

GOD & SCIENCE

Science is finding God

by Richard Oliver

Of Spare Earths

"We find that we live on an insignificant planet of a humdrum star lost in a galaxy tucked away in some forgotten corner of a universe in which there are far more galaxies than people."

Carl Sagan, Scientist, cosmologist and agnostic.

And that is the view of many. We are just an average planet, one of billions and billions, in an average galaxy. However, as scientific understanding improves we find that belief simply isn't true.

But let's get a couple of things straight first.

The universe is uniform. What works in our Solar System works for all the universe. In other words the same basic laws of science work everywhere. Gravity, the strong or weak nuclear forces, electromagnetic effect, the speed of light plus a group of other basic laws all work everywhere and in the same way as they do for us.

What this infers is that conditions that allow life here on Earth is the required conditions for life anywhere. For example, we can safely say that any planet with life on it must have a sun like ours.

Our sun is a G2 main sequence dwarf star. There are blue giant, red and white dwarfs and several other types of star but only a G2 produces the yellowy green light essential for photosynthesis. And without plant photosynthesis there is no life. So only G2 stars who have planets are able to support life. As only 10% of stars are G2 we know that 90% of stars cannot have planets with life on them.

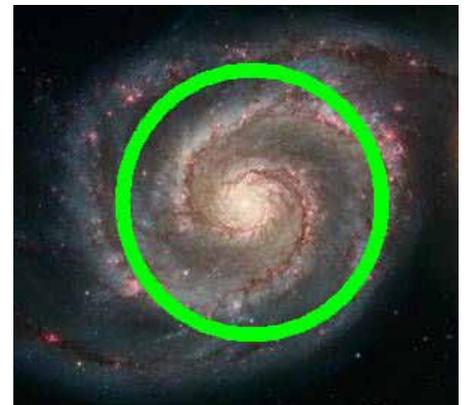
But life needs more. Liquid water is essential for life. And here's the rub. Water vapour is no good nor is solid water, or ice. Water must be liquid. If earth were a little closer to the sun all the water would evaporate. No life. If our world were

a little further away from the sun all water would freeze. Again, no life. Our distance from the sun is crucial. Earth is in the "Gold-

ilocks Zone", not too hot, not too cold, but just right to have liquid water.

Already we have two essential ingredients for an earth like planet. Few other planets have these. but there's more! Our position in the Milky Way galaxy is another example of the Goldilocks zone. If we were closer to the centre of the galaxy then

lighter gases, such as the oxygen in our atmosphere would be stripped from us. If we were further out then there would be far less of the heavier elements necessary for life. Just as our outer planets are only made of gases, and poisonous ones at that, spare earths further from the gal-



actic centre than us are likely to have little, or any, solid form. We are placed "just right" in our galaxy to hang on to our atmosphere and have the necessary heavy elements to make our bodies and allow life.

Our Solar System exists outside of the main spiral arms of our galaxy. We are away from the high levels of light and lethal radiation that is in the galactic centre and even in the galactic arms. Were we there we would never get a dark night and we would be microwaved from all sorts of stars close to us. Life could not survive.

But there's another quirk about our position. We are ideally sited to have dark nights, to see both our own and other galaxies. It's the study of other stars and galaxies that has allowed us to understand much about the universe.

Now why is it that the only known planet with observers on it is ideally placed for observation? Why is it that our far from insignificant planet is placed where human life can see and work out the mysteries of the universe?

It's as if our planet and its position were all planned by a superior intellect.

Hello God!

