

## God in the Universe

### Introduction

For many today, prayer is like talking with an unplugged phone, for they have no God in their universe.

Yet many of our society's more serious problems are traceable to loss of belief in God and His absolute moral standards.

Many who do believe in God are weakened with doubts and fears that they may be mistaken.

Yet an enormous amount of evidence has been uncovered by recent scientific discoveries which points to the existence of God.

We want to sketch some of this this morning.

### Cosmology

We have evidence for a universe with a beginning, and avoiding this is very difficult.

- (1) Evidence that the universe is expanding and that stars are running down (known since the 1920s and 30s).
- (2) Discovery of the cosmic radio radiation as the remnant of the big-bang (1960s).
- (3) Problems facing the alternative, a big bounce.

We have evidence of design in the relative size of the universe's basic forces:

- (1) A delicate balance of cosmic expansion & gravity:  
$$1/10 \rho_{\text{crit}} < \rho_{\text{now}} < 10 \rho_{\text{crit}}$$

At the Planck time ( $T = 10^{-43}$  sec),  $\rho$  differed from  $\rho_{\text{crit}}$  by less than 1 part in  $10^{60}$  ( $\rho$  = matter density of universe)

  - (1) If  $\rho$  much larger, quick collapse of universe, no life.
  - (2) If  $\rho$  much smaller, quick expansion, no galaxies.
- (2) A delicate balance of forces for element formation: ( $g$  = force strength)
  - (a) If  $g_s$  (strong force) weaker, fewer stable elements.  
If  $g_s$  50% less, Fe C unstable (no elements for life).  
If  $g_s$  5% less, Deuterium would not exist, stars would not burn  
If  $g_s$  a few % larger, diproton would exist,  $p + p \Rightarrow D$  would go by the strong force, stars would burn catastrophically.
  - (b) If  $g_w$  (weak force) much smaller, no supernovas, as neutrinos would not interact with & explode outer shell of star to scatter elements.  
If  $g_w$  much stronger, no supernovas, as neutrinos could not escape core of star to scatter elements.  
Thus if  $g_w$  much different, no heavy elements outside cores of stars.

## Planetology

Earth has the right stuff!

(1) right sun

Life time over 4 billion years (if  $M_* < 1.2 M_{\text{sun}}$ ).

Enough UV for photosynthesis (if  $M_* > 0.8 M_{\text{sun}}$ ).

Single-star system

Not too much luminosity variation (in fact, sun's variation is too large, rising by 25% over past 4 billion years).

(2) right gravity: enough for life, not too much greenhouse  $0.25 > M_{\text{earth}} > 2$ .

(3) right atmosphere, sufficient water, right temperature.

Life zone & problem of runaway greenhouse or runaway glaciation: a very narrow window for survival of life over 4 billion years

(1) If earth 5% nearer sun, runaway greenhouse near beginning of period.

(2) If earth 1% further, runaway glaciation at about 2 billion years.

## Biochemistry

The peculiar properties of carbon, phosphorus, water:

(1) Carbon:

Only element forming chains of almost unlimited length, allowing complex life molecules; 4<sup>th</sup> most common element.

By a strange quirk,  $C^{12}$  is far more common than nuclear physicists might have expected:

Formation in stars: rare three-He collision, but thermal energy in stars is right at  $C^{12}$  resonance! If resonance only 4% higher, almost no C would be formed.

Destruction in stars:  $C + He \Rightarrow O$ , but thermal energy in stars is above  $O^{16}$  resonance, so  $C^{12}$  preserved. If this O-resonance only 1/2 % higher, virtually all  $C \Rightarrow O$  (Hoyle see Davies, *Accidental Universe*, 117-118).

This produces a bottleneck, giving a large abundance of C in the universe.

(2) Phosphorus:

Certain compounds of phosphorus (ATP) can store and release large amounts of energy; only such element; no higher animals without it.

(3) Water:

Very small molecule (molec wt 18 versus  $N_2$  at 28,  $O_2$  at 32), so would expect it to be a gas at room temperature; but it is liquid due to polymerization (2x or 3x), so able to work as liquid in chemical reactions for life processes. But gaseous state is not polymeric, so

behaves as lighter than air gas, not hugging surface to stifle breathing. No other substance has this property.

Universal solvent: carries solid chemicals in blood stream, plant sap and fluid within cell. Other comparable solvents are destructive to living tissue.

High heat capacity: moderates earth's climate, stabilizes body temperature.

Expands on freezing: a very rare property, which prevents ocean freeze-up and aids soil formation.

The problem of suddenness in the fossil record (just mention)

(1) origin of life very sudden

(2) appearance of new forms in the fossil record also quite sudden

### **Conclusions**

God is! See the book by Alan Hayward with this title. See also Paul Davies, *Accidental Universe*.

So, for our prayer breakfast, we can pray with confidence that there is someone out there to hear us.

We must not try to make God to be the way we want him to be, but find out how he really is.