Going Back in Time

Science and Technology in Epics

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HOW much hi-tech and science did our forefathers really know? On the one hand, there are emphatic claims that they knew everything that modern science has taught us today and will teach us in the years to come. On the other, there are sceptics who would associate the dawn of science and technology with the West, dating back no more than a few centuries and would thus deny any knowledge to oriental ancients.

The arguments "for" fall into three categories. The first line of argument takes us to our *puranas* and the epics. In the *Ramayana*, we have the *Pushpaka Vimana* which clearly establishes the existence of helicopters and aeroplanes. What better example of a laser-guided missile than the *Shakti* with which Karna killed Ghatotkacha in the *Mahabharata*? And the instant beaming of a living body across vast distances that you see in the futuristic Star Trek was routinely practised by our *devas* and *rishis*.

The next line of argument invokes ancient works like the *Brihad Vimanashastra* which describes different flying vehicles and methods of constructing them. Then there are interpretations of the *Vedic Richas* to show that they contain details of the nuclear fusion that powers the Sun. There is Vedic mathematics which is claimed to contain advanced mathematical concepts and methods. It has often been said that the philosophers of the Vedic and later times knew about quantum mechanics, gauge theory, unified field theory and so on which the theoretical physicists of today are grappling with.

Third Argument

The third argument brings forth examples of old tests like the *Vedanga Jyotisha* attributed to Lagadha which has astronomical discussions relating to the solar system, the *Shalbha Sutra* containing geometrical ideas, and the *Charaka* and *Sushruta Samhitas* which contain ideas on medicine and surgery. Surely these demonstrate that some science was known and practised in the ancient times.

You don't need a lawyer to tell you that a case is weakened if some of its arguments are demonstrably refutable or are basically ill-formulated. The first two lines of arguments given above fall in this category.

Thus to convince a scientist it is not sufficient to refer to descriptions of the epics and *puranas*. Absorbing and imaginative though they are, they are a far cry from what constitutes a technical manual. Imagine that thousands of years later our descendants recover a cassette of *Star Trek* from an archaeological excavation and manage to view it. Are they justified in concluding on the basis of what they see that we ourselves were in possession of the kind of technology shown there? Therefore, we can credit our ancients with giant leaps of imagination to have produced those works... but no more.

For, if we treat these descriptions as of reality then we run into trouble. In our epics and *puranas* we see no description of electrical power that is the first significant step of high technology. Why do we find no reference to even the capital cities of Dasharatha or Dhritarashtra enjoying this amenity? Remember that of the four fundamental forces of nature the electrical one has the largest variety of manifestations in nature and should be the first one to be extensively studied, understood and applied.

Basic Framework

I had studied the *Brihad Vimanashastra* and failed to find in it a technical description of aeronautics. For example, a *shastra* should contain a basic framework of rules governing flying objects which then gets translated into technical reality. Basic principles of flying like what is today known as Bernoulli's theorem, the idea of life and streamlines should be described. Even assuming that the ancients somehow bypassed these basics through some yogic insight not available to the modern scientist, the actual description of construction is also vague and certainly cannot be used for making a real aircraft.

Much is made of Vedic mathematics. Leaving aside the claims and counterclaims about its adjective, "Vedic," let us look at the mathematics part. If it is looked upon as a system of carrying out quick numerical manipulation it has its merits. But as any mathematician of distinction will tell you, that does not constitute advanced mathematics.

I love Sanskrit as a language and have enjoyed reading its classics. But its very versatility proves a stumbling block in interpreting ancient descriptions and with Vedic Sanskrit (which I confess, I cannot readily follow) the problem of interpretation is even more tricky. It is easy for the interpreter to read into a statement the meaning he or she wishes to read. This probably explains the *post facto* nature of interpretations: only after modern science makes a discovery do claims appear that it is contained in such and such ancient tome. In many cases, the antiquity of the statement may also be questionable in the sense that later writers inserted their own ideas into the old works. Simply because a statement appears in Sanskrit does not mean it is ancient!

Arguments in the third category, however, are worth taking note of and deserve further scholarly studies. For, they are clearly documented, can be interpreted without "personal" ambiguities and do tell us that our ancient civilisation did have thinkers and experimenters of high quality. Thus Lagadha should be studied with as much care as his (much) later descendants like Aryabhata (fifth century A.D.) and Bhaskara (12th century A.D.) The works ascribed to Sushruta and Charaka, unlike the speculations described above, are experimentally testable. The legacy of *yoga* as a discipline of mind and body is indisputable.

Our old texts are often examined for astronomical events like eclipses, comets and conjunctions. Another useful and hitherto unexplored line of investigation is supernovae. A supernova is an exploding star: an event which can be spectacular if it takes place in our galaxy. The Chinese and Japanese astronomers have recorded an event that was seen on July 4, 1054, when the exploding star brightened so much as to be visible in daylight. Surely a spectacular event like that would not have gone unnoticed on our sub-continent. With the glorious tradition from Aryabhatta to Bhaskara continuing at that time it is worth looking for records wherever they may be. A finding will be of enormous importance to astronomical archives.

Precise Rules

Let me end with an example from social sciences. In his book, *Labour Management* the late R.G. Rajwade has an appendix on *Shukra Neeti* written mostly in the Gupta period. Shukra had laid down precise rules for the employee and the employer, spelling out details on the types of wages, periods of payment, grades of employment, fair wages, industrial disputes, leave rules, sickness benefits, pension, provident fund and family allowance, bonus, etc. For example, Shukra recommends that an employee who has served for 40 years should be paid a pension equal to half his wages throughout his life. For bonus he recommends one-eighth of the employee's salary.

I mention this example to illustrate the fact that our ancients could be precise when they chose to be so. Let us stress examples of precision which is the hallmark of science rather than ambiguous personalised interpretations of what they said. Only then will we do justice to the achievements of our ancients.