

‘Unlike medieval Europe, India’s intellectual climate was free and tolerant’

French-born academic Michel Danino is a specialist on Indian history and science, and currently a guest professor at IIT Gandhinagar. Speaking with Seema Kamdar, Danino discussed achievements of ancient Indian civilisation, why these didn’t produce crucial modern research – and whether ancient Indians also knew how to fly planes:

■ Amidst current debates over ancient India’s accomplishments, what were some key scientific breakthroughs?

Well, Indians made major contributions to a vast number of fields, especially mathematics, astronomy, metallurgy, alchemy, medicine and agriculture. India’s water harvesting and management techniques are something we can still learn from. Metallurgical advancements, like the corrosion-resistant iron pillar in Delhi’s Qutub complex, were other achievements. There were texts on sustainable agriculture – today, we talk of organic farming but it was practised widely.

Fields Medal awardee Manjul Bhargava recently said much of pre-modern mathematics has foundations in India. The 8th to 6th century Shulbasutras knew the Pythagoras theorem. Modern Arabic numerals originated in India. The decimal place-value numeral system evolved in India around the 3rd or 4th century AD.

Aryabhata conceived the earth as a rotating sphere in space, which causes the apparent rising and setting of the sun. Varahamihira disagreed and Brahmagupta derided Aryabhata – but unlike medieval Europe, the intellectual climate in

India was free and tolerant of dissent.

Centuries ahead of Europe, Brahmagupta envisaged mathematical infinity and proposed that zero and infinity are mutually inverse notions. In fact, the concept of infinity underlies much of Indian science – also the infinitesimal.

Many of those techniques of algebra and astronomy travelled to Persia and Arabia. Some went to medieval Europe. Overall, texts suggest the flow of mathematics was much more out of India than into it.

■ But why didn’t Indian science mature into path-breaking modern science?

Well, there were many complex factors at play – the destruction of centres of learning from the 11th century onward led to a fragmentation of the scientific community.

Also, there was a relative lack of royal patronage to science. And there was a lack of desire to expand beyond India’s borders through conquests – let’s not forget that colonialism in Europe was a prime engine for science and technological progress.

■ Speaking of technology, is there evidence to indicate ancient Indians knew how to make planes?

No – although ancient India did have the concept of flying machines. Vimanas are mentioned in the Ramayana and other texts, leading enthusiasts to confuse conceptualisation with implementation.

Greek mythology mentioned a winged stallion, Pegasus, but there was no such animal. Like the vimana, this reflects an aspiration to fly, nothing more.

■ There’s debate over teaching Indian schoolchildren Sanskrit today – your take?

Students should certainly be exposed to India’s knowledge systems, at least to major accomplishments – why should they not know, for example, that the decimal notation of numbers the world uses is of Indian origin?

The University of St Andrews in Scotland has an extensive repository on mathematicians of India – no Indian university offers any data.

However, there are reliable translations of original texts. So, knowledge of Sanskrit isn’t necessary to introduce students to the field. Of course, it’s indispensable for the serious researcher.

Q&A

