THE ADSTOCK SCIENCE CLUB

It's a Spooky World

"There is more to us than meets the eye", well that's how the saying goes, and in most cases this is probably true. If you start looking at us, you and me, in greater detail you will find that our bodies can firstly be differentiated into organs i.e. brain, heart, liver skin etc. On further magnification all these organs are composed of individual cells. Some of these cells are too small to see with the naked eye, whereas others are more visible.

Cells are also composed of a number of parts, the cell membrane, cytoplasm, nucleus, mitochondria etc. We are now definitely into the microscopic world. Cells are probably the smallest entities which you could call "Living", any smaller than this and we sink into the world of molecules which are themselves a combination of atoms, and as far as we know definitely not living.

Up until the early 20th century it was thought that all matter was composed of atoms and that was about as small as one could go: there was nothing smaller. This all changed when it was discovered that atoms were composed of a positively charged nucleus, the proton at the centre with negatively charged particles, electrons orbiting around it. The nucleus of atoms, other than that of hydrogen, was also found to contain uncharged particles called neutrons. Both protons and neutrons were much bigger and "heavier" than the surrounding electrons. The whole atom was seen as a mini solar system.

From the early 20th century onwards, further discoveries were made showing that protons and neutrons were made up of "point particles" called quarks. This and other discoveries led some philosophers and scientists to question our very existence and the nature of reality. You see, when you get down to these minute scales, and further, the everyday world of classical, "Newtonian physics", where apples fall off trees and bounce gently on the grass before coming to rest starts to get a bit weird. We are now in the world of Quantum Mechanics.

In this world there are no certainties, solid matter seems to have evaporated into gossamer woolly entities composed of waves of energy. These particle/waves can disappear and reappear just about anywhere at any time; pass right through what was once thought of as solid objects without the slightest effort; change their appearance from being a particle to a wave, depending on how "we" look at them and in fact be both at the same time. They can also be intertwined (called entangled) with other particle/waves in such a way that anything done to one affects all the others instantly, no matter how far apart they are from each other. Einstein called this "Spooky action at a distance".

All of this tends to fly in the face of our day to day experience. If you think what you see in programs such as Star Trek or the X-Files as strange, all I can say is that if you tried reading some modern books (or should I say E-reader) or magazines such as New Scientist about the latest scientific ideas about the quantum world, you will find things much stranger.

This brings to mind the well-known phrase that "Reality can be stranger than fiction", where the quantum world is concerned, it certainly is.

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