

## Insight

## Nanotechnology

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**“I don’t give them hell. I just tell the truth and they think it is hell.”**

**Harry S Truman**

Nanotechnology is a method primarily of molecular manufacturing, for the creation of tools, materials and machines that might eventually enable us to “snap together the fundamental building blocks of Nature easily, inexpensively, and in most ways permitted by the Laws of Physics”. Nobel Laureate physicist Feynman gave a talk in 1959 titled “there is plenty of room at the bottom.” The outside world thinks that nanotechnology started after that, but the truth is otherwise and an attempt at giving the reader the true story is the aim of this article. One of the brilliant Indian scientists, who is now the Evan Pugh Professor of Solid State and Emeritus Professor at the Pennsylvania State University, Rustom Roy, is the real pioneering father of nanotechnology. Even at his age he has the enthusiasm of youth and continues to do research with the same passion. He has a vision but he couples it with his passion. Vision plus passion is the best combination for innovation in science.

I have a special soft corner for this great scientist, who according to my information was nominated to the Nobel several times (I could be wrong) but, did not make it. His plight reminds me of what the War time British Prime Minister, Winston Churchill once said: “It is better to deserve than to get.” How true? The world works that way. Socrates did feel that this world is very queer. Plato, his arch disciple, writing in his monumental book *The Republic*, has this to say about his teacher. Socrates tried his level best to change the scenario but to no avail. He even risked his life in Greece of those days by telling the truth. “Justice was injustice there at that time. (I think even now all over) Justice was the convenience of the powerful. It is power that runs the world even now in the “so called” civilized world. People want money-power

by hook or crook and then acquire political power to run the world. If that does not succeed some of them try the power of religion, an opiate of the masses, to get power. Power, one must have to have a big reputation. Reputation is what the world thinks of one but character is what one is when no one is looking. Science should aim at character building and not reputation.

You might wonder why this introduction. This is only to show that science is no exception to the above rule. There are great scientists and genuine scientists. It is difficult for the lay people to judge them as science is still shrouded in mystery and people venerate scientists. Most of them are also after power. Science is what the scientists do. Given the present gross exaggerations associated with the halo-word nano, I must confess that it was Rustom Roy in the early 50s, working as a chemist and now for well over sixty years, has worked with ions, atoms or molecules-all genuinely nano. By 1950 he had designed the sol-gel process, still the most used route to produce, relatively effortlessly, nanoparticles of myriad compositions. Using this route he and his team started to make genuine nanocomposites by the late eighties. By 1991 he convened a Symposium on Nanoscience and Technology at the Materials Research Society. “The idea caught on; the saleability of a euphonious slightly mysterious term became caught up in the corridors of Science Funding and the rest is (bad) history” he says with nostalgia. To-day “nanotechnology” is a PR bonanza for a subset of science. It is focus of attention on “nano,” the very small, which had NEVER been neglected by chemists or biologists. Regrettably it causes the neglect of many other fields closer to society’s needs - health of the masses, the environment, employment etc - which are at the Giga end of the spectrum.” opines Rustom Roy in one of his pensive moods. That bares his heart.

In matters of inorganic chemistry and social activism Rustom was probably Linus Pauling’s closest disciple. By chance he also worked with

both Ivan Illich (of Medical Nemesis fame) and Norman Cousins, and was well schooled in the failures of conventional high-tech medicine. That is why he is so close to my heart. After my cardiology training in London and Harvard, at a young age, I too was also similarly disappointed to know the real world of medical sciences in the conventional sense. But I am too small a person to be compared to Rustom- it is that our real education started alike. Conventional medical schools come in the way of our education, anyway. One has to unlearn to relearn, after quitting medical school, if one wants to be a humane physician.

Those fortuitous connections are what started Rustom Roy down the path of a scientific appraisal of the field. Moreover, as an experimental scientist - (Penn State's Materials Research Laboratory, which he founded was ranked #1 in the world, by ISI strictly on the strength of its Faraday like empirical experiment-based advances) - Rustom Roy immediately grasped the value of masses of empirical data contained in long traditions of healing. His Indian ethnicity might have programmed him to think on those lines. Being a conscientious scientist, Rustom knew who he was and why he is here on this planet. Indian culture says that man is here for the common good of others. *Paropakaraartham idam shareeram*. And, most important of all, Rustom had his continuous, very successful research in the hard sciences not dependent on the medical establishment he was soon criticizing.

Rustom Roy put together an unusual seminar during the week ending 14<sup>th</sup> through 17<sup>th</sup> of April 2005 in Washington DC. I was given the opportunity to deliver a plenary talk on the *Clinician's view of Whole Person healing* - the theme of the seminar. More about this conference in the next issue. For now let me complete by saying why I have written this piece. I met a conventional clinician while in Washington and he was telling me: "When, at a time, medical science has come to molecular bio-technology and genetic engineering, people like you still dabble in this non-sense!" I pity that person as he is still in his own make believe world.

When Ian Wilmut, at the Rosalind Institute in Edinburgh, succeeded in producing the first "Dolly", I had the temerity to write to *The Lancet* that we can never clone a real human being, as man is not just his/her phenotype. One could clone a look alike but not the real replica in totality. One could never make another Mahatma Gandhi or Adolph Hitler, but always make a very good look alike. The consciousness depends on the environment for every one of us. The whole is a whole and might not be the sum total of the bits. If a bit is broken from the whole, the bit might act like a whole and the remaining whole becomes complete whole again. Reductionism does not work in a dynamic human body. I had also predicted that "Dolly," the baby, is chronologically as old as the mother when she was born (made). I had also warned that she will have precocious old age diseases.

When the truth came out they were looking for my article sent to them which they did not publish at the time it was sent. It was published elsewhere! Now that a great scientist like Rustom Roy gives credibility to this idea I think it will be more acceptable. Let us come out of our delusion that genetic engineering would solve our problems. There are so many imponderables in human physiology that one could never predict time evolution in human beings and hope that the slight changes that we have the power to make in the initial state (like surgery in healthy people and genetically engineered molecules introduced into the body) using our hi-tech stuff would do what it is intended to do, as time evolves. On the contrary, they might harm (they have) as time evolves through the "butterfly effect" of Edward Lorenz. Long live mankind on this planet in spite of reductionist science. Man has lived for millions of years without the ravages of reductionism and has not been extinct like the Dinosaurs. After all, the present avatar of quick fixes in modern medicine has been there for less than quarter of a Century!

**"There can be no happiness if the things we believe in are different from the things we do."**

**Freya Stark.**