a light environment that causes an animal's offspring not to have eyes, it is an enormous disadvantage…so natural selection eliminates this flaw…When the eyeless defect occurs here [in a cave], it does not give any disadvantage, so it is not eliminated. In fact, it gives advantages…Eventually, selective pressures ensure that all are eyeless.

2 For more details of the Heterozygous Fractionation model, which is one of the most recent and comprehensive creationist models to rely on natural selection as a driving mechanism for adaptation, see Jeanson (2015, 2017).

natural selection on a population over long periods of time. By fluctuating selection, the study authors mean selection that reverses direction, repeatedly, over relatively short periods of time, due to changing environmental conditions. The study authors argue that hundreds of studies which have interpreted patterns of population variation and claimed to find evidence for natural selection failed to account for the strong significance of fluctuating selection and so misconstrued transitory changes as evidence for directional selection.

One well-studied species which demonstrates clear directional selection in the short-term (i.e., seasonal adaptation), but on which selection has apparently little to no long-term effect, is the fruit fly (*Drosophila melanogaster*). The Lynch et al. (2024) study authors point out that fruit flies have population-genetic features quite similar to the *D. pulex* study population, and they reference the findings of Machado et al. (2021), which are particularly instructive. In the Machado et al. (2021) study, researchers looked at parallel changes in allele (i.e., genetic variant) frequencies across 20 populations from 15 separate locations across North America and Europe. Sampling was done early and late in the growing season (roughly spring to fall, corresponding to about 10 generations) over the course of 1–6 years. Over such a wide geographic range, the length of the growing season and other environmental conditions varied substantially, but a clear and consistent pattern of seasonal adaptation was nonetheless observed. That is, the populations adapted to seasonal changes in a predictable manner, such that the traits they exhibited at the end of the season were quite different from those exhibited at the start of the season. Patterns of adaptation also varied from south to north. Though the study authors were unable to identify the specific environmental variables driving these changes, they did find that the changes were statistically associated with temperature extremes in the two weeks prior to sampling in the spring and fall. However, one aspect of the observed population dynamics puzzled the researchers: How do *D. melanogaster* populations survive the annual population collapse during the winter and then establish the same spatial population structure and patterns of seasonal and clinal (i.e., varying from south to north) adaptation year after year?

The Machado et al. (2021) study authors admit that the ability of fruit fly populations to reestablish themselves every spring is poorly understood, but they raise the possibility that "natural selection may not push populations in the same consistent direction across the entire growing season but rather that natural selection and adaptation may be more heterogeneous through time," and that this may have something to do with it. They propose that sampling on a shorter timescale might illuminate how quickly the "selective pressures change in strength and even direction." In the end, they speculate that polymorphisms (i.e., two or more different forms) *must* be maintained by "balancing selection," despite or even because of "strong fluctuating selection," to explain the observed "reset" to the spring state every year.

The findings of Machado et al. (2021) and similar studies prompted an experiment at the University of Pennsylvania (Rudman et al., 2022) in which the researchers looked for fluctuating changes in fruit fly traits during the growing season. Specifically, they were looking for evidence of "adaptive tracking," which they define as "continuous adaptation in response to rapidly changing conditions." The study authors point out that adaptive tracking has historically not received much attention because it has been thought that natural selection is too slow and should theoretically prevent it from occurring.

To test this assumption, researchers established ten separate populations of fruit flies from the same original population and measured changes in traits over four months (about 10 generations). Each population began with 1,000 founders and grew to a maximum of approximately 100,000 individuals. All ten populations were exposed to similar conditions but were not allowed to interact. Every four weeks (about three generations), sampling was conducted for six different physical characteristics (i.e., traits) related to reproduction and stress resistance. The results were astonishing. The study authors report that the direction of adaptation for the traits changed multiple times, "swinging like a pendulum as environmental conditions changed." They were very surprised that a trait could become dominant in the population over a few weeks and then reverse direction the following month, and they reasoned previous studies missed this rapid change in direction by looking at too long a timescale, just as suspected by the authors of the Machado et al. (2021) study. The Rudman et al (2020) study results are shown in Figure 2.

The Rudman et al. (2022) study authors also note that observed changes in fruit fly traits were both phenotypic (i.e., variation in gene expression) and genomic (i.e., variation in the genes themselves), and that the changes affected more than 60% of the genome. To explain these extensive changes, the study authors appeal to a "rapid adaptive response to momentary selection pressures that often results in strong and fluctuating selection." However, they did not actually observe any selection events, only "rapidly fluctuating patterns of adaptation that suggest that populations of *D. melanogaster* are

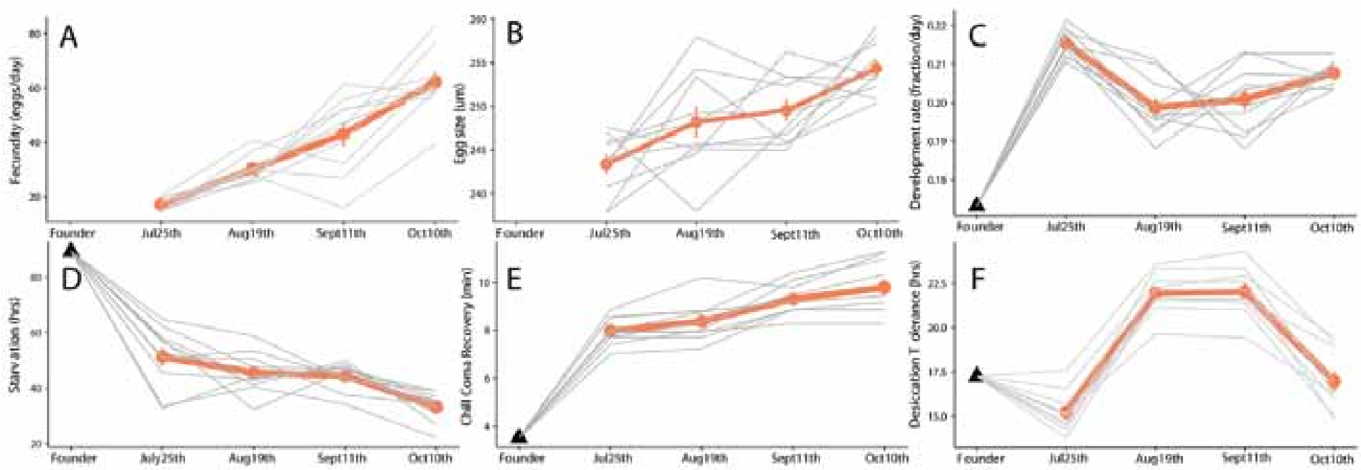

Figure 2. (A-F) from Rudman et al. (2022). Trajectories of change in reproductive-associated traits (A-C) and stress-resistance traits (D-F) in multiple populations, measured every three generations, over four months. Black triangles are the starting point of the founding population. Gray lines are the mean trajectories of each population, and orange lines are the mean of all mean trajectories. Note that the direction of change switched multiple times, even when exhibiting a clear directional trend over the entire study period, and that the directional trend reversed for development rate (C) and desiccation tolerance (F).

continuously and adaptively tracking the environment."

A Challenge for Selectionists

When non-random changes in the frequency of variations are attributed to "selection," even in the absence of an observed selection event, the term itself becomes ambiguous to the point that it ceases to be meaningful. To select is, by definition, to choose or pick out one thing from among several, to remove all but one thing from consideration. This is implicit in Darwin's definition of natural selection (Darwin, 1872):

> This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or the Survival of the Fittest. (Charles Darwin, *On the Origin of Species, Chapter IV)*

Thus, it is difficult to maintain that a process that doesn't reduce the frequency of "unfit" variations in a population can legitimately be described as selective. Therein lies the problem presented by the findings of Lynch et al. (2024), Machado et al. (2021), and Rudman et al. (2022).

To adapt a population to rapidly fluctuating changes in the environment, selection must be strong enough to result in "fit" variations becoming much more common (i.e., higher frequency) than unfit variations over a short period of time. However, if selection is too strong, the frequency of variations fit for change in the opposite direction will be so low that the time required to re-establish them at high frequency when the environment changes will be too long. On the other hand, if selection is too weak, fit variations will not become common enough for the population to adapt. At either selection extreme, the frequency of variations in the population will quickly become out of phase with changes in the environment and will soon be indistinguishable from genetic drift (i.e., a change in frequency due to random chance). Thus, the strength of selection (i.e., the "selection pressure") must be finely tuned. The more quickly changes in the environment switch direction, especially when acting on a large population, the more finely-tuned selection pressures must be to adapt the population to those changes.

Since little to no long-term divergence from the initial set of traits is observed in study populations, both the direction and magnitude of change in environmental variables must nearly or exactly balance in oscillating fashion, and thus arrive back at the starting point, given sufficient time. Even a slight deviation would lead to a long-term shift in the frequency of traits and could be readily observed. That the environment could maintain such a delicate balance over anything but a very short period of time is highly improbable.

One oft-invoked way around this dilemma is to assume that fluctuating selection somehow actively maintains multiple variants for the same trait (with opposing fitness value) and alternates the expression and suppression of each variant, as appropriate ("balancing selection"). This may appear at first glance to be a reasonable solution since there are many known examples of such polymorphisms (light and dark peppered moths immediately come to mind). However, the speed at which selection must occur to effectively switch the population norm from one variant to its opposite in time with environmental oscillations brings up the fine-tuning issue again. Further, this means that selection must simultaneously act to increase the frequency of fit variations while also preserving unfit or less-fit variations at a high enough frequency so that they are readily available when the environment changes in a direction which would render them fit once again. This is counterintuitive and turns the concept of selection on its head.

Replacing "selection" with "variation" brings clarity to the situation. This is what is being observed in study populations: directional variation, balancing variation, fluctuating variation; variation that closely corresponds with (i.e., responds to, tracks) changes in the environment and is thus inherently adaptive. Occam's razor is applicable here. It is far more plausible to affirm what is apparent (non-random variation) than to assume that random and counterintuitive processes are occurring behind the scenes. The straightforward explanation should be adopted, instead of deferring to an unnecessarily complicated one.

To bring it full circle, why are multiple (even counterintuitive) kinds of selection invoked to explain observed population dynamics? Because those dynamics are unexpected from the original conception of the random variations plus natural selection model. This indicates that one or more of the original assumptions is incorrect. The situation should seem familiar to those who have read Thomas Kuhn's *The Structure of Scientific Revolutions* (Kuhn, 1970). In his classic work, Kuhn describes how an established scientific model is augmented with an array of increasingly cumbersome secondary assumptions in an attempt to save the model as evidence contradicting the original assumptions begins to mount. After some time, the model becomes so unwieldy that, when a simpler model with more accurate initial assumptions comes along, the old model is quickly abandoned, and a paradigm shift occurs. With regard to our understanding of biological adaptation, now is one of those times.

Adaptive Variation by Design

If we accept that biological variations are not random, then it logically follows that a selective mechanism is unnecessary; there would be no "pool" of random variations from which to "select." Instead, another mechanism must be at work; one that responds to environmental changes by generating variations that are inherently adaptive. Such a mechanism would naturally allow organisms to adapt to their environment more rapidly than the trial-and-error approach integral to the random variations plus natural selection model. This is precisely what is observed in the water flea and fruit fly populations.

Of course, these aren't the only populations in which adaptive environmental tracking is apparent. The evidence is abundant. Guliuzza and Gaskill (2018) and ICR's Engineered Adaptability series of articles[3] have discussed more than thirty examples, and even a cursory review of the scientific literature reveals dozens of additional studies in which similar patterns of non-random variation have been observed. The accumulating evidence shows that adaptation is rapid, predictable, repeatable, reversible, and precisely controlled. It is targeted, purposeful, engineered. Once the baggage of the random variations plus natural selection model has been jettisoned, it becomes clear that the generation of adaptive variation is by design.

Though there remains much to learn about exactly how organisms are engineered to closely track changes in the environment and respond by quickly generating adaptive variation, an emerging theory of biological design has identified at least three key elements:

1. Organisms are equipped with a wide array of sensors which are finely-tuned to specific environmental stimuli and which trigger an adaptive response when stimuli exceed a designed threshold (Guliuzza, 2018).
2. A blockchain-like process enables individual organisms to combine inherited information, environmental variables (more specifically, biochemical responses triggered by the sensing of environmental stimuli), and internal state (e.g., metabolic rate, energy reserves, hormone levels, etc.) to adaptively adjust their traits during development and as adults (Gaskill and Guliuzza, 2019b).
3. Distributed problem solving allows a population of organisms to cooperatively and rapidly converge on optimized solutions to environmental problems (Gaskill and Guliuzza, 2019a).

The last of these is critical, since it presents a resolution to the challenge that was pointed out at the beginning of this article. Namely, with the very weak "directional selection" observed

3 See Acts & Facts 46(9)–48(8), appearing from 2017 to 2019.

by Lynch et al. (2024), how did the diversity of life arise in just a few thousand years, how did populations become so well-adapted to their environments, and how do they continue to adapt today?

To achieve rapid convergence on an appropriate set of traits for a specific environmental niche, individual organisms generate similar "solutions" (i.e., adaptive variations) in response to environmental "problems" (e.g., changing conditions or the colonization of a new environment). These adaptive variations are then rapidly distributed within the population by reproduction, with the consensus solutions becoming dominant in one or a few generations. Thus, a population can quickly become optimized to its environment. In a stable environment, oscillations in environmental variables are closely tracked by the population in this manner, resulting in fluctuating and balancing variation. If significant environmental change occurs or if the population migrates and fills a new environmental niche, the same mechanism allows the population to undergo rapid directional variation.

In the creation worldview, the immediate post-Flood world and the Ice Age, which followed soon after, present the most significant colonization event and epoch of extreme environmental change, respectively, since Creation itself. Present conditions are far more stable. It should be expected, then, that the history of life would exhibit explosive diversification post-Flood, then a rapid re-shuffling of diversity as the Ice Age waxed and waned, followed by relative stability today. The distributed problem-solving mechanism is an eminently plausible explanation.

Conclusion

There is abundant evidence demonstrating that organisms rapidly and repeatedly adapt to even minor changes in the environment. Such adaptive environmental tracking can only be described as directed, purposeful, and even engineered. In contrast, as the recent studies discussed in this article reveal, there is little to no evidence that natural selection has any significant effect on populations in the long-term, or explanatory power in the short-term.

The bottom line is that natural selection is not operating in the real world. The hypothesis that adaptation results from engineered optimization provides the only plausible explanation for the origination and perpetuation of the mind-boggling diversity of life in only a few thousand years. It is time for creationists to discard models that rely on natural selection and replace them with a theory of biological design which puts the inherent and amazing ability of organisms to quickly adapt to environmental change back into proper perspective: credit should be given to the Creator who engineered it.

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