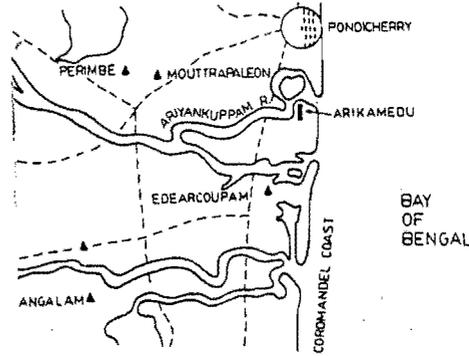


The MARGARETOLOGIST

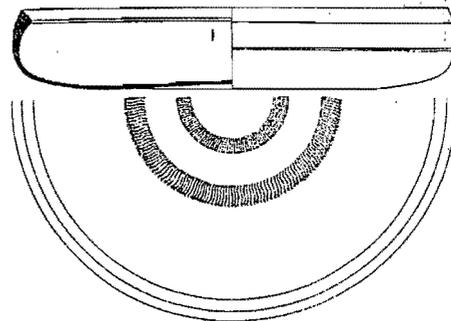
Final Report on Arikamedu, India



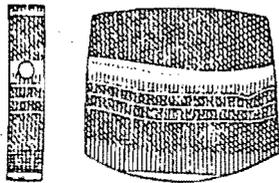
Position of Arikamedu in India.



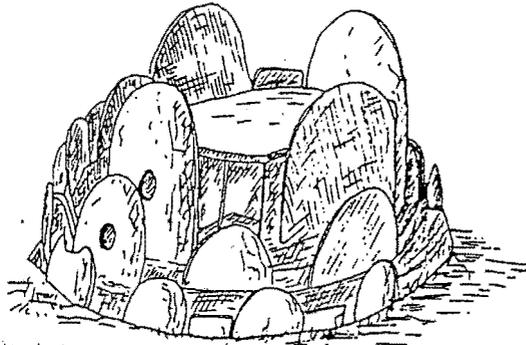
Arikamedu's harbor is in a river sheltered from the Bay of Bengal. From Begley.



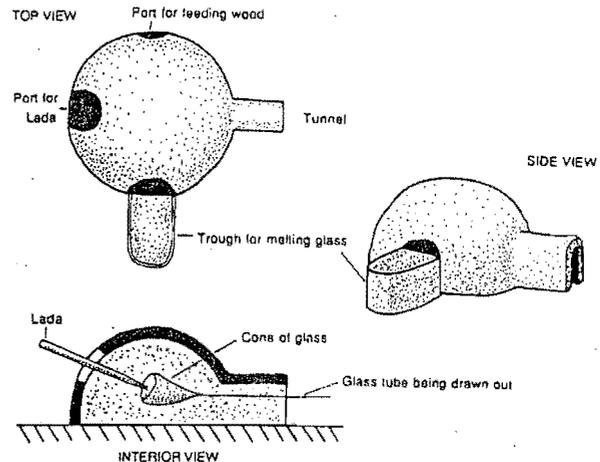
Rouletted ware, side view (top) and interior (bottom) with two rings of the decoration. From Wheeler.



Flat black onyx barrel, end and face. From Wheeler.



One of several styles of Pandukal burial sites. From Leshnik.



Views of a Papanaidupet tube making furnace, model for an Arikamedu Indo-Pacific furnace.

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Through the Eye of a Needle

Quite simply, Arikamedu is the single most important beadmaking site ever. Its products are found literally from Mali to Bali. Not all readers are interested in old beads from India. Yet any "bead person" should find this story compelling.

This is an unusual issue. It is not so much about beads as it is about a beadmaking city and what beads tell us about the city, its region and places far beyond.

Arikamedu was discovered a couple of generations ago and has been excavated four times. The last excavation was the most fruitful, fixing dates, confirming principal industries, identifying some of the populace, and pinpointing relations with other areas of India and far beyond.

Most of this information has come from a detailed study of the beads. Beads were often the critical evidence in drawing conclusions about the people and their activities at the site. At Arikamedu, beads rank with pottery in reconstructing the history of the ancient port, of South India, of Indo-Roman relations and of India's role in Southeast Asia.

This is my final "popular" report on Arikamedu. The formal one is currently in press. Although space is restricted here, I wanted to communicate to you some of the discoveries that the beads have revealed.

Due to the unusually complex nature of this topic, this *Margaretologist* differs from past ones. To clarify specialized vocabulary, I have added "definition boxes," a practice I started in the last issue. To save space and the average reader's sanity I eliminated most internal reference citations.

However, since this is a scholarly journal, information for those who want details is available. Obscure references are noted in the text. Principal references in the text are easily recognized in the Abbreviated References section. A comprehensive Arikamedu

bibliography (including many of my own papers) is available on-line by going to the home page of TheBeadSite/ bead galleries/ 13(1) issue/ Arikamedu bibliography at: <http://www.thebeadsite.com/MG132-BIB.htm>

During the preparation of this issue, both Vimala Begley, the excavator of Arikamedu, and S. B. Deo, the former Director of Deccan College, Pune, India, passed away. This issue is dedicated to their memory.



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The Margret Carey "Gotcha" Award goes to the person who spots the most errors per issue. One point for a typo, two for an error of fact. The award has been extended to The Bead Site.

Color plates for all past issues of *The Margaretologist* from 9(1) onwards are available on TheBeadSite.com. All past issues may be purchased there at the World's Biggest Bead Bookstore.

Final Report on Arikamedu

Phase One: Discovery

In 1734 the Consul of the Indo-French enclave of **Pondicherry** sent a note to the French East India Company observing that the villagers of **Virampatnam** (variously spelled) were taking bricks from an old place near their village. Later in the century Le Gentil, on a trip around the world to observe astronomical phenomena for the King of France, reported the same thing and said the villagers told him that the large bricks came from what they described as the castle of king Vira-Raguen.

"A true Roman city."

The site was reported upon occasionally thereafter, but it was nearly two centuries before G. Jouveau-Dubreuil, a French historian, visited it and saw beads and wasters on the ground. Children from Virampatnam followed him around offering things they had picked up after the rains for a few *centimes*. One item was a seal engraved with what he believed to be the head of the young Caesar Augustus. He wrote a letter to the Governor of French India declaring that here was "a true Roman city."

Phase Two: Investigation

Under the direction of Père Fauchaux, a local priest with scant archaeological training, the Pondicherry Public Works Service dug at the site in the early 1940s. They found glass and stone beads, pottery and other artifacts. Finds were sent to French scholars in Hanoi and to several museums in British India. Somehow the seal with Augustus' head was lost. The other objects gathered dust.

In 1944 the famous English archaeologist, Sir Mortimer Wheeler, recognized as Mediterranean a piece of pottery from Arikamedu in the Madras Museum. He vis-

ited Pondicherry and after a leisurely breakfast topped with an "admirable cognac," accompanied two officials to the local Museum. He could hardly believe his eyes. He had found what he was looking for – an Indo-Roman connection; a link between the Classical Mediterranean and Ancient India.

Time was running out. Wheeler was the last British Director-General of the Archaeological Survey of India; India was to obtain Independence in two years. He assembled a team of bright young Indians and dug in the summer of 1945. The results were quickly published the next year.

In 1948 the French archaeologist, J.-M. Casal, dug for another season. He found levels earlier than Wheeler had and also published promptly. Because he published in French and in a small run, no one in India paid any attention to his work.

To re-excavate with an emphasis on beads.

In 1981 John Anthony and I visited the Pondicherry Museum and the site of Arikamedu, through the kindness of Director F. Cyril Antony. I was thunderstruck. Not only was it home to one bead industry, but to two: in stone and glass. Moreover, the glass beads, at least, were found all over the ancient world. I wanted to study this place; I wanted to re-excavate Arikamedu with an emphasis on the beads.

A few months before our visit, an Indian-born American archaeologist, the late Vimala Begley, had also spent time at the Pondicherry Museum. She was overwhelmed by the pottery, her specialty. When I came across her article, *Arikamedu Reconsidered*, I could hardly sit down out of excitement.

We got in touch. Along with Antony and other concerned citizens, we petitioned to have Arikamedu declared a protected archaeological site, preventing the farmer who owned the land from turning it into a coconut grove. Begley got permission to excavate beginning in 1989; 1992 I joined the last season as the "small finds man."

As ill as she later became, she persevered and managed to publish the first volume of the excavation report. The second, in which the bead section plays a very large part, is in preparation.

Phase Three: Interpreting Arikamedu

Arikamedu is a modern name meaning "Mound of Arakan," after a Jain figurine found there. To ancient Indians it was Viraiyapattinam or Virampattinam, the "Port of Virai." The ancient Tamil *Sangam* literature praises Virai for its harbor and salt pans; it belonged to the Velir dynasty. Two *Sangam* poets, father and son, came from Virai. The old name, of course, lives on as Virampattinam.

> Tamil 1. A people and language of southern India, concentrated in the state of Tamil Nadu. 2. The major Dravidian tongue, which includes nearly all languages of South India. 3. The inclusive name of the three South Indian kingdoms of ancient times.

> Sangam (academy) refers to the legendary group of poets evoked as the writers of the classical Tamil poetic literature, composed between ca. 3rd C. BC and 6th C. AD.

Westerners called it either after the Tamil word *potikai* (a meeting place), or the local Poduvar clan. The *Periplus of the Erythrean Sea (Circumnavigation of the Red [Arabian] Sea)*, written by an anonymous Greek captain in the first century AD, referred to it as Podouké. Ptolemy in his *Geographia* (mid first century) called it Pôdouké *emporion*. Both writers knew it as a major port, but the Westerners had no understanding of its central role in trade and manufacturing.

The Western literature does not speak of this place after Ptolemy. Wheeler (1954) and the many writers who relied on him assumed that it was important for a short time only because Romans were there and had sunk back into obscurity after they left.

The Romans knew the place, but didn't understand its importance.

Begley and I long suspected the opposite: the Romans went to Arikamedu *because* it was important. The new excavation was a chance to demonstrate this. The beads played a crucial role in reconstructing Arikamedu's history. I was not surprised at that, but I think she was.

The northern sector of Arikamedu was the harbor. We found large serving bowls and trays here, which may indicate hostels for visiting traders. We only got down to second century BC levels in one area and had to stop, despite bringing a pump in, because we were below the water level.

The southern sector is older; Casal found black and red ware typical of Megalithic (Pandukal) styles. We never reached the earliest levels here. Begley had permission to dig for five years, but she stopped after three, largely because of the mindless interference of the "officials" assigned to observe us. In one place was a piece of the famed local flat "rouletted ware" with numerous bird (probably chicken) bones resting on it. I dubbed it *The Last Supper*.

> Rouletted ware - Luxury ceramic plates decorated inside with concentric circles of incised dashes; a misnomer, as the dashes were not put in with a "roulette." An important Arikamedu export product.

Dating Arikamedu

Arikamedu is difficult to excavate because it is highly disturbed by farming and the old practice of the people of Virampattinam

digging for reusable bricks. This latter activity is usually called "brick robbing," but I think this is a little harsh, as the people are only recycling what their ancestors left.

As a result, it is impossible to date many of the loci. There was no charcoal for radiocarbon testing. However, much of the pottery can be dated and the bead evidence makes it clear that Arikamedu was occupied for a very long time.

> **locus** pl. **loci**. A discrete archaeological feature such as pocket of soil or remains of architecture.

We don't know when it was first occupied. Glover's excavation at Ban Don Ta Phet, Thailand is radiocarbon dated to the early 4th century BC. It has many **Indo-Pacific** beads that, as far as anyone can tell, were first made at Arikamedu. This hints at a founding date for Arikamedu.

> **Indo-Pacific beads**. Small glass beads cut from tubes made by a special technique used at Arikamedu and associated sites. They come in a limited range of color and are made of bubbly glass. They were the most widespread trade beads in the ancient world.

As for its abandonment, there are Western ceramics down to the 7th or 8th century, a 10th century coin of the Colas (a powerful Tamil state), Cola ceramics and 13th to 15th century Chinese blue-and-white ware and celadon. Wheeler found these ceramics, but said that "brick-robbers" had left them, as though villagers took their best china to have a picnic when they were scrounging for bricks. Glass and stone beads show up throughout the occupation of the site.

The bead evidence tells us even more. The Indo-Pacific beadmakers moved about 100 miles (160 km) *north* of Arikamedu to **Papanaidupet**, a village recorded in 1598 (Pimenta 1905: 219).

In 1593 J. Lavanha (Theal 1898: 303) said that the Portuguese bought small glass beads for East Africa at **Nagapattinam**

because they were made there. They could have been made at 1.) Nagapattinam, 2.) Papanaidupet or 3.) Arikamedu.

Nagapattinam is *south* of Arikamedu. My extensive survey of the Old Town found *no evidence* for glass working there.

Nor did Papanaidupet make the beads. If so, they would have been exported from São Tomé (Madras), *much closer* to Papanaidupet and *the major port* in Portuguese India, rather than Nagapattinam.

That leaves Arikamedu still making Indo-Pacific beads in 1598 but abandoned when the French Consul noted brick removal (1734), giving a terminal date of about the 17th century. The glass beadmakers went to Papanaidupet, the stone beadmakers to **Kangayam** and the fisher-folk shifted their location less than a kilometer away to modern Virampattinam.

Arikamedu's Role in South India

Before, during and long after Roman occupation the dominant ceramic at Arikamedu is a red-and-black ware. This was called **Megalithic** after the large stones used to mark some graves of their makers, a people who have been a "mystery" in Indian archaeology for over two centuries.

The term "Megalithic" is now being discarded. Leshnik pointed out its absurdity. Indian megaliths are not derived from European ones, as was once thought. He derided terms such as *megalithic pottery* (*megalithic stone bead* is even dumber). He proposed returning to the original name for the stone burial circles of the south, **Pandukal**, Tamil for "old stones."

The mysterious people become better known.

For a long time the Pandukal people were known only from their burials, often marked with large stones, stone circles, cairns or sarcophagi. When Leshnik pub-

lished his formidable study in 1974 no habitation sites had been identified and almost nothing was known about the people who constructed these monuments.

Soon thereafter S. B. Deo, then at the University of Nagpur, explored the Vidharba region of northeast Maharashtra and uncovered many habitation sites and the cemetery of **Mahujhari**, with abundant evidence of lapidary work. In the late 1980s K. Rajan of Tamil University (Tanjore, Tamil Nadu) found scores of sites in the Kongu region of that state, including **Kodumanal**, the ancient Kodumandan, celebrated in *Sangam* poems for its jewelers. It was also a large lapidary center.

Mahujhari, Kodumanal and Arikamedu were more-or-less sequential and shared several important traits. They were Pandukal sites (Arikamedu was more cosmopolitan) and they made stone beads using a technique not known elsewhere in India.

For brevity's sake, this technique is called the "**pecking**" method (or complex). As with stone beadmaking elsewhere in India, stones are first dressed into crude shapes (**roughouts**). In the north the roughout is then ground, drilled and finally polished. Pandukal lapidaries pecked (repeatedly hit with a small point) the roughouts into final shapes, polished and then drilled them. The technique is distinctive. It accounts for about half the beads at Arikamedu and all those at the other two sites. It marks Pandukal beadmaking.

> Northern stone beadmaking 1. Roughout, 2. *Grind* to a blank, 3. Drill 4. Polish (**grinding complex**).

> Southern (Pandukal) method 1. Roughout, 2. *Pecking* to a blank, 3. Polish, 4. Drill (**pecking complex**).

Who were the Pandukal people? They were innovators. They brought horses to South India, as well as iron and goldsmithing, stone beadmaking and a distinc-

tive etched carnelian style, Dikshit's (1949) "Southern group."

Once thought to be only herdsmen, they are now recognized as agriculturists and perhaps warriors. Many Pandukal settlements are near iron or gold deposits. Kodumanal is close to quartz, beryl, sapphire and probably amethyst sources. We don't know what language they spoke; their writing system is still undeciphered.

There is a growing feeling among Indian archaeologists that the Pandukal people might have been ancestors to the Tamil Kingdoms that flourished in the early centuries AD and left the extensive *Sangam* poems. Radiocarbon dates for Pandukal settlements are surprisingly early. If they did not develop the Tamil civilization, they at least heavily contributed to it and assimilated into it.

The Pandukal people were major contributors to Indian civilization.

As horsemen, their young men took herds out to pasture. They would have been in a *perfect position to scout out mineral sources*: gold, iron, semiprecious stones, diamonds for drilling them and raw materials for coloring glass, in particular copper and *wad* or bog manganese, with or without cobalt. These resources are found between the Krishna and Godavari Rivers, north of the Tamil Kingdoms in what Leshnik called the "tribal belt."

A thick band of Pandukal settlements reach from the Southeast Coast of India just south of Arikamedu to the Palghat Gap, the only pass through the Western Ghat mountain range in southern India, beyond which was the celebrated port of **Muziris**. Raw materials, finished stone and glass beads and gold jewelry traveled along this route. Most of the favorite stones of the Romans had their origins in

South India and they were probably found, cut and exported by these hither-to-unknown people.

Arikamedu Beyond India

If Arikamedu had played no role larger than the one it had in South India, it would be a remarkable story. But its sphere of influence went far beyond India. Not only did its gems satisfy elite Roman tastes, but the port's reputation traveled East as well.

Arikamedu contributed to the development of Southeast Asia.

Many places in Southeast Asia have evidence for trade and communication with India. Older historians thought that the ties were with northern India, particularly the region of the mouth of the Ganges. South India gets scant mention in older histories of the subcontinent.

In fact, most Indian cultural traits found in Southeast Asia point to *South India* rather than then north. These include languages inscribed on seals, gold eye covers for the dead, megalithic tombs, rouletted ware and the introduction of iron working. Not only are these southern traits, but several are specifically Pandukal, especially the burial complexes. Arikamedu is the likely source of the rouletted ware.

The bead evidence points to this as well. Glass beads from first/second century AD sites in Bali, Indonesia (Gilimanuk and Sembiran) have been analyzed. The blue glass shows the characteristic Arikamedu signature of potash as the major alkali and cobalt-bearing wad as the coloring agent.

Moreover, Gilimanuk and the unexcavated but heavily looted region known as the "Buni Complex" west of Jakarta on Java, Indonesia have yielded stone and glass collar beads that almost certainly came from Arikamedu workshops.

Perhaps it is not a great surprise that this crucial port exported quantities of locally made beads and pottery, even if the period is early and the distances are great. But there is more. The beads give us solid evidence that there was movement of people from Arikamedu to several places elsewhere in South and Southeast Asia.

The Spread of Arikamedu Beadmaking

Arikamedu made the world's first "seed beads" for the masses by a complex and unique process still used in Papanaidupet. A dozen men work together to form a large (40 to 50 kg; 100+ lbs.) hollow cone of glass at the end of a tapered iron tube. The cone is put into a furnace and on the opposite side a master draws it out as a continuous tube (he breaks it every meter/yard or so) over a three hour period (two masters relieve each other). The tubes are then cut into segments, packed in ash, stirred on a plate over heat in another furnace and eventually strung up by women and girls.

The process for making Indo-Pacific beads is so demanding and elaborate that it is unlikely that it was invented more than once or easily viewed and copied by others. Archaeologists refer to such processes as being "non-transferable."

Indo-Pacific beadmaking spread throughout Southeast Asia.

Yet, Indo-Pacific beads were made, not only for over 2000 years at Arikamedu, but also at *nine other places now located in six different countries*. It is not difficult to understand how the process was transferred to some of these. As we have seen, **Papanaidupet** is the heir to **Arikamedu**. **Karaikadu**, some 30 miles (48 km) south of Arikamedu was only occupied during the first century AD or so and was a satellite town. **Mantai**, in northern Sri Lanka, had many connections with South India.

This great northern port was the first place Indians visited when they went to Ceylon.

However, the other six places are further afield in Southeast Asia. There may have been two "waves" of emigration of glass beadmakers from Arikamedu, though the precise mechanism and exactly what happened may never be known with certainty.

> **Funan** was the first state in Southeast Asia, centered in southern Vietnam and southern and peninsular Thailand. It was the intermediary in Chinese – Western trade.

We know that in the early centuries BC Indo-Pacific beads were being made at **Kuala Selinsing** (on the western coast of Malaysia), **Khlong Thom** (to the north in modern Thailand) and **Oc Eo** (southern tip of Vietnam). Oc Eo was at the heart (though probably not the capital) of Funan; the Romans knew it as Kattigara. Khlong Thom (locally called Kuan Lukpat "bead mound") was Funan's western port, known to the Romans as Takkola. Kuala Selinsing was a quieter place. Though it imported Indian luxury items it is not equated with any place named in ancient texts.

Arikamedu, Kattigara, Takkola and Modutti (Mantai) were all called *emporium* by Ptolemy. Within the Empire this word denoted the quarter in which merchants lived. Outside the Empire it stood for a port where Romans were free to trade and find temporary lodgings. However, the Roman presence alone did not make these places important.

Romans didn't make the three-year trip to China and the Chinese rarely went to sea in those days. However, the Malay people are great sailors. So Funan became the intermediary in long-distance trade.

If Miller's hypothesis proves correct, the Romans traded with Malays not only in their own back yard but also in far-away East Africa. Cinnamon (and the substitute cassia) was known in the Middle East from ancient times. The Romans called East

Africa the "Cinnamon Land," because they bought it there. Neither crop grows in Africa. It was imported across the vast sea on typical Malay outriggers. Pliny reported that among the items traded for the precious spices were "necklaces."

China, Japan and Korea received goods from the West as well as some made in Funan. In these countries Indo-Pacific beads are found in abundance. They are overwhelmingly blue in color and associated with burials of the elite – nobles and royalty. When analysis are done, I suspect that they will show that the beads were made mostly in the Indo-Pacific bead-making sites of Funan.

Blue Indo-Pacific beads were status symbols in East Asia.

All kingdoms, like all people, come to an end. Funan was overrun by its neighbors, leaving a gap in trade between the West and China. China, "the Middle Kingdom," held the key to the future. Smaller and less powerful states and city-states of Southeast Asia respected its wishes. For years there were rival tribute missions from Sumatra and northern Java to woo China into trade agreements. In time, **Srivijaya** emerged victorious. It controlled the distribution of goods from its large hinterland and navigation through the strategic Malacca Strait (Funan had transferred goods overland).

> **Srivijaya**, successor state to Funan, was centered on Sumatra and the Malay Peninsula, controlling East-West trade from about the 8th to the 11th century

Beadmakers from Arikamedu or Funan probably went to Srivijaya. Soon after the elevation of the Srivijaya Kingdom Indo-Pacific beads were being made in **Vijaya** (the capital, modern Palembang, Sumatra) and the important trading post of **Sungai Mas** (western coast of Malaysia; Arab

traders called it Kalah). During the 9th century a new market was set up at Takua Pa (Khao Ka Kao) Thailand, apparently to exploit the transpeninsular trade (at that spot it would take only four days to cross by elephant). An Indo-Pacific bead industry was established there as well.

Transferring Indo-Pacific Beadmaking

Glass beadmakers in India have always been of the lowest caste. Glass is considered an inferior imitation of gems and its production is hot, sweaty and dirty. How could low-class glassmakers have made the transfer from Arikamedu to these new places? How would they even have known where to go? How could they have attained permission to settle in new lands? How could they have raised the capital to make the journey?

There must have been an intermediary, a person or organization with powerful connections at both ends of the route who could pave the way, lend the money and maybe even protect the beadmakers when they were established in their new home.

During the Funanese period there is no known candidate unless there were a government-to-government exchange. Perhaps the sites (noted by the Romans as major trading ports) had more contact with each other than we know. Certainly Funan became heavily Indianized, a process that started in the area around Kuala Selinsing, eventually spreading to the center, where in the fifth century a new king "changed all the rules according to the custom of India."

For the "second wave" of emigration to Srivijayan sites, I suggest that the facilitator was not the state but one of the powerful South Indian guilds. These guilds were so strong that at times they administered whole districts, kept armies and minted coins. One of the principal South India guilds had five crafts associated with it, though we do not know what they were

(one may have been oil-pressing). This guild operated both at Vijaya and at Takua Pa, where they built a large tank and guarded it with their own troops.

Was the Manikgramman really the Bead Guild?

The name of this guild is **Manikgramman**. *Gramman* is guild. *Manik* comes from the Indo-Iranian *mani*, which means "seed, sperm, precious stone." *Manykia* is used in modern Hindi for precious stone, while *mani* means bead. Hence, this was the "Bead (or precious stone) Guild." This name may not be any more significant than "Diamond Matches." On the other hand, it may furnish an important clue. It could have been the Manikgrammen who facilitated at least the second emigration of Indo-Pacific beadmakers into Srivijaya.

Stone Beadmaking

While Indo-Pacific glass beads had the most impact on world trade, stone beads were also part of the industry at Arikamedu. Semiprecious stone beads of quartz crystal, amethyst, carnelian, banded agate, garnet and prase were made into beads in large numbers. The lapidaries plied their craft through the long occupation of the site. Kangayam is the apparent successor.

Arikamedu and Kodumanal must have cooperated, at least at the beginning of the Arikamedu lapidary work. Kodumanal would have furnished quartz crystal, amethyst and maybe workers to Arikamedu. In addition to Pandukal lapidaries, some using North India techniques must also have moved to Arikamedu.

Arikamedu was inventive in stone beadmaking. It is one of the earliest (perhaps the earliest) places recorded using **double-tipped diamond drills** for beadmaking. It also pioneered the production of **black banded onyx** by soaking banded agate in

sugary water and then putting it into sulfuric acid. It is also the first place recorded where **citrine** (golden quartz) was made by treating weak-colored amethysts.

Arikamedu lapidaries must have gone along with Indo-Pacific beadmakers to some of the other sites mentioned in connection with that industry, particularly in the early centuries.

The stone bead industry at Karaikadu is very similar to that of Arikamedu, though garnets and citrine have not yet been identified (this place has not been excavated much and is now being covered over by industrial buildings). It appears, however, that it processed much more of the crystalline prase than did Arikamedu.

Oc Eo was a major stone beadmaker, working most minerals found at Arikamedu as well as others, including plasma and some precious stones. The work often resembles that from Arikamedu, especially flat onyx pendants drilled through their lengths at the top.

The garnets at Arikamedu are mostly of the almandine type, though there is some hessonite (cinnamon stone) as well. The relative abundance is reversed at Oc Eo, with hessonite being more common. Vietnam is one of the few sources of this type of garnet (Sri Lanka is the other major source), and raw material may have been exported from Oc Eo to Arikamedu.

Beads excavated recently at Kuala Selinsing were published with great fanfare a few years ago as made from rare minerals. Unfortunately, a careless undergraduate conducted the mineralogical tests done to identify them and all the "rare minerals" are actually glass, save the "beryl," which is carnelian. A grooved stone for shaping or polishing beads was also found there.

Stone beadmaking is evident at Khlong Thom. A few blanks had small bits of resin adhering to them so that the stone could be mounted on a short stick (a dop)

and ground against a wheel. This is a known South Indian technique not recorded in North India.

**The early Indo-Pacific
beadmaking sites, at least,
also adapted Arikamedu
lapidary techniques.**

The Srivijayan group of Indo-Pacific beadmaking sites does not seem to have been so influenced by Arikamedu lapidaries. There is no evidence for stone beadmaking at Takua Pa and little at Sungai Mas (there may be more to be found; excavations have been quite limited). Vijaya made stone beads, but they are quite different from Arikamedu ones. A white, friable, banded flint was used, sometimes dyed on the surface (a couple of fragments at Arikamedu are no doubt from Vijaya). The carnelian beads have odd shapes (mostly pentagonal barrels and cylinders) and are poorly finished on the surface, unlike Arikamedu beads.

Summary

The most famous archaeological site in South India has undergone many interpretations over the years. The excavations by Wheeler in the 1940s amazed the world by demonstrating a link between the Roman Empire and South India.

However, his version of history has now been drastically revised. The Romans did not build Arikamedu; that was an accomplishment of the Indians. The port was not celebrated for textiles (Wheeler's "dye vats" are built on sand), but for beads and ceramics. The place did not shine for a century or so and then revert to a sleepy fishing village. It was a major manufacturing center and port for some 2000 years.

The study of Arikamedu leads us to many other insights. The role of the previously mysterious Pandukal people is now

being appreciated. Innovations in both glass and stone beads were pioneered at Arikamedu. Arikamedu was a key node in the South Indian network that furnished many gems to Rome, forming what I call "The Treasure Chest of the Ancient World." It was also a crucial partner in the building of the economy and shaping of the history of much of Southeast Asia.

Conclusions

What's the point of bead research? After all, there are no textbooks, classes nor degrees in the field. It is not monetarily rewarding. For the most part it is a "hobby" of either academics who find them interesting or amateurs (in the best sense of the word) curious about those they own.

Most bead research has concentrated on manufacturing techniques and origins. Archaeologists hoped they would be useful in dating sites and adding information about trading patterns. While these are legitimate concerns, bead research had the potential to go far beyond these limited boundaries. This may be especially true for sites where beads are made, but can also be applied to importing sites.

In the case of Arikamedu, an intensive, scientific study of its beads with an emphasis on the human element has revealed many things:

1. Beads furnish the crucial evidence for dating the beginning and ending of the site.
2. The bead industry is now seen as *a*, if not *the*, key economic activity of the city.
3. The distinction once drawn between the northern sector being only the port and the southern sector being the industrial area is no longer clear-cut because of the distribution of beadmaking evidence.
4. The beads provide strong evidence of the economic and perhaps political role of Arikamedu in both South India and Southeast Asia.

There is more. In addition to what the beads tell us about Arikamedu, they have expanded our ideas about activities far beyond the site:

1. The central role of the Pandukal people enlarges what we know about them and strongly suggests that they were major actors in building South Indian culture, perhaps even the development of the Tamil states and the *Sangam* literature.

2. The technology transfers of glassmaking, glass beadmaking and stone beadmaking to Southeast Asia was a crucial event. Glassmaking was introduced to many of the places Indo-Pacific beadmakers went. Nearly all of these places were important in the development of the states in which they were located. The exportation of the beads made in these places facilitated trade and the exchange of ideas.

3. Understanding the implications of the wider Indo-Pacific beadmaking history gives us more information regarding communications and trade on a large scale. For example, we now know that when Egypt resumed trade with the East in the 4th century AD it no longer traded at Muziris, in southwest India, but at Mantai in northern Sri Lanka. The Indo-Pacific beads found at Berenike, Egypt tell us that. A large-scale program of glass analyses is underway to help us learn much more about trade and other contacts between the people of Southeast Asia and beyond using the data of Indo-Pacific beads.

I can't help but think back 20 years when John Anthony and I saw our first beads from Arikamedu. The idea of working at this remarkable site excited me then and still does now. We haven't revealed all the secrets of the past, but we understand much more than had been understood previously. And we have the beads to thank for that.

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