Hype, Hype, Hurray

The Scientist in the Marketplace

By J V NARLIKAR

IN 1684, Edmund Halley (the astronomer who has a comet named after him) visited Isaac Newton in his rooms at Trinity College, Cambridge and during a casual conversation asked if he knew what orbit a planet would follow if it were attracted by the Sun with a force that followed the inverse square law of distance. It will be an ellipse, replied Sir Isaac immediately. Now this was a momentous statement, for it contained the resolution of the way planets move around the Sun as observed and quantified by Kepler some six decades earlier. So Halley asked Newton how he knew this. And Newton replied that he had calculated it. In the next couple of years, Halley worked on Newton to publish his seminal work in the form of a book. The book *Principia* which Newton wrote, forms the foundation stone for modern physics.

Newton had been working on these problems since his *Anni Mirabiles*, the years 1664-67, when he had moved to his native Woolsthorpe, to avoid the plague epidemic. The many brilliant ideas he had in those years provided him with food for thought in later life. Yet more than two decades had to elapse before his works could be made public. Even granted that Newton's was a taciturn nature, this long gap reflects on the scientific ethos of those times when there was no rush to publish one's results.

Multinational Kitty

In the post-World War II era, things began to change as scientific research got into a higher gear. After the success of the Manhattan project, the perception of scientific research changed with greater stress on organised mission-driven research. The rising costs called for more funds for expensive experimental facilities. These facilities, whether a particle accelerator or a space borne telescope, may cost millions to billions of dollars, with financial support coming from national governments and private funding agencies. Where does that leave today's scientist?

Pretty much at the mercy of grants. For this to work, the granting agency must have adequate funds from the national or multinational kitty. While the peer reviews involve the scientific community, the sources of funds are under political control. For example, the US Congress will determine the total funds available to NASA or the NSF. And with demands always exceeding available funds, the funding agencies have to demonstrate to the lawmakers (or to the trustees of any private foundation), that they have an excellent record of achievement, that the funds disbursed by them in the past have led to excellent science.

So far so good. That there should be credibility to begin with and accountability at the end of a funded proposal, nobody would deny. But the system has increasingly led scientists to hype their achievements so as to impress those who control the purse strings.

The Black Hole

Take a few recent examples. In 1992, when the COBE satellite launched by NASA discovered very tiny fluctuations in the background of radiation in microwaves that pervades the cosmos, the finding was greatly hyped. Said the leader of the team: "If you are a religious person, it is like seeing the face of God". A big bang theoretician exclaimed that they had found the Holy Grail of Cosmology. Now we need to see these ecstatic reactions in the proper context. Radiation backgrounds exist at other wavelengths also and they show fluctuations too. However, the big bang cosmologists wish to relate the fluctuations of the microwave background to the formation of galaxies in the universe, and for this they needed to show that radiation also has ups and downs of intensity. But till 1992, all studies of the microwave background showed extreme homogeneity. Which is why big bang cosmologists breathed a sigh of relief when the COBE data did find inhomogeneities, albeit on a very tiny scale.

In short, what was discovered in 1992 was not a proof of the big bang theory, as was variously claimed, but a result that could at best be consistent with some theoretician's pet model of how galaxies formed.

The urge to be more exotic than reality warrants is also seen in the now regular announcements of finding black holes in the centres of galaxies. A black hole is believed to form when a very massive object shrinks and collapses to a very small size under its own gravitational field. Technically it is a body that holds in its light by its gravity, so that it is invisible to the external observer. How then does one claim to have detected a black hole? The evidence claimed is indirect, from the observations of the environment of the the centre of the galaxy which shows an increased dynamical activity.

What is often forgotten in the euphoria behind these claims is that for an external observer, the time taken by the shrinking object to reach the black hole stage is infinite. That is, no external observer can ever claim to have found a black hole, either directly or indirectly.

Lest you think that only astronomers engage in hype, consider the recent news releases from leading labs in high energy particle physics. CERN, Geneva, and the Brookhaven National Labs in New York, claim to have recreated the first few moments of the universe. We are told that these experiments tell us what the universe was like in the first millisecond (thousandth part of a second) after creation. Hype apart, scientists have achieved a state when very high energy subatomic particles, like the familiar neutrons and protons that we are made of, break into their constituents called 'quarks' along with their binding agents called 'gluons'. It is indeed a remarkable achievement in particle physics and it would have been more appropriate to have highlighted just that. From there to the early universe is speculation. Nobody has seen, nor can ever see what the early big bang universe was like, since the theory itself tells us that those epochs are unobservable.

Tomorrow's Fact

What is wrong with a bit of advertising, exaggeration and self-promotion you may ask. Are we not living in an era dominated by commercials selling a product? In any case, doesn't a noble and intellectual pursuit like science deserve to be presented as boldly and widely as media would permit?

This is where I beg to disagree. The hallmark of science is its objectivity, its factualness, and its ever-present questioning attitude. When a scientist sees a spade, he should call it as spade and not mix it up with the garden that the spade will be used to create. The scientist is expected to clearly state what are facts and what are speculations. Speculations are also needed in science, and it may well happen that today's speculation becomes tomorrow's fact. But today that speculation is a speculation and must be presented as such.

