How Small We Really Are !

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How many times have we caught ourselves wondering how big we are! Especially in the light of all the scientific discoveries and inventions that we have made. But let's see how big we really are.

There was a time when nothing seemed bigger than the vast dome over our heads that we call the sky and nothing smaller than the twinkling of the eye. And could anything be more than the number of stars in the sky?

Our response to the question 'How many stars are there in the sky ?" was 'As many as hair on your head!" or sand on the beach. It seemed a perferctly smart response at that time especially as we were not aware of any way that the number of hair or the sand particles on the beach could be counted.

And then one grew up and the answers did not seem as smart as they once did : for one, it was now quite possible to 'count' the number of hairs (all one had to do was to find the average weight of one hair by weighting 20 or 25 strands and dividing it from the total weight); for another, the number was small enough to be dwarfed by other 'big' figures one read about - the population of the world, for instance.

Similarly, the twinkling of an eye was not that small as it once seemed! It was a fraction of a second, no doubt, but what was it as compared to the microsecond that it took for the voice of our cousin to be rushed to us on the wire from the States !

What about the stars in the heavens ? Surely they were countable ! For had they been that many, the sky would have been many times brighter than day light ! For after all stars were just like our sun, only a little more distant and if there were too many of them the night sky could not really be dark.

The sky is dark not because the number of stars is limited, but because they are spread out in increasing depth from us. And, more important, they are all running away from us with speeds which increase as the distance from us increases.

Let us see what is the order of this distance.

I still remeber an H.G. Wells story about a boy dreaming on the meadow that he was soaring up and up towards the heavens. Soon the earth is but a rotating globe...and then nothing but a small satellite of the now seeming massive sun with the moon nothing but a small dot orbiting the earth. Soon even the sun itself is dwarfed by the solar system.

The boy soars further and further up till he is a part of Milky Way galaxy, with the solar system hardly disernible in the trillions of such brighter suns...but for all their brilliance still barely able to light up the even more vast dark and empty spaces in between. Soon even the Milky Way galaxy becomes but a small speck as the boy soars past the trillions of such galaxies and galaxy clusters. Still he soars up...through the dark and mostly empty spaces till he reaches...well...what seems to be the end.

And here he sees one Hand wearing a small ring in its index finger. And in the ring he gazes in awe at the wonder of the entire creation.

Had this boy been born in India, instead of gazing into the stone of the open ring he would have been looking, like Mother Yashoda, into the open mouth of the child Krishna.

Well, is 'big' only as big as the mouth of the Lord or the size of the ring of the Creator ? Well, maybe...but most probably not.

Many discoveries that the scientists have made have made them wonder if ours is the only universe : look at it any way, there must be another universe. May be one, may be many more. But our universe cannot be the only one. If that be so, then our creation is one of man...may be one of an endless series. In fact that is what some ancient cosmogonies would have us believe. If that indeed be so...how big is 'big'!

Let's look at it another way, we know that the present universe started with the Big Bang some 15 billion years back; that would make its radius now 15 billion light years. That's big but not that big; at least we can put it understandable language. Is that really so ?

But let's analyze our statement a bit more, 15 billions is 15 followed by nine zeros. But what is a light year ? That is the distance traveled by light in a year. How much is that?

Light travels 300,000 kilometers in one second. And there are 60 seconds in a minute, 60 minutes in an hour, 24 hours in a day and 365 days in the year: that makes one light year equal to 9,460,800,000,000 kilometers ! And 15 billion is 15,000,000,000 ! The edge of the universe is 141,912,000,000,000,000,000 kilometers away ! And that is the case if there is only one universe !

Well, big seems to be really big but what about small ? Surely there is a limit there. For a long time it was believed that the measure of 'smallness' was the atom. The atom was so small indeed that it existed only in the scientist's minds or in their mathematics: even the most powerful electron microscope cannot make them visible. And that is the case even today. There would be many trillion trillion trillions of these in Cash gram of any substance.

But is that as far as small will go ? The first shock came when it was found that the atom was not indestructible; it consisted of a nucelus of protons and neutrons and many orbiting electrons. These were thousands of times smaller than the atom. But was that the limit? No. Take the elementary particles: exotically named particles like muons, photons. They have given a new dimensions to 'small'; but is that the end? Other candidates wait in the wings: neutrinos, gravitons. These latter will give a new meaning to the term 'particle' since though they occupy space and exert 'force' they have no mass !

Science hates absolutes but seems to be veering towards them: Absolute zero for 'small' and infinity for 'big'! Science hates these absolutes because this is where the laws of physics break down and the so called 'singularities' occur.

It is for this very reaon that artists, poets and swamis love them: no longer the confining effect of laws and principles to chain the mind; no longer the didactic confinement to the imagination allowing the mind to soar free and high. Like that of the boy in the meadow.

The poets and artists have known this for a long time though the scientist has allowed himself to be surprised by this 'revelation'.

I wonder what T.S. Eliot would have thought had he realized that when he cried : The world ends not with a bang but with a whimper' he was not merely making a poetic exclamation of delight and wonder but also a truly scientific statement !

For the universe which began with the Big Bang is destined to die an undistinguished and quiet whimpering death.

The gap between reality as perceived by artists and poets and the one arrived at analytically by the mathematician and scientist could not possibly be smaller than what it actually is now. Whether it is because of the greater interaction between the two or because the scientist has himself turned artist and poet (both these statements are to some extent true) is difficult to say. But the fact is that the gap is narrowing; and soon may disappear altogether.

This is not going to be a bad thing at all.