

GLASS IN INDIA

How can one test the thesis that glass was a necessary, if not sufficient, cause of the explosion in reliable knowledge in western Eur-Asia? One method is to compare what happened in the two halves of Eur-Asia. This is not, one should stress, conclusive. One can plausibly argue that if one could find a case (for example India, China or Japan) where the kind of growth in reliable knowledge we have found in western Europe occurred in a civilization where glass was little used, then it would disprove the hypothesis that glass was a necessary condition for the development of 'science'. On the other hand, if India, China or Japan do not have that expansion of reliable knowledge, it might still be the result of other things than the absence of glass. Glass can never be other than one of a number of necessary causes, and never sufficient in itself. Hunter-gatherers do not lack science because they lack glass.

Nevertheless, it is still useful to create a sort of control study by looking not only at other cases, but also to look at what happened when glass and non-glass worlds collided, as they did when Europe expanded all over Asia in the seventeenth century.

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Starting with the area closest to western Eur-Asia, the history of glass in India is particularly interesting. Here was a vast and sophisticated continent which excelled in many technical processes over the ages, in iron and pottery, in weaving and spinning, in woodwork and basketwork. It was situated adjacent to the area where glass was first developed (Persia and the Middle East generally) and was in constant trade relations with that area. If there is something inevitable about the progress of this technology, we might well have expected glass manufacture to have blossomed in India. What then can we learn about its history?

The situation in the several thousand years before the birth of Christ suggests a widespread knowledge of glass, but its use was mainly for decoration. The Harappans (??? dates) made glass beads and bangles, ear ornaments, seals, glass discs. As Singh summarizes this period, 'the most popular articles were confined to beads and bangles as compared to the sites of the old world, which show great profusion in use of glass vessels, decorations and utilitarian objects'.¹ The knowledge and technology were there, but 'it must be admitted that Indian Glass technology does not compare favourably with contemporary cultures of the outside world.'² Nevertheless it is worth noting that Pliny states (**Nat.Hist.** xxxvi.26.66) that no glass was to be compared to the Indian, and gives as a reason that it was made from broken crystal... We have, however, very little knowledge of Indian glass of any considerable antiquity.³

¹ Singh, *Ancient*, 215

² Singh, ***Ancient***, 219

³ *Enc. Brit.*, 105

There seems to have been a surge in the making and use of glass in the period from about the birth of Christ to the fifth century. Dikshit writes that 'the early centuries of the Christian era have been the most affluent period for the spread of glassware in India.'⁴ He claims that glass 'became an article of common use'. Traces of both indigenous glass manufacture in India, 'finger rings, Intaglios, lenses, glass-disks and other objects' have been found. ⁵ Foreign glass objects, including wine glasses were being imported and it is clear that the revolutionary technique of blowing glass was known in India. At this point it looked as if India was moving in the same direction as the lands to the west. Yet the industry then faded away for over a thousand years. From the golden period of the Guptas, from about 450 A.D., 'the glass industry in India had declined to such an extent that it would not be far wrong to estimate that glass was not valued and was little cared for.'⁶ Dikshit describes this as a dark age when only a few bangles and glazed bowls were made. In the Bahmani Period (1435-1518), there was a small revival, with 'layered glass bangles, beads of composite glass and a few fragments of bowls' being found through the Deccan. Yet when we compare this, for instance, to what had by now happened in Europe, we notice the conspicuous absence of windows, mirrors, lenses, spectacles and widespread use glass for drinking vessels. As other authors put it 'In India, apart from beads and a few other small objects which appeared from the fifth century BC, there is not much evidence for glass or its manufacture until the Mughal period (1526-1857).'⁷

In the Mughal period, Persian craftsmen were brought to court and glass was manufactured. Clear glass was uncommon, the glass being usually of a deep copper blue, and ornamented with flowers and other decorations. Hukkah bowls ('hubble bubble') were decorated with glass and some bowls and spittoons of glass were made. By a curious twist, while glass began to be used for mirrors, it was used on the **back** of a metal mirror as decoration (usually green or light brown in imitation of jade).(quote?)⁸

Another account of what happened over the Mughal period is as follows. 'During the Mughal period (1526-1857), glass was widely used by the imperial family and the nobility... The **A'in-i Akbari**, compiled in 1596-7, notes the manufacture of glass in Bihar and near the Mughal capital at Agra. Later sources mention factories outside the Mughal Empire, in Gujarat and other parts of western India. Most of the surviving Mughal glass, however, dates from between the late seventeenth century and the mid nineteenth century.' The eighteenth century objects 'include **huqqa** bases and glasses made in imitation of imported Dutch gin bottles.... A completely different type of glass was produced at Kapadvanj, near Ahmadabad in Gujarat. It consists of blue, green, brown and purple sprinklers, tumblers and spouted vessels. Production

⁴ Dikshit, **Glass**, 25

⁵ Dikshit, **Glass**, 31; it should be noted that the lenses were of blue glass and not for magnification etc. p.33) An intaglio is an engraving with a sunk pattern or design.

⁶ Dikshit, **Glass**, 59

⁷ Klein and Lloyd, **Glass**, 45

⁸ Dikshit, **Glass**, 103

ceased in the nineteenth century, when English lead glass captured the local market.⁹

The divergent development of India when compared to western Europe could be seen as the impact of the expanding Portuguese and British traders began to be felt. Spectacles of glass begin to be found from the first quarter of the sixteenth century, and there is a great deal of evidence of the import of spectacles by the East India Company from the early seventeenth century. The correspondence of this company 'shows that foreign glass, especially large looking glasses, spectacles etc. were in large demand in India'.¹⁰ Dutch bottles for rose water, gin, ink and so on are also now widespread. Imported glass seems to have been quite widely used, but it is difficult to know how much native production there was even in this period. Certainly by the later eighteenth century, there are interesting descriptions of native glass kilns, such as that described by Buchanan near Mysore.¹¹ In the nineteenth century there was quite a large indigenous glass industry, though it seems that the main products were bangles and vessels and little evidence is to be found of the making of mirrors, window panes, spectacles, lenses etc. Thus Dikshit concludes that 'It must be admitted that the Indian glass industry did not go much beyond the manufacture of bangles and some small objects.'¹²

The quality of Indian glass was also a problem during this period. We are told that 'Indian glass is usually full of impurities and extremely light in weight'. This had various consequences. 'The poor translucency of Indian glass led to a constant demand for superior foreign imports, and in the eighteenth century English lead glass was particularly favoured, though the Dutch also had a flourishing Indian trade. By the nineteenth century the indigenous industry had almost collapsed in favour of foreign imports.'¹³

The puzzle is this. As Dikshit writes 'The industry did not realize the fruits of the invention of glass blowing and the revolution it brought about elsewhere' even though 'Indians had a full knowledge of the different processes of blowing glass'.¹⁴ Several contributory factors have been suggested by historians of the subject. One concerns the materials for glass. Singh suggests that 'Probably there was a limiting factor in the mass production of glasses. This was precisely the shortage of natron, natural alkali, in India which did not allow this industry to expand.'¹⁵ This may be important, but if other factors had been propitious one suspects that, given the widespread cottage industry of the nineteenth century, this obstacle could have been overcome. Likewise another difficulty which is not mentioned, the huge consumption of wood

⁹Sotheby's Encycl. p.65

¹⁰ Dikshit, **Glass**, 104

¹¹ Dikshit, **Glass**, 127 - with pictures.

¹² Dikshit, **Glass**, 147

¹³Glass, ed. Liefkes, 104

¹⁴ Dikshit, **Glass**, 148

¹⁵Singh, **Ancient**, 219

needed to make glass, might again have been overcome. Certainly in the early period India had vast forest reserves.

Dikshit puts forward two other interrelated causes for the slow development of glass. One was the low position of glass makers. As with all those who turn nature into culture (blacksmiths, tailors, leather-workers etc.), glass makers were relegated to the bottom of the caste system. Thus glass making would not attract educated or wealthy people, unlike in Europe where glass-making was a reasonably prestigious occupation. Somehow this was also linked to social snobbery and religious restrictions. Although the statement is vague, we are told that 'Another obstacle in the industry was the general dislike for glass itself which was not counted among articles to be used by the rich and sophisticated. Though there was no ban on using glass articles, according to religious texts, traditionally these were held in contempt and this often restricted their use.'¹⁶ Perhaps one could even see how glass is thought of today. Certainly it does seem to be the case that the main use of glass was to try to imitate something else - jade and precious stones, china and porcelain and so on. It does not seem to have been valued for itself.

If we take a wider view various things stand out from this story. Firstly, the non-development was not the result of either lack of knowledge or lack of craft skills. Both were in as great abundance in this area as around the Mediterranean where glass developed so rapidly. Secondly India is a prime example of a civilization which over a thousand years or so almost forgot about glass. Having been quite widespread, at least for small decorative items, by 400 A.D., by 1400 it had almost disappeared. Thirdly, it is not difficult to see functional reasons for this, quite apart from the materials side. If we examine each of the major uses, we can see why India did not need glass. Firstly, it had an ancient and very widespread pottery tradition. Cheap pots and drinking vessels dealt with the storage and drinking side much better than the costly glass vessels. Secondly, its climate did not make glass windows a high priority, so flat glass would not develop. Thirdly, it had plenty of good brass and other metals for mirror-making. It may therefore not be necessary to invoke Hindu or Islamic attitudes to glass in the explanation of why India remained, essentially, a civilization which did not develop glass.

The consequences were incalculable. Among these are the possible effects on Indian science. It is well known that India was very advanced in its mathematics, giving the west the concept and sign of the zero, for example. Yet after the period up to about 500 A.D. (check), the mathematics became more and more abstract and 'pure'. Nor was there much development, as far as I know, of geometry or optics. The practical experiments and testing of mathematics which glass allows through the use of mirrors and lenses was not possible in India. This is probably very important and deserves further research. Secondly there are the effects on Indian art. As I have tried to show, glass is one of the crucial features which led to a revolution in western art, with perspective, depth, realism etc. The fact that Indian art, from the medieval period right up through the famous Persian art of the Mughal period, remained two-dimensional and symbolic, is perhaps also influenced by the absence of glass. Thirdly, the concepts of the

¹⁶ Dikshit, **Glass**, 147

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person and individual were deeply effected by glass, and particularly by mirrors. It will be interesting to see how this theory works in Indian concepts of the person and individual.