Chapter Four Perception and Reality

The Universe is relative. It exists in relation to its inexistence. As it evolves, its motion may be perceived to be relative or non-relative. Thus every environment may appear to consist of change and stasis.

The rate of change is regulated by the environment, as it forces its dependent organisms to adapt within the constraint of universal interaction.

However, the rate of adaption is dependent upon the variability of the environment, and each organism's potential for adaptive adjustment.

Basic Environments

The most basic environments are solid, liquid or gaseous. They represent the balance of gravitational and thermal pressures, which create the spherical shapes of the stars and planets. These environments are resistant to changes in their structure, and tend to diffuse any variations in their composition.

The heat generated by gravitational pressure flows out towards the surface of the stars and planets. If there are marginal differences in their spherical structures, these result in the formation of convection currents.

On Earth, the heat differential on the planet's surface varies its elasticity, and causes convection currents to flow from the equator to the poles. This leads to a fluting effect -- due to the constriction in volume in the polar regions. The longitudinal variations in thermal elasticity cause corresponding variations in the thickness of the Earth's crust.

The Earth's oceans form within the depressions between the thicker parts of the planetary crust. The seas are affected by the same interactive pressures as the rest of the planet, and behave in the same way. As a result, convection currents form within the oceans, transferring heat from the ocean bed to the surface of the sea.

The relatively rapid transfer of heat, by the oceanic convection currents, leads to a consequential variation in the subterranean convection currents of the Earth's interior. Therefore the asthenosphere tends to well up in the centre of the ocean sea beds, causing the mid-ocean ridges. The steady up-flows of planetary material spreads out under the oceans, leading to mountain building on the coasts.

The atmosphere is affected by similar convection currents, as the planetary heat flows out into space. As a result, the air transports water vapour from the surface of the sea, to cooler regions at higher altitudes and latitudes.

Resistance

These basic forces, and the flow patterns which result from them, are resisted by the atomic and molecular forces of the particles which comprise the Earth. Thus each element and molecule has a specific degree of resistance to the gravitational and thermal pressures. As a result, they tend to form a hierarchy of layers in the terrestrial, oceanic and atmospheric regions of the planet.

The elements with the optimum combination of gravitational and thermal resistance, tend to stay near the Earth's centre, while those with the lowest resistance are forced into the upper layers of the atmosphere.

The planetary convection currents in the Earth's solid, liquid, and gaseous environments, appear to be the main agents of change: while the resistance of the atoms and molecules, appears to be the main cause of stasis. This is the dynamic environment in which living organisms have evolved.

Adaptive Potential

The relative homogeneity of the basic environments tends to encourage the highest degree of individual abundance and speciation, although the individuals tend to have a relatively low degree of adaptive potential. As a result, such environments tend to have the highest rates of extinction during major changes in the environment's composition or structure.

By contrast, the peripheral conjunctions of the basic environments are marginal in volume, and tend to be relatively varied in composition and structure. As a result, the peripheral environment tend to minimise the degree of individual abundance and speciation, although they require a relatively high degree of individual adaptive potential.

As a result, the peripheral environments tend to have relatively low rates of individual and specie extinctions, and the surviving peripheral specie tend to form the basis for each new advance in physiological and behavioural adaption.

Life Molecules

In this context, it appears that the original life molecules formed in a peripheral environment at the conjunction of the oceanic and terrestrial environments.

Thus, the terrestrial convection currents of the asthenosphere welled up in the centre of the oceanic sea bed, venting a continual supply of terrestrial elements and molecules into the oceans. Furthermore, the oceanic convection currents, created by the mid-oceanic thermal activity, caused relatively cold water to flow over the warm sea bed. This created peripheral environments in the depths of the oceans, where the cold water currents were sandwiched between the warm sea bed and the warm surface water.

In this pre-organic environment, the relatively high thermal pressure of the water just above the sea bed, tended to cause the dissolution of molecular compounds. By contrast, the relatively cold water of the deep ocean currents tended to encourage molecular combination and crystallisation.

Boundary Layer

The original life molecules appear to have formed in a boundary layer, between the warm sea bed and the cold water environments above. These life molecules appear to have been a complementary union of dissimilar elements, which could resist both the divisive effects of the hot environments, and the combinational effects of the cold environments.

The life molecules were able to achieve this through a change in structure, which altered their surface-to-mass ratio. For example,in the cold environment, a life molecule could fold up into a relatively compact form -- whereupon it would sink under gravitational pressure, until it reached the warm sea bed environment. Then, under increased thermal pressure, it would unfold to form a larger, more open structure. This would increase its surface-to-mass ratio, so it would be forced up again -- by hydrostatic pressure.

Thus the original life molecules could continuously oscillate, between the warm water environments near the sea bed and the cold water environment above. This cyclical oscillation, between the hot and cold environments, would pre adapt the life molecules to similar variations in gravity; salinity; acid/alkaline solutions; electrostatics; hydrostatics; and electromagnetic radiation.

As a result, the life molecules would be able to survive by continually avoiding total dissolution, or crystallisation. Furthermore, their pre-adaptions always tended to move them away from any environment which would be likely to cause their extinction.

Dynamic Nature

In this regard, the essential feature of the early life molecules was their dynamic nature. Their partial combinations or divisions, allowed them a temporary change of structure which endowed them with a degree of independent mobility. In addition, any complete combination or division, could lead to a permanent change in their structure, or a complete replication of the molecule itself

These early life molecules would die when their dynamic processes were curtailed. This could be due to permanent dissolution or crystallisation, or to any structural rigidity which prevented mobility, growth, or replication.

However, they were totally dependent upon their environment. If the environmental variations ceased, the life molecules would all die. The environment provided them with the continual production of elements and compounds, brought by the convection currents. It also created and maintained the dual, hot & cold environment near the ocean floor.

This oceanic environment was an automatic consequence of the Earth's evolution - within the Solar system. Likewise, the evolution of life molecules was a similarly automatic development - within the oceanic environment.

Furthermore, the long term survival and evolution of the life molecules was also automatic as they oscillated from one environment to another.

The original life molecules could only survive if they maintained their ability to alter their surface-to-mass ratio. Any kind of growth which inhibited this characteristic would lead to extinction. Thus their evolution has always demanded a consistency of structural character, in order to maintain their dynamic nature. As a result, they have tended to grow head-to-tail to form chain molecules, because a more compact shape would tend to restrict their need for structural variations.

However, long chain molecules are structurally weak, and prone to breakage. As a result, most life molecules consist of a series of chains which can fold up to produce relatively compact structures, but which nevertheless still retain a degree of structural flexibility.

The temporary alteration of a life molecule's surface-to-mass ratio could also be achieved by temporary combinations or divisions, with other elements. Furthermore, if such a combination involved the acceptance of a complementary chain of atoms, the subsequent division of the two chains in the warm environment could lead to the replication of the original life molecule. In addition, if a life molecule combined itself with a hydrophobic compound, it could insulate itself against cold water dissolution.

The First Biospheric Environment

In time, these oscillating life molecules would form a relatively large layer between the hot and cold environments. As such, this layer would become the Earth's first biospheric environment. In this regard, the interior of the oscillating layer of life molecules would be the equivalent of a basic environment, while the exterior would be the equivalent of a peripheral environment.

As a result, the greatest degree of speciation and individual abundance would occur at the centre of the layer, leading to highly variable replicating chain molecules. By contrast, the molecules near the edges of the layer would have the greatest degree of adaptive potential, and the smallest variety of structure. Furthermore, the external molecules would tend to interact with the centre molecules, as the former oscillated from the upper edge to the lower edge of the layer.

Eventually, complementary combinations of these specialised life molecules would form viral and bacterial forms of life.

Early Organisms

The ocean currents would tend to force the early organisms towards the polar regions. In these areas, the oceanic environment is relatively stable, and the early organisms would be able to evolve under the polar ice caps -- which would protect them from harmful solar radiation.

As the early organisms evolved on the ocean floors of the polar regions, the steady increase in their individual abundance would force those on the margins of the environment to adapt, or move, or die.

In this regard, the mainstream environment of the organisms would be within the troughs of the ocean sea bed. Thus the peripheral environments would be above the sea bed, where the marginal organisms would have to adapt to reductions in gravitational pressure and salinity. As they approached the surface, they would also have to adapt to an increase in solar radiation, and a consequential increase in thermal pressure.

In this regard, it should be noted that evolutionary adaptations depend upon either point mutations, regulatory mutations, or structural mutations. Furthermore, the rate of mutation varies with the growth rate and complexity of the individual organism. In addition, a set of simultaneous mutations is much rarer than a series of single mutations.

As a result, the successful marginal organisms tend to transfer from one environment to another in any way which will maximise their chances of a single mutation - and minimise the requirement for a set of simultaneous mutations.

Marine Development

In this regard, as the ocean floor consists of a series of ridges and troughs, the temperature of the sea bed varies according to the relative thickness of the oceanic crust. Generally, the sea beds near the coastal regions tend to be cooler, because they are far from the volcanic activity which takes place in the central regions of the oceans

Thus the early marginal organisms, which spread out towards the coastal regions, would adapt initially to a reduction in temperature. This would slow down their growth rate, and thereby increase their chances of successful mutations.

Then, by following the temperature gradient, the organisms could adapt to the higher elevations at the edge of the sea bed. As a result, they could adapt to the reduced density and salinity of the sea water, by a series of single mutations. Furthermore, as long as they remained under the polar ice caps, their need for adaptations to solar radiation would be minimal.

In this context, the early life forms would have to remain under the ice caps until the Earth's atmosphere had formed. However, when the ozone layer in the stratosphere had become sufficiently concentrated, the organisms could emerge from under the polar ice.

At this stage, the marginal organisms at the edge of the polar ice caps would be forced to adapt to all of the environmental variations which are involved in any transition from the poles to the equator. Thus they would have to adapt to a general increase in the salinity and temperature of the sea water; plus daily and seasonal variations in the water temperature.

As a result, the marginal species would be forced to adapt to the environmental changes in a series of short steps. In this regard, they would first follow the temperature gradient downwards to lower depths in the sea. Then they would adapt to the increase in solar radiation and temperature variations, by moving up to the surface of the oceans. This procedure would be repeated many times, so that the organisms would follow a saw-toothed evolutionary path on their way down to the equatorial latitudes.
(See Figure 1).

When the organisms had colonised the surface regions of the equatorial seas, they would increase their individual abundance to form a mainstream specie. As a result, the individuals on the periphery of this equatorial environment would be forced to adapt either to lower depths, or higher latitudes, in order to survive.

As a result, the process would reverse as the marginal individuals followed the same saw-toothed evolutionary path back to the polar regions. This cycle of latitudinal adaptations could continue indefinitely leading to more and more complex organisms, which would adapt to various depths within the oceanic environment.

The equatorial organisms would eventually transfer from the oceanic environments to the land. This would follow the normal evolutionary pattern, as the organisms adapted initially to freshwater conditions, in the river estuaries. They would then follow the inland water table, below the surface of the land, before eventually adapting to the atmospheric environment.

Terrestrial Evolution

When the micro-organisms had colonised the subsoil of the coastal regions, the marginal shoreline plants and animals could adapt to the terrestrial environments. In this regard, the evolution of multi-cellular, terrestrial plants and animals, would be most rapid in the equatorial environments, as these tend to have the lowest fluctuations of temperature and humidity. In the terrestrial biosphere, this is the environment where most of the initial plant and animal evolution takes place.

In this context, the equatorial regions of the terrestrial environment represent the apotheosis of life. The most varied and complex, plant and animal systems tend to evolve in these regions. It is a very competitive environment, where the optimum terrestrial conditions limit the quality and quantity of available life forms.

As a result, the less competitive plants and animals, are forced to move into the poorer, more marginal environments, where they either adapt to the adverse conditions, or die. These marginal terrestrial species are therefore forced to move to higher latitudes, in the same manner as the marginal oceanic species.

Altitudinal-Latitudinal Evolution

In this regard, the general process of terrestrial evolution, from the equator to the polar regions, is very similar to that of the oceanic species. Thus, the marginal terrestrial species have to adapt to four major environmental variations, namely: a general decrease in temperature and humidity; a decrease in the rate of the day/night cycle; daily variations in temperature and humidity; and seasonal variations in temperature and humidity.

The evolutionary adaptive paths are also similar to those of the marginal oceanic species. Thus, the marginal terrestrial species follow the temperature gradient, by initially adapting to higher altitudes in the equatorial regions. Then they adapt to the higher latitudes.

By adapting initially to the higher altitudes, the terrestrial specie slow down their metabolic rate, and thereby increase their chance of mutations. This evolutionary path allows them to adapt slowly to a general reduction in temperature and humidity. Thereafter they adapt to the daily and seasonal variations in temperature, humidity, and daylight, which are typical of the higher latitudes.

In this context, it is very important to note that although this transfer of terrestrial species to higher altitudes and latitudes has resulted in the evolution of specie with highly complex, organic and behavioural adaptations; all of these specie's ancestors were once the least competitive individuals in the equatorial regions.

Driven Out

Thus, in the basic environments, those animals whose genetic inheritance best fits the specie's ecological niche, will be the most successful individuals -- in terms of survival, mating and reproduction. These animals will comprise the more dominant individuals within the specie, and they will drive the more subordinate individuals out of the specie's mainstream territory

As a result, the least competitive individuals -- which have the least standard set of genes, will be forced into the least favourable environments. Here, their death rate will be relatively high - due to a general lack of food resource, and increased predation.

However, the relatively high death rate of these individuals will paradoxically reduce the competition for food and mating partners - among the survivors. Furthermore, the progeny of some of the pairings may have a combination of genes which create an adaptive advantage -- within the poorer environments.

As a result, if the poorer environments are large enough, these less competitive individuals will be able to evolve into a subordinate, variant specie -- which will be specifically adapted to survive in the poorer, marginal environments.

This process of peripheral adaption, to poorer and poorer environments, could continue as long as there were alternative environments, and a sufficient degree of individual adaptive potential to survive in such environments.

In this context, although the general trend of evolutionary adaptations would be from the mainstream environments to the marginal environments, it should be noted that this process could reverse -- in times of climatic change.

Reverse Colonisation

For example, if the climate in the optimum environments of any mainstream specie changed adversely, the individuals of this specie would be ill-adapted to survive in the worsening conditions. By contrast, the neighbouring subordinate, variant specie, which had adapted to the poorer, marginal environments, would be pre-adapted to survive the adverse conditions.

As a result, if the adverse conditions were sufficiently severe, the mainstream specie would become extinct, and the subordinate, variant specie would colonise the territory left vacant by such extinctions. Thus, the general process of marginal colonisation, in the warm periods of biospheric evolution, would be varied by the 'reverse' colonisation of the mainstream environments, in the cold periods of biospheric evolution.

After each period of reverse colonisation, the subordinate, variant species would become the new mainstream specie within the optimum environments. Thereafter, the process of marginal colonisation would recommence.

Thus: most of the physiological and behavioural adaptations occur in marginal species of plants and animals. Furthermore, as the Earth's temperature has alternated between warm and cold periods, the successive marginal species of plants and animals have become increasing efficient at adapting to peripheral environments.

Specialised Mainstream Specie

In the cold phases of planetary evolution, the highly specialised mainstream species in the basic environments tend to become extinct. In these periods, they are replaced by the generalistic marginal species, which are pre-adapted to adverse conditions.

As the marginal species are not very abundant, there tend to be relatively few fossils of these transitional plants and animals.

In the warm phases of planetary evolution, the generalistic marginal species adapt to the basic environments, and radiate into a number of highly specialised mainstream species. These species eventually become too competitive for the original generalistic species, which themselves become extinct.

As a result, most of the present-day specie are highly specialised descendants of an extinct generalistic specie.