Delhi iron pillar and its relevance to modern technology

Often, the relevance of studies conducted on ancient Indian science and technology is questioned because no direct applications can apparently be envisaged by the revival of ancient Indian technologies in the modern context. However, studies on ancient Indian science can open new lines of thinking which may prove beneficial, if applied appropriately, in modern times. In this letter, we present a new idea for the possible application of the scientific and technical knowledge that we have accumulated on the historically, culturally and scientifically significant Delhi iron pillar.

We begin by noting certain basic facts about modern iron and steel-making technology. The technologies dealing with both the extraction of metal from the ore in the blast furnace and its conversion to steel, are highly environmentally unfriendly. The emission of greenhouse gases and their role in causing deleterious climatic changes have been well documented. Therefore, there is an urgent need to adopt iron-making technologies that do not emit significant amount of greenhouse gases. The main culprit is, of course, coking coal used for extraction of iron. Interestingly, all the major coke oven batteries in existing iron and steel plants around the world are due for significant replacement in the very near future. The huge investment required for this activity has provided an opportunity to look afresh at the entire iron and steel making operations, in general. In this regard, the direct reduction process of iron making, which was in vogue in ancient India, may be relevant to solve the environmental pollution problem, especially if a clean reductant like hydrogen can be used for the reduction of the ore to metal. The iron produced from the direct reduction processes can be utilized for several large-scale applications. One important application is the production of corrosion-resistant iron. The specific environment in which corrosion resistance needs to be enhanced is atmospheric exposure. Huge investments are being currently made to prevent and control the atmospheric corrosion of iron objects. The Delhi iron pillar reveals that phosphoric irons would offer excellent resistance to atmospheric corrosion3. Therefore, production of phosphorus-rich iron from the output of direct reduction furnaces would be a major step that needs to be debated. In this regard, the relevance of puddling technology must be emphasized. In the puddling process, the interstitials (carbon, phosphorus, etc.) are reduced by reacting with iron oxides in the puddling furnace and the operation is carried out in solid state. The puddling process of manufacturing wrought iron, which has almost died, could be revived so that phosphoric iron can be produced in large quantities. Additionally, the slag composition can be controlled to allow higher P retention in iron. This can be easily achieved by minimizing limestone charge in the puddling furnace. This would also reduce the environmental pollution problems associated with limestone mining. The end product of the puddling furnace is phosphoric iron, which would be corrosion resistant in atmospheric exposure conditions. Moreover, the entrapped slag inclusions...
Recent findings on the Acheulian of Isampur excavations and its dating

Paddayya et al. claim discovery of ‘the oldest known (stone age) site in India’ at Isampur, which is dated over a million year. Earlier, Mishra et al. had claimed the site at Bori, near Pune, to be the earliest and 0.67 Ma old. Dating of these Acheulian sites is suspect.

The Acheulian site at Isampur (16°30′N: 76°29′E) is set in a 20–30 cm thick calcareous silt above the Bhima Group limestone. Fragmentary vertebrate remains associated with the Acheulian tools have not been identified to specific levels and contain no Middle Pleistocene forms. Based on fresh condition of the artefacts, their occurrence at the raw material source, and the recovery of a large number of small-sized debitage fragments, the assemblage is assumed to have virtually escaped erosion and reworking before being buried under colluvially deposited silt. Under such a setting, cultural elements and vertebrate remains lying on the limestone floor may belong to more than one age and get mixed up. This is corroborated by wide range of 260Th/234U radiometric dates on dental material from the Acheulian sites in the Hunsj and Baihbal valleys, which ranges in age from 174 to 350 ka. Such dating was not attempted on Isampur site, but electron spin resonance (ESR) dating was done on two fossil teeth. The early U (LU) uptake (EU) ages set the minimum age for the site at 730 ± 100 ka, while the recent uptake (RU) ages set its maximum possible age at 3.12 ± 0.40 Ma with a mean age of 1.27 ± 0.17 Ma assuming linear U (LU) uptake. ‘Considering the technological and typological features’ the Isampur assemblage was assigned much older age (0.5–0.6 Ma) than the nearby sites. Its age was increased two fold further and the older average ESR age 1.27 Ma was chosen without any additional reason. The inference that the Isampur site is the oldest Lower Palaeolithic site in the subcontinent is thus not convincing. The absence of any Mid-Lower Pleistocene faunal elements is also noteworthy.

Earlier, the Acheulian site at Bori was claimed to be the oldest from the Peninsular India, which was also strongly contended. Highly discrepant radiometric ages (K–Ar, Ar–Ar, fission-track, TL) were obtained from a differ-