

Interrupted Development & Bursts of Creation

Paper I

Emergent Levels of Evolution

Whenever I read papers or books on Evolution, they seem to describe an uneven, indeed tumultuous flow of Change. It is not a smooth, incremental ride all the time. Natural Selection is usually placed within an independently varying, and “driving”, environment, where two factors seem to be at the heart of Change in this amazing process.

The First is the permanent competition both within and between species, the success of which (determined by **fitness**) will “select” for one rather than less endowed competitors.

The **Second** is when the environment independently changes of itself and thus effectively **moves** the *fitness* goalposts.

To be susceptible to these factors, species cannot be immutable.

They **must** be subject to intrinsic change themselves.

These necessary changes do occur due to random mutations in the genetic material of individual living things. Such genetic material is the “blueprint” for the characteristics of the living thing as it develops and matures. Obviously such chance changes in these crucial “instructions” will be mostly disadvantageous, and the “damaged” individual will not survive long enough to affect the population as a whole. The very rare mutations that confer an *advantage*, on the other hand, will greatly enhance the survival of that individual, allowing more offspring, and making a **surviving & advantageous** contribution to the species population as a whole. In time, such positive mutations will spread through the population, as less well endowed individuals relatively diminish in numbers.

Thus the engine for driving our two processes is **Variation** – the random mutation of genetic material.

We can conceive of a *normal form* of Selection, which pertains during a relatively stable environment, within which, driven by variation, **gradually** changes the composition of the population.

The other, *abnormal form* is driven by major changes in the enclosing environment. This is not gradual but dramatic, quick and often calamitous.

In this latter form, whatever causes the changes, undermines the “fitness” that was determined during the normal phases, and leads to a general decline in the population of certain species. It also establishes very different criteria for fitness. The intra-species competition becomes much less important than the inter-species competition, because the changes in effectiveness in survival in the face of such unusual new circumstances. So the criteria for selection are completely and unsympathetically changed for species that were before positively encouraged.

These situations sometimes involve extinctions, as the species cannot adapt quickly enough (via variation & selection) to cope, but such Events are always followed, in the ensuing “normal” stable interlude by what is called an “adaptive radiation”. Instead of the usual “incremental improvement” where changes were selected for with intra-species causes being dominant, we get the much amplified success of more erratic, and more major variations being selected for, as such will tend to significantly push the envelope of possibilities, and thus more effectively reach quite new fitness “areas”. Some of these sizeable changes, which in previous stable periods were ALWAYS disadvantageous, would, in these new circumstances, indeed MATCH the new conditions, and so many new strands – indeed, new species will come into being – will be CREATED by these pressures.

The same effects will also be caused by the newly precipitated absence of competing species in the numerous new potential, habitats, either because old species that may have fitted were now made extinct during the change over phase, or because wholly NEW habitats have been created.

These are the engines for **Adaptive Radiation**.

Now, these tumultuous changes are classically linked by authors with cataclysmic events, such as meteorite impacts from outer Space and a series of other major catastrophes, but to insist that all such radical reorientations in Evolution MUST require disasters does NOT seem necessary to me as the ONLY possible cause.

I can see why such catastrophes have the effect that they do, but I do not agree that they are the ONLY possible cause for radical changes in Evolution.

I can also conceive of a built-in intrinsic feature of Natural Selection that will create its own Revolutions. They WILL involve re-mix in some way, but catastrophes of global proportions may NOT be necessary. The proof is there in Evolution itself – in the very same evidence that Darwin drew upon to devise his original Theory.

The answer is in the case of the Galapagos Finches!

There is no doubt that Adaptive Radiations took place on these islands WITHOUT the presence of major catastrophes, and they were often different on the various islands.

What drove Evolution there was an absence of competitors and predators, and the presence of diverse, and uninhabited, potential habitats. A single “finch” species radiated into a whole rich set of different species, each adapted to a given habitat and lifestyle.

To tender another pertinent example, in quite a different set of circumstances, one can conceive of an Ice Age rapidly locking vast amounts of water into ice caps, and thus causing the levels of the oceans to drop. Once separated lands became joined, and this could lead to interchanges of separately evolved species across the new land bridges, precipitating new competition and even potential new habitats for some incoming new species.

A vigorous destructive Selection AND an Adaptive Radiation might well ensue once again without external calamity.

To be continued

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