FITNESS OF EARTH FOR LIFE

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The physical and chemical properties of water and the atmosphere show a "fitness" of the environment for life, as William Whewell and Lawrence J. Henderson have so ably asserted. This article contains a review of such evidence as a testimony to God's authorship of the physical and chemical environment for life.

Let us suppose that you are taking a walk along a river among the trees and bushes. Somebody whom you cannot see throws a stone which hits a tree. If this occurs only once you think the stone was thrown at random; but if the same spot is hit nine times out of ten you feel certain that the thrower is aiming at that very spot. He is throwing with a purpose.

Earth and Life Agree

It is well known that living things are constructed in a way that fits their manner of life. Swimming birds have webbed feet, wading birds have long legs and long beaks. Plants have leaves in which sunlight combines water and carbon dioxide into sugar for the use of the plant.

Animals which eat leaves and grass have large stomachs and intestines to contain the large amounts of food which they must eat. Fish have a spindle shape which enables them to pass through the water with but little resistance.

A very long list could be compiled of these useful structures. The remarkable fact is that the earth has resources which fit these structures of living things. Dr. Henderson stated that:

> In fundamental characteristics the actual environment is the fittest possible abode of life. Such is the thesis which the present volume seeks to establish. This is not a novel hypthesis. In rudimentary form it has already a long history behind it, and it was a familiar doctrine in the early nineteenth century.[1]

Like the stone which hit the tree nearly every time, the earth is so planned and constructed that it supplies the needs and requisites of living things. Able observers have ascribed this correspondence to purpose in the plan of the Creator. But men who follow the negative, doubting thinking of the twentieth century, hold back belief, and refer to ascribe this reciprocal relationship to chance.

Nature Testifies

Seneca (A.D. 1-65) a prominent Roman, gives this testimony:

> Every man knows without telling that this wonderful fabric of the universe is not without a Governor, and that a constant order can not be the work of chance, for the parts would then fall foul upon one another. The motions of the stars, and their influences, are acted by the command of an eternal decree. [2]

A contemporary of Seneca, the Apostle Paul, writing to the countrymen of Seneca, makes this statement:

> For all that may be known of God by men lies plain before their eyes; indeed God has disclosed it to them. His invisible attributes, that is to say his everlasting power and deity, have been visible, ever since the world began, to the eye of reason, in the things which he has made.[3]

This method of learning about God from the things which he has made is called natural theology, and it was very popular in the first half of the nineteenth century. Some theologians of more recent years do not approve, but their objections seem obscure. Natural theology is valuable in that it calls attention to God. Since it says nothing about Christ and the redemption which he accomplished, one should not stop with natural theology but use it as a corridor to the gospel.

William Whewell (1794-1866) wrote one of the Bridgewater Treatises entitled, "Astronomy and General Physics Considered with Reference to Natural Theology," in 1834.

> Master of Trinity College for 25 years, Whewell was one of the most powerful men at Cambridge during the period of educational reform. . . . He received a Royal Society medal for his work on tides and furnished Faraday with the nomenclature he wanted for his work in electricity. The terms "anode," "cathode," "ion," "anion" and "cation" are due to Whewell.[4]

Whewell discusses 19 laws of the earth which indicate that the world was formed purposely as a home for living things. Henderson comments, "It is hard to understand how such ideas could have fallen into oblivion."[5]

Water a Unique Fluid

Space forbids comment on all of Whewell's arguments for purpose in creation but a most outstanding one must not be ignored. Water, like subtances in general, expands when heated and contracts when cooled. But it departs from the rule very markedly when it freezes. Water has

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the greatest density-therefore occupies the least space—at four degrees Centigrade. If the cooling continues the water expands until at zero degrees it occupies about one-ninth more space and changes from liquid to solid.

This expansion at freezing is familiar to people in the bursting of pipes and car radiators, and as such seems to be unfortunate. But for living things in general and indirectly for mankind it is a distinct advantage.

The expansion of the ice causes it to float in any open body of water, whereas if it obeyed the general rule of contraction upon cooling it would sink to the bottom and the river or lake would freeze solid. While fish have been known to live after being frozen in ice, they would not do so after being frozen a long time, and while frozen there is a loss in their vital functions.

Bodies of water frozen all the way down would thaw very slowly, having a layer of liquid water collecting above the ice which would protect it from the warm air. In temperate climates it might not thaw to the bottom (if water followed the general rule of expansion) before the process of freezing started again.

A demonstration, credited to Rumford, has been repeated many times in classes. A piece of ice is inserted in a test tube of water and held at the bottom by a wire or some other device. Then the upper part of the test tube is held over a flame until the surface water boils before the ice at the bottom melts. The water when heated expands, rises to the top and remains there.

This anomaly of the expansion of water on freezing undoubtedly prevents the "closing of shop" of countless water habitats with their abundant fauna and flora. And the loss to man caused by freezing and bursting can be avoided because freezing always takes place at known temperatures.

The very presence of water on earth is a matter that excites our wonder. Long before the American astronauts went to the moon we knew there was no water there because there were no clouds to obscure the surface features when viewed through a telescope. Pictures and tests of Mars show very little if any moisture. Venus and Mercury are too hot to contain water in solid or liquid states. Jupiter, Neptune and Pluto are too far away to describe with accuracy but reveal no evidence of abundant water. Thus, earth is unique in having this compound in abundance.

Physical Characteristics of Water

The physical and chemical characteristics of water make it much more useful to living things than any other liquid. It is so formed that it dissolves more substances than any other except perhaps ammonia. In the human body it is necessarily true that foods are dissolved in the blood, and wastes in urine. Plants dissolve their food in their sap. Being chemically inert, water does not change these solutes but simply transports them.

Water is unique in having a high specific heat. This is the amount of heat in calories needed to raise one gram of a substance one degree in temperature (Centigrade). The following table (from Henderson, *op. cit.*) shows that water has the highest specific heat of any substance mentioned except ammonia and hydrogen:

Specific Heats in Gram-Calories Per Degree Centigrade

water	liquid	1.00
	solid	0.50
	gas	0.3 -0.5
	lead	0.03
	iron	0.1
	quartz	0.19
	salt	0.21
	marble	0.22
	sugar	0.30
	ammonia	1.23
	chloroform	0.24
	hydrogen	3.4
	alcohol	0.5

Properties Fit Man

What do these facts mean to mankind? A man weighing 165 pounds produces at rest daily about 2400 calories, which is enough heat to raise the temperature of his body 32 degrees Centigrade. Of course the excess heat is removed by the temperature-controlling system of the body, unless one has fever. This removal is not only a comfort, but also a means of keeping the chemical changes from accelerating.

This important heat control is possible because water is the principal substance in the human body, and water has a high specific heat. If the body were filled with an average substance instead of water, a man would produce enough heat in a day to raise his temperature 100 degrees Centigrade.

Now let us consider latent heat, which is heat that becomes imbedded and lost and is not apparent for a time, nor detected by a thermometer. No doubt you have noticed that when you wash your hands and swing them until they are dry, they feel cool.

When a substance is evaporated from the liquid state or melted from the solid state a certain amount of heat disappears. This heat reappears when vapor is condensed into a liquid or a liquid is frozen into a solid.

At the beginning of a rain shower there often is an increase in temperature because water vapor is changing into liquid rain drops; and conversely, after the shower when vaporization is increased, there is a lowering of the temperature.

Latent Heats of Evaporation

water	536	calories per gram
ammonia	295	" " "
chlorine	67.4	" " "
oxygen	58	" " "
sulfur	362	" " "
carbon dioxide	72.2	" " "
mercury	62	" " "

Here we have the basis of one of the cooling devices of the human body. Sweat is poured out upon the skin and its evaporation removes the excess heat of the body. Evaporation of water in lakes and streams removes heat from the air above them and also from nearby land. For this reason, islands and peninsulas have freedom from excessive heat, and the freezing of water in winter gives them some heat. The properties of water are well suited to the needs of living things.[6]

Fitness of the Atmosphere

From the foregoing facts we see that not only do living things have needs, but also the remarkable truth is evident that the environment is so formed as to supply those needs. As you know, our air is admirably fitted for living things.

Let us look at what it might be without planning. There is sulfur in soils and in foods such as eggs, but none in the atmosphere except around volcanoes and the chemical works of man. We should be thankful for the absence of the compounds of sulfur such as hydrogen sulfide, the stinking gas of rotten eggs, and sulfur dioxide, a gas used to kill bacteria and insects.

A man in the neighborhood of the writer had a contagious disease and was told to fumigate his clothes when he recovered. He decided to fumigate himself at the same time. Securing a sulfur candle he climbed into a piano box, let the lid down, lighted the candle—but got out faster than he got in.

Is it simply chance that keeps sulfur in the soil instead of the lungs of man?

Consider that important gas, oxygen, which composes about 20 percent of the atmosphere and is essential to the life of man and animals. It could have been possible for all of it to combine with other substances, if there had been no planning in the creation of the earth; it might have combined with hydrogen to form water or with silicon to form sand. Someone may say that it did so and that the oxygen now in the atmosphere came from diatoms and other plants in the ocean. But even so there would be evidence of planning.

Plants were formed with the capability of giving off oxygen, a substance which they liberate; not for their benefit at all, but for the untold benefit of mankind and animals in general. It is hard to escape purpose in accounting for free oxygen.

Carbon dioxide (one part carbon, two parts oxygen) is needed to build roots, stems and leaves, while carbon monoxide (one part carbon, one part oxygen) is a poisonous gas not found in normal air but in exhaust gas from an automobile. Carbon dioxide is a normal constituent of the atmosphere and is breathed out by animals and man, making plant growth possible.

Hydrogen, one of the elements in water, is not found in the free state in the atmosphere. If it were, it would unite with oxygen with a loud noise when a fire is lighted, as has been demonstrated repeatedly in chemical laboratories.

Ammonia is another gas which Wisdom has excluded from the atmosphere.

Planning Cannot Be Ruled Out

Some persons, who will not accept divine planning to account for life, prefer to maintain that a piece of ordinary matter chanced to turn into a living thing. They remark that, given enough time, the improbable occurrence can take place. Then chance made all sorts of types of plants and animals, the adapted ones remaining to the present, the failures becoming extinct.

If such a process had occurred, the fossils which we find would be bizarre types with no relationship to their environment. But far from being misfit creatures of chance, they were of the same types as living things, and can be classified in the phyla of present living creatures. Such hypotheses are clearly *ad hoc;* made to avoid recognition of divine creation.

However, even if natural selection were entirely effective it could not account for the fitness of the environment. Living things and the environment fit together like the pieces of a jig-saw puzzle. Chance might give an earth that would be fit in one respect, but only God himself could plan the earth as it is, or was before the fall of man.

References

[1]Henderson, J. Lawrence. 1913. The fitness of the environment. Beacon Press edition, 1958, Boston, p. v.
[2]Museum of Antiquity, p. 826.
[3]Romans 1:19,20, New English Version.
[4]Butts, R. E. 1970. Wm. Whewell's theory of the scientic method. Review in *Science,* 168:1195, 5 June.
[5]Henderson, *op. cit.,* p. 7.
[6]Regardless of his excellent observations, Henderson did not account for the fitness of the environment. He longed for a mechanistic explanation.