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Glass beads and bungoma: The link between southern India and southern African traditional knowledge known as *bungoma*

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Conference Title:
***Rethinking Africa's transcontinental continuities in pre- and proto-history*:**
An international conference to mark the retirement of Wim van Binsbergen, and one of the activities in the context of the 65th anniversary of the African Studies Centre, Leiden, the Netherlands
Venue: African Studies Centre, the University of Leiden, Leiden, Netherlands
12-13 April 2012

The paper examines possible links between the southern African practices of 'traditional healing' (known as 'bungoma' as practiced by initiated practitioners called sangoma) and trance and healing in southern India. The paper is based on archaeological evidence and artefacts in southern Africa (Botswana, South Africa, Zimbabwe, Mozambique) and southern India, and on new archaeological analysis of these materials, especially the material culture associated with this. It also utilizes a reading of South Indian iconography, but is not primarily based on historical reading of texts or oral evidence. Evidence for an early link—perhaps dating from 600 CE to 1600 CE—is developed by comparing instances of material culture from traditions of the sangoma in the southern Africa and the iconography of southern India, especially of Ganesha and Hanuman. In particular, the ritual use of metal tools and glass objects, specifically beads (*ubuhlalu*, *insimbi*, made of metal and glass), the 'mace' (*sagila*), 'axe' (*lizhembe*), 'spear' (*umkhonto*, *sikhali*), the knife (*mukwa*), and the 'fly whisk' (*lishoba*, made either of tails of hyaena [*impisi*] or of blue wildebeest [ngongoni]). All of these items are found in the ritual practices and iconography of the sangoma and of iconography and practices of devotees of Hanuman and Ganesha, among other gods, in south Indian Hinduism. This material culture, especially the 'weapons' of the southern African sangoma and the south Indian icons and ritual practices, show strong similarities that suggest more than trade was involved in early links between the southern Indian region and the southern African region.

It has long been known that the Indian Ocean trade distributed beads across India, the Middle East, southern Europe and Africa. Scholars have long known, too, that Africans traded items like ivory, metals (iron, gold, copper), gums, woods and slaves out of Africa in exchange for beads from other sources around the Indian Ocean, especially India. These beads are often associated with dry-stone walled structures such as Mapungubwe on the South African-Zimbabwe border, and with others in Zimbabwe, South Africa and Botswana, and they are found on the coast of Mozambique and farther north into Swahili coastal regions. Recent compositional analysis of the beads from the interior of southern Africa, however, have failed to show detailed similarities in shape and elemental composition with other bead industries in other continental areas that are known to have traded in the Indian Ocean trade.

This raises the possibility that beads were made in Africa in response to the local demand for beads for ritual and religious use, and that these were manufactured by specialist syndicates or guilds of technicians who were skilled in pyrotechnic arts. Beads were certainly made of iron or steel, copper and gold in this period (600-1600 CE), and were made of ostrich eggshell and other shells much earlier, so the model for and practice of bead manufacture existed. Metal and ceramics were also made in this period and earlier, so complex pyrotechnical arts also existed in the region. These skills were almost certainly controlled by secret or secretive guilds of technically adept craftsmen, since this is the pattern seen in all instances elsewhere in the world prior to industrial-type and industrial-scale manufacture and global distribution of metal and glass objects. Little evidence has emerged so far concerning manufacture of glass in Africa.

Considerable evidence exists for traditional smelting of iron and manufacture of iron, steel, copper, bronze, and gold artefacts in southern Africa. By contrast, almost nothing is known about manufacture of glass, except that a certain kind of large bead cylindrical coloured beads appear to have been made in Mapungubwe and elsewhere locally by means of re-melting smaller glass beads in moulds in order to fuse them into larger beads. If it was possible to fuse smaller glass beads into large glass beads using moulds, then it was almost certainly possible to produce smaller beads in the first place using local technologies. The manufacture of glass, and fusing or melting of glass for shaping, require extremely high temperatures, well in excess of 1000 degrees C. This is much higher than temperatures required for iron smelting, or working of gold or copper. It appears that temperatures above 1000 degrees were possible, however. There is also evidence that it was achieved at a relatively large scale, although the archaeological materials involved have not been correctly identified.

An anomalous substance that has been called 'vitrified cow dung' or 'biomass slag' has been discovered at a number of sites in what is now central and northern Botswana, and extending eastwards towards the coast through the site of Mapungubwe on the Limpopo. This apparent and so-called 'biomass slag' or 'vitrified dung' is also found in southern India. It is found nowhere else in the world.

In Africa, this archaeological material occurs in relatively large masses usually on the tops of steep sided hills, and is usually buried and surrounded by soils rich in ash and sometimes other organic materials. It has not been studied extensively, nor with contemporary high-tech analytical equipment, but earlier studies present sufficient chemical and physical evidence to identify it unambiguously as a glass, that is, as fused silicon dioxide, with other minerals and materials included within the mass. This material however shows very low values for all metals (iron, manganese, magnesium, copper, nickel, aluminium, titanium, etc.) that would be expected in metallurgical slags as a by-product of metal smelting or forging. Despite being labelled in some work as 'biomass slag', it is clearly not slag. It is also clear that 'biomass' (wood, straw, dung, waste vegetable matter, etc.), and especially dung from cattle or other livestock does not contain enough silicon dioxide to make glass. It generally burns to ash in all normal and natural fires, and without producing any great heat. Although experiments have shown that the ash, like any ash, can be vitrified at sufficiently high temperatures (1100-1300 degrees C), it is not possible to achieve such temperatures by accident in nature or by natural means. The morphology of the material also excludes fulgerites that form as the result of lightning strikes on earth or sand.

The apparent presence of large quantities of 'dung' in a 'vitrified' form has been used to support the contention that these sites were used for intensive cattle penning and that such large concentrations of cattle signified a highly class structured society with 'elite' owners of large herds, and therefore emerging or proto-state, or state-like social structures with class divisions, kings, and hierarchies of chiefs over subservient 'commoners' who herded cattle and tilled fields. This distinctly European model is extremely unlikely to have flourished in southern Africa in the period that most archaeologists have claimed, that is 600-1600 CE, and then entirely vanished.

Similarly, since dung and biomass do not 'vitrify' under any natural conditions, and because it is extremely unlikely that kings deliberately set out to turn dung into glass, that the 'vitrified cow dung' or 'biomass slag' hypothesis is not tenable.

Evidence shows, however, that large deposits of glass of this anomalous sort do exist in southern Africa, and in southern India. Both types of archaeological sites are associated with intensive ritual use of beads and are connected in other ways through similarities in ritual forms and material culture, and are known to have been connected at least through trade links. Both regions also show strong similarities in manufacture and use of metals, including gold and iron/steel in particular.

The material is in fact glass, and not 'biomass' or 'dung', and since it is not possible to reach temperatures required for glass to form in nature — excluding volcanic lava that is generally cooler (at 700-1000 degrees C). In fact, glasses manufactured by humans require temperatures in excess of 1000 degrees C. The conclusion that this was glass made deliberately by humans is compelling. Given this evidence, it appears very likely that the 'biomass slag' is in fact remains of deliberate early manufacture of glass, and that this was in turn used to manufacture beads in the southern African, and very probably in the southern Indian region where these deposits are found.

How could this have been done?

The glass already existed in large chunks that have been called biomass slag. First, it probably would have been possible to select zones of desirable glass from a large mass of foamy and partially consolidated glass that might have been produced in local traditional furnaces. These could have been chipped out of the large mass using simple tools that were already available in stone and metal. Areas with particular colours might also segregated using mechanical means in this way. Once the glass exists, it can also be powdered by grinding, put into moulds and re-fired to make beads. Alternatively, it can be re-melted and dipped hot, wound on mandrels as some of the beads seem to have been made, or cut into globules that could be punched using an awllike metal tool. All of these technologies and methods have been documented elsewhere in traditional glass making sites.

But how did the glass come to exist in the first place?

The large plates of 'glass foam' or 'biomass slag' may have been produced in a way similar to the way in which charcoal and iron was produced. For charcoal production, it is likely that the same methods in use today throughout Africa were used in the past since there is no evidence of innovation, and considerable evidence for conservatism. Wood is stacked tightly, then covered in clay and ignited. Some of the wood burns to ash, providing the heat for the rest of the tightly packed pile to convert to charcoal as the gasses, water, and other organic compounds are driven out of the wood in a reducing environment, leaving more or less pure carbon behind. By restricting oxygen in-flow to just enough to create the heat to convert the rest of the pile to carbon, a reducing environment is sustained. This required careful control and skill borne of experience, as it does today. If the airflow is too large, the pile converts entirely to ash. If it is too little the fire is extinguished, and one is left with partially burnt wood. Neither outcome is desired since a great deal of labour is required to gather and stack the wood, create the temporary oven structure in which the charcoal can be formed, and to monitor the process. The same thing is true for iron smelting. A great deal of skill and experience is required in order to prevent failure in the highly labour intensive process.

Since both processes are highly likely to fail unless skilful and careful control is exercised, they are also highly protected by magic, and ritual. By extension, the magic that is deemed to be effective in preventing failure of charcoal and smelting processes, is also expected to be more generally effective. Craftsmen were not just people with technical knowledge, but also persons who were considered to have great magic as well.

If metal processing and charcoal production were both possible, then it is also probably that glass making was indeed within the range of possibility. Since some types of beads were probably locally produced from re-melting other glass beads, it is clear that the temperatures for re-melting glass were possible. Given this, it is well within the ranger of probability that the 'biomass slag' was produced deliberately. It is also possible that the masses that have been identified were mistakes, or that the glass was too foamy, or not of a sufficiently high quality to have been used. Alternatively, it is also possible that all of the usable consolidated glass from the sites was mechanically removed (chipped away) and that what is left is simply waste from the process.

Accordingly, it is possible that glass-making furnaces might have been constructed on tops of steep sided hills of rough stone work or clay furnaces that was ultimately destroyed in the process or after the glass had cooled. Remains of these furnaces, however, should ultimately be discoverable.

If such furnaces were constructed with flue holes and packed with silicon dioxide, fluxing agents, and charcoal, it would have been possible to produce a mass of glass for subsequent extraction, remelting and use. Alternatively, the glass produced could have been ground up, placed in moulds and heated in a furnace of a similar design to melt it into bead shapes.

If glass beads were manufactured in southern Africa by skilled guilds of glass makers who also, perhaps, made iron and other objects of metal and glass, then a new approach to southern African history would have to be undertaken.

Specifically, it would be possible to imagine the link between India and Africa as a two way link, with beads not only traded in to Africa against raw products such as ivory, but also as a two way complex trade that involved traders from both sides of the Indian Ocean trade network. This would place Indian technical specialists in the southern African arena, and African technical specialists in the southern Indian arena.

Since metal and glass were primarily utilised for ritual, healing, medicinal and 'decorative' application, it is clear, also, that ritual knowledge and practices that were associated with glass and metal manufacture would also have been included in the interactions between the two regions.

This would help us to explain not only the preponderance of beads in southern African sites that have no obvious, or yet discovered, source outside of southern Africa. It would also help us to understand the parallels in ritual costumes, iconography, regalia and ritual techniques in both places.

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