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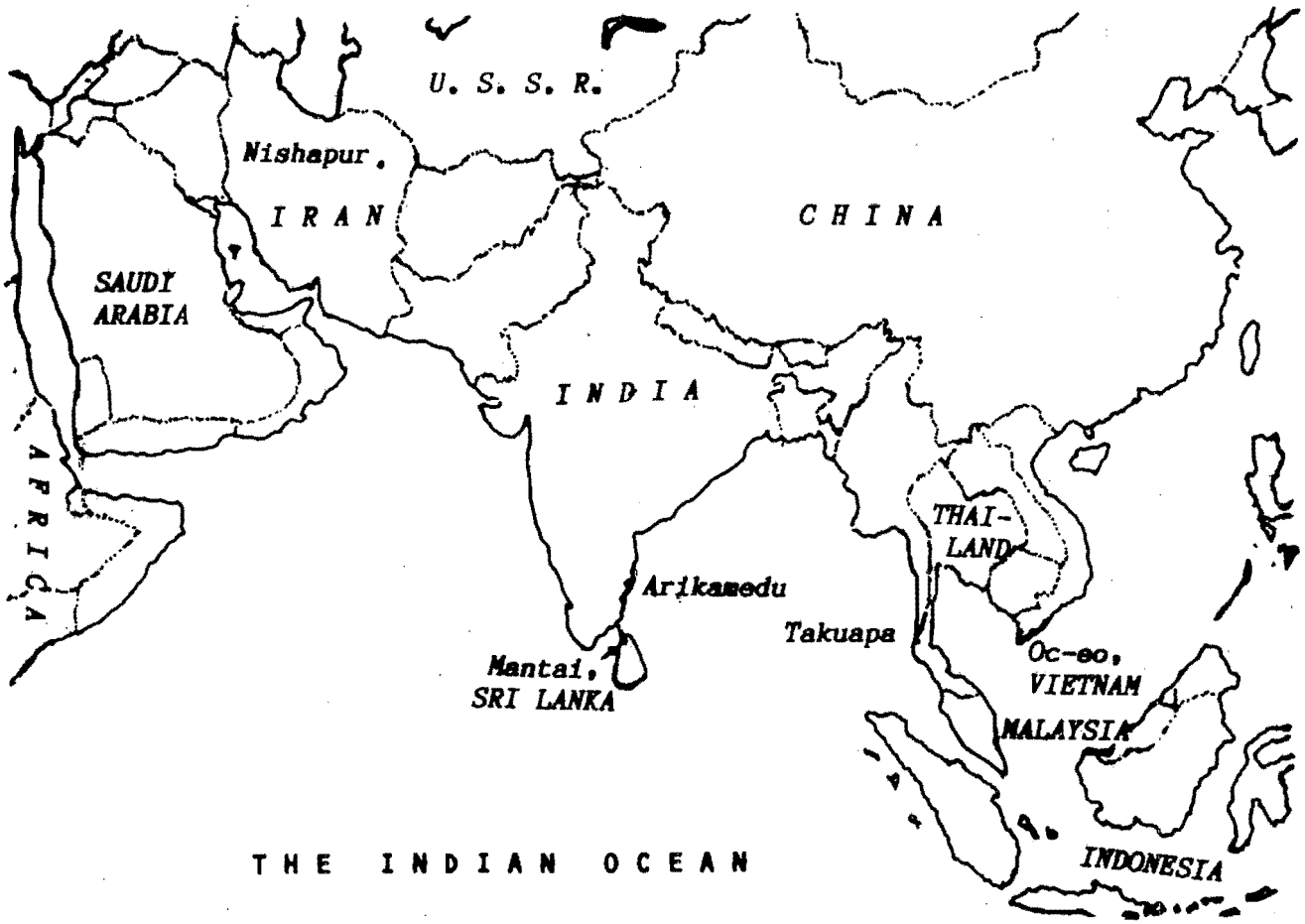
THE INDIAN OCEAN BEAD TRADE



THE INDIAN OCEAN

In this Issue:

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Through the Eye of a Needle: The Editor's Page

An exciting new chapter in the history and archaeology of the ancient world is being written, and the Center is contributing to it. Long considered a backwater of social or economic change, the lands of West, South, Southeast, and East Asia are now receiving their due credit for having participated in a nearly global network of commerce and communication which sent people, goods, and ideas throughout the Old World for some 2000 years. From Syria to Sri Lanka, from Kilwa to Korea, ties between people were far more numerous and productive than most standard text books would have us believe.

During the last few years, excavations along the East African coast, the Red Sea and the Persian Gulf, the coasts of the Indian Ocean and the Bay of Bengal, the islands and peninsulas of Southeast Asia, and the cities and necropoli of the Orient have revealed the interplay of cultural and economic forces, the consequences of which are still echoing in the modern world.

Increasingly, the excavators who have been uncovering long lost cities and revealing astonishing records of intercourse among people are realizing the benefit of a rigorous study of the beads they discover in their thousands. Beads were never the major trading good taken on the voyages of discovery or trade. They played minor roles next to wine, oil, grains, metals, or cloth. Yet they were always there. They could travel farther and swifter than other goods, and unlike other commodities were not melted down for reuse, worn out, drunk, or eaten. Only ceramics can be said to have had as much attraction for other peoples and to have survived as long to document the story. Long neglected, beads are now beginning to take their rightful place among the data used to reconstruct the past.

The Center has been invited by and has solicited the aid of several people and institutions to work toward a common goal: the elucidation of trade and other cultural contacts among people living along or near the shores of the ancient sea routes. The project is as large as it is exciting. As you read this I shall be far away gathering more information to help piece this story together. As more is learned, it will, as always, be published here first, as a tribute to our Members and Patrons, who help support this work. In the meantime, this issue may be considered a preview of this major project. We shall be focusing on the beads uncovered at four sites, once teeming ancient cities at the crossroads of this international trade.

I want to take this opportunity to thank some of the people and groups who have most directly contributed to this work. To John Carswell, formerly the director of the Alfred and David Smart Gallery, University of Chicago, for outstanding moral and financial support. To the Hagop Kevorkian Fund for a grant to catalogue the Nishapur beads in the Metropolitan Museum of Art in New York. And to the Bead Society of Los Angeles, whose support of bead research in Southeast Asia is an outgrowth of the material presented here and will be a foundation of future work on this project.

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The Center for Bead Research 4 Essex Street, Lake Placid, N.Y. 12946

THE ASIAN MARITIME BEAD TRADE

CA. FIRST TO TWELFTH CENTURIES A.D.

This issue will document what is known about the bead trade in West, South, and Southeast Asia for the first 1200 or so years of the current era by concentrating on beads excavated at four key sites in the region. The beads of three of these, Arikamedu (India), Mantai (Sri Lanka; formerly Ceylon), and Nishapur (Iran, ancient Persia), have been personally examined and catalogued. The fourth, Oc-eo (Vietnam), was unavailable for examination, but was so fully documented that, despite the excavator's lack of knowledge about beads, it is possible to reconstruct much from the published report. Because of the importance of Oc-eo, it has been included in this summary.

Arikamedu has been excavated a number of times [for a summary and dating see Begley 1983], and I have studied its beads for years in cooperation with the Pondicherry Museum [Francis 1984; 1986a; 1987a; n.d. a]. The site will soon be reexcavated, and I have been asked to continue my work on the beads. Mantai was excavated in 1980 - 1984 by John Carswell, University of Chicago. Publication is expected shortly, with my contributions on the beads, the glass bangles and rings, and Western references to Mantai and Sri Lankan trade in general [Francis n.d. b, c, d]. Nishapur was excavated in the 1930s and 1940s by Charles Wilkinson for the Metropolitan Museum of Art. Recently I catalogued its beads at the Museum [Francis 1987b]; fuller publication is expected. The Oc-eo beads are available in Malleret [1962]. Few references will be made to most of these sources, as many are not yet published. The exception is Oc-eo, where page numbers in Malleret [1962] are noted.

Each of these places were crossroads of international commerce. Arikamedu was the leading trading post of South Asia, and important enough for a Roman trading colony to live there. Mantai, at the northern end of Sri Lanka, controlled East-West trade because all goods passed by or through due to the impassability by large craft at the Palk Strait, which separates India and Ceylon. We now realize that it, too, had a colony of Roman traders. Oc-eo was a convenient stopping point for East-bound trade, and was a gateway to the riches of Funan, the first national state of Southeast Asia. Nishapur, unlike the others, was a land mart, sitting astride the routes which linked South and Central Asia with Asia Minor and the Mediterranean basin.

A summary of the characteristics of these places is provided in Table 1:

Table 1: Four Major Ancient Trading Centers

Name	Country	Dates (centuries)	Trade by	Foreign Quarter?	Beads Made
Arikamedu	India	3rd BC- 3rd AD	Sea	Yes	Glass, Stone
Mantai	Ceylon	2nd - 10th AD	Sea	Yes	Mostly Glass
Oc-eo	Vietnam	2nd - 7th AD	Sea	?	Glass
Nishapur	Iran	7th - 12th AD	Land		Jet, Faience

These four sites overlap in time so to give us an almost continual picture of the bead trade in this region from the 3rd century B.C. until the 12th A.D. They were not all the same, however. Nishapur, youngest of these sites, was not served by sea. Yet, its connections with Medieval Mantai are obvious. Rather than individual site reports, we have synthesized the data from them and used it to compare the beads at different times amongst them.

THE EARLY CENTURIES

Arikamedu, Mantai, and Oc-eo have several characteristics in common. They were all major sea ports for their regions, they all had direct or indirect connections with the Roman Empire, and they were in contact with each other. It has been assumed for a long time that Arikamedu is the remains of the city known to the Romans as Poduke Emporium. The word emporium derives from the Greek *emporos*, a merchant who sailed on ships belonging to others. An emporium was the quarter of a city where these merchants lived. There were numerous emporia within the Roman Empire, and outside the Empire, emporia represented colonies of Roman traders abroad. My studies into the Classical literature have demonstrated that Mantai, too, was an emporium -- called Modutti Emporium -- founded late in the first century. It is not known whether Oc-eo also had a colony of Roman merchants, but it is a bit unlikely given its geographic position. Nonetheless, it had at least considerable indirect contact with Rome, as the numerous seals and coins show. Roman seals have also been found at Arikamedu and coins at Mantai.

Beads from the West

The bead evidence gives a similar story. Mosaic glass beads have been found at all three sites. At Arikamedu a round tabular with a floral motif on both sides was found, exactly like beads known from first century European sites. There were also a few folded mosaic beads and some folded zone beads which are likely Roman. At Mantai, the most spectacular bead had a sky blue core decorated with three zones of white and yellow glass, between which are rows of square mosaic eye canes. At Oc-eo the evidence is a bit weaker. A number of mosaic beads were uncovered, and at least some of them appear to be Roman types. However, most of them come from the surface or close to it, and the illustrations (watercolors) are not quite clear enough to say for certain which are Roman. Malleret called them "Roman or Psuedo-Roman," but some of them are likely from the Eastern Mediterranean [pp. 269-71].

A few beads at each site are made from materials not locally available and were clearly imports. Several probably came from the Roman World, while at least one came from further east. A coral bead at Mantai reminds us that coral was a major Roman import to India. Warmington suggested that Indians traded coral for pearls [1928:263], and the position of Mantai near the pearl beds of the Gulf of Mannar, as well as the discovery of unperforated pearls in the lower levels would strongly suggest this commerce at Mantai.

At Oc-eo were a couple of amber beads and one of jet [p. 238]. The amber is likely to have come through the Roman trade, ultimately from the Baltic. The jet may have as well; the Romans were fond of jet, and Pliny says their major source was Lycia in Turkey [Eichholz 1962:113].

A bead of lapis lazuli was found at Arikamedu, a fairly large square tube of poor grade stone, similar to others from contemporary sites in south India (the C.B.R. data bank on Indian beads indicates seven other sites with these beads). The only known ancient source for lapis lazuli was Badakhshan in north Afghanistan, controlled at this time by Parthain Persians. This is the only bead from the Persian region found at this time in these sites.

Finally, we must mention beads whose origin is more ambiguous. These are gold-glass beads, made of two tubes of glass, the inner one coated with a foil of gold (or other metal) and the outer one serving to protect the metal foil. They are found at all three of these sites at this time. They are

also found in the Medieval levels at Mantai and at Nishapur. Moreover, they are well known in Europe and far to the east in Thailand, Vietnam, south China, Malaysia, the Philippines, Java, and Korea, spanning the entire first millennium A.D. At least some of these beads are Egyptian made [Boon 1966]. Boon suggested that they were principally Coptic in date, but they are known earlier than that as well. Their presence in small numbers at many Indian sites has led some Indian scholars to suggest they were made in India [Dikshit 1969:56-8; Singh 1983]. Their wide distribution in time and space makes it all but certain that they were made in more than one place, but much more work has to be done before we can unravel their entire history.

Beads from Arikamedu

Another thread connecting these sites is the Arikamedu bead industry. The early date of beadmaking there, confirmed in Phase A from 250 to 150 B.C., and its evident large size (I catalogued over 50,000 beads and wasters in the Pondicherry Museum) suggest its importance for beadmaking at this time. In addition, there are several beads at both of the other sites which almost certainly were made at Arikamedu, and even more important is the evidence that Arikamedu beadmaking was transferred to the other two sites.

Both Mantai and Oc-eo [pp. 254, 257] have some translucent green (or blue) glass tubes which were drawn and paddled into square or hexagonal shapes. These beads were made at Arikamedu, perhaps as imitation beryls, which the Romans greatly favored. There is no indication they were made at the other two sites, and their scarcity indicates importation.

At Mantai was a flattened opaque red collar bead. As a specialized type, collar beads are Indian, and Arikamedu first made them in glass. These were common at Arikamedu, and most likely came from there. There were other collar beads at Oc-eo, somewhat different than Arikamedu ones, and may have been locally made [p. 253 ff.].

An onyx pendant, flat in section and somewhat pentagonal in profile, was found at Oc-eo [p. 241]. Such pendants were made at Arikamedu, which may have been the first place, at least in India, to use acid for coloring onyx black [Francis 1986b:55-6]. These pendants have been uncovered from Iron Age sites in Thailand [Francis 1987a:10]. Two citrine beads (golden quartz, inevitably made by artificially treating amethyst) found at Oc-eo [p. 198] may have also come from Arikamedu, perhaps the first producer of this stone [Francis 1986c]. A citrine bead at Mantai was found at a later level.

Beads from India and the Far East

Aside from beads which can be ascribed to Arikamedu itself, these sites contain some which came from other parts of India. At Arikamedu are only a a very few (soda) etched carnelians, so scarce as to suggest they were not made there. India had a lively industry in these beads from high antiquity. No etched beads were found at Mantai, but at Oc-eo one of a typical south Indian pattern was uncovered [pp. 203-4]. It is a round tabular with short dashes radiating toward the center, listed as Pattern 24, and found mostly in southern Megalithic tombs, down to the early Historic Period [Dikshit 1949:27]. Dikshit noted a parallel at Ras Shamra (Ugarit), Syria [p. 36].

Only a couple of faience beads have been found at Arikamedu; they must have been imported from elsewhere in India. Two dark translucent blue glass melon beads made in series and later broken apart were also found. These are typical products of Satavahanna sites from the Peninsular region ca. 2nd century B.C. to 2nd century A.D.

At Mantai were found ten beads of dark translucent blue with white zones so deep into the matrix that they often reach the perforations. These deep zone beads are known from the Gangetic Valley [Narain and Singh 1977:39], the Deccan Peninsula [Dikshit 1969:58], and southern Megaliths [Beck 1930: 173]. Some were folded, and others wound; both types were found at Mantai.

Only a single bead from the Far East has been found in these sites at this time, and it is not really a bead. It is a long spool shaped blue glass "capstan bead" found at Oc-eo [p. 254]. These are not really beads but *erh tang* or ear spools made in Han China [Francis 1986d:10, 19].

THE MEDIEVAL PERIOD

In this period our attention swings away from Arikamedu and Oc-eo to focus on Nishapur and the later levels at Mantai. Arikamedu was abandoned in the 3rd century A.D., and Oc-eo destroyed by the Kymers in the 7th. Mantai was still an important port until the Cholas invaded from southern India in the 10th century, while Nishapur, which had been founded under the Sasanians, reached its height in the Early Islamic period, finally being destroyed by the Mongols in the early 13th century. The connections between Mantai and Persia were revealed by an Egyptian monk, Cosmas Indicopleustes, who visited Sri Lanka in the 6th century, long after the bulk of trade with Rome ceased. Although he did not mention Mantai (or any city) by name, he discussed goods coming to Sri Lanka from the East or West and being shipped out on the other side, strongly indicating that he spent some time there. He continually referred to Persian merchants and Chinese goods [McCrindle 1897; Francis n.d. d]. Nishapur was not a sea port, although it must have participated indirectly in international maritime commerce, as it was the leading city of Persia in its day and one of the largest cities in the world.

Beads from the West

Only one bead type can be ascribed to the Medieval Mediterranean world, but it was found both at Nishapur and Mantai: coral. We have noted that coral was a leading Roman export to India. It continued to be important (indeed, into the 20th century) in the Egyptian-Indian trade, and a letter of 1119 by Issac Nishaburi, a Nishapur merchant who lived in Alexandria, attests to its value in his business [Goiten 1961:70; 1963:198; 1973:247-8].

A couple of amber beads at Nishapur came no doubt from further West, most likely the Baltic region. They did not necessarily come through western Europe, however, as the Persian Sasanians and early Muslims maintained trade relations with Russia, especially exchanging silver for furs, but also for honey, wax, and amber [Frye 1972; Harper and Meyers 1981].

Several glass beads at Nishapur came from the West, most likely Syria or Egypt. These include mosaic and stratified eye beads, beads with combed and others with wave and blob decorations. Glass beadmaking of this period still needs to be studied in detail, but it is interesting to note that hardly any beads of these types were found at Mantai.

Gold-glass beads were found at both Medieval Mantai and Nishapur. Neither place seems likely to have made them. However, as discussed above, they are so widely distributed chronologically and geographically that more study is needed on them to determine their source or more likely sources.

Beads from Persia

Several beads at Mantai closely match some from Nishapur, and can be assumed to have been imported there by the Persians. We cannot be sure if they were made in Nishapur itself, but if not, they were made elsewhere in Persia.

Lapis lazuli is the most outstanding of these beads. You will recall that a poor grade square lapis tube was found at Arikamedu, similar to beads at early south Indian sites. In the Medieval Period, however, the Mantai lapis is of fine quality. Not only did Nishapur control the lapis sources and was a likely beadmaker (it certainly was of turquoise), but the shapes of the beads from the two sites closely match. At both sites there are cornerless cubes, beautifully made octagonal drop beads, and flat diamond beads, though differently perforated. A spherical lapis bead at Mantai was not matched at Nishapur, and several types at Nishapur not found at Mantai (barrels, flat drop pendant, a round tabular seal, and a bird-like pendant). Similar beads from a known source is eloquent testimony to Persian-Mantai Medieval trade.

There was one cornerless cube jet bead at Mantai. At Nishapur jet was the most common bead material, accounting for about 41 % of the 700 or so beads. It appears to have been made there, and was worked in many ways: engraved, painted, cut in extraordinary forms, and even used for seals. The source of all this jet is not known, but there are coal deposits near Nishapur.

Three other bead types at Nishapur were not recovered at Mantai. Faience, which made up more than 20 % of the Nishapur beads, was apparently locally made. Seven (soda) etched carnelians confirm that their styles are Persian rather than Indian [Francis 1980]. A dozen glazed quartz beads show that this technique was still used. All three types are of special significance in Persian bead history. Each had been considered to have ceased production with the coming of Islam. Modern faience production was said to have been a re-invention [Allan et al. 1973:171]. Soda-etching was thought to have been abandoned for beads in favor of plaques with Qoranic inscriptions [Francis 1980]. Glazing quartz has completely disappeared. The discovery of these beads in significant numbers at Nishapur prove that the methods did not abruptly stop with the Islamic dispensation.

Beads from India

It is likely that India furnished many stone beads at Nishapur and at least some at Mantai. The western Indian agate and carnelian industry had already been a major producer of stone beads for millennia [Francis 1982a]. It will require more detailed study to show which beads came from this industry and which from other areas, but the lack of evidence for local manufacture strongly points to importation, and this region is the most likely source.

At Nishapur were 50 plain carnelian beads, mostly well cut, many faceted. At Mantai most of the 19 carnelian beads were locally made. This industry (which also included quartz crystal) was late starting, not beginning until the 7th century or so. It was not particularly outstanding, making only rough oblates. The one cornerless cube found there was likely imported from Western India, and duplicates cornerless cubes at Nishapur.

Both sites had some onyx beads, 13 at Nishapur and 12 at Mantai. There is no evidence for local manufacture at either place (beadmaking evidence is scanty at Nishapur, having been excavated some time ago). Onyx, almost all of which must be artificially colored, is an important product of the Indian agate bead industry, using grey and white "babaghoria" agate as the base.

Except for a couple of collared beads at Mantai, the only glass bead from Medieval India shows up at both sites. This is a small drawn bead, either oblate or tubular, distinguished by a core of yellow glass and an outer coat of dark translucent green. Such beads are known from sites in Peninsular (Deccan) India in both the Early Historic and Medieval Periods.

Beads from the Far East

Our knowledge of beads of the Far East is less complete than from some other regions. In the last few years we have come to appreciate that production in China and neighboring areas was larger and more varied than had been suspected before. Until we have more hard data from these areas we will not know for sure what sorts of beads were produced. The initial result of these studies, however, furnish hints about Far Eastern production by giving us an idea of the distribution of certain bead types. Two of these beads are known thus far only from Sri Lanka and farther East, and are candidates for having been produced in Eastern Asia.

One is a stratified eye bead with a dark blue or green body, and blue on white eyes. It differs from stratified eye beads known elsewhere, including Nishapur. To date, these beads have only been found at Mantai and Thailand. One was excavated at Takuapa, Thailand, dated from the 7th to 10th century [Lamb 1961:52, Pl. II], contemporary with the Mantai one.

The other bead is dark blue or green wound glass pressed into a hexagonal bicone shape. At Mantai, three were found at or near the surface. Further to the east, however, they have been found in earlier contexts, at Oc-eo, where analyses show them to differ from the usual glass at the site [pp. 254, 256, 466], and in Han tombs near Canton [Guangtong Provincial Museum, personal observation]. One in the Philippines has no provenience, but may be later [Villegas 1966: bead color plate 2, row 3.5].

INDO-PACIFIC BEADMAKING

The most important trade bead of the ancient world was the smallest. Small (usually under 6 mm in diameter), monochrome beads made from cutting tubes and reheating the segments to round them off (drawn beads) are known from South Africa to Korea during the whole period we are considering. They have been given other names, but because none are really appropriate, I have coined the term "Indo-Pacific" beads in recognition of their distribution.

The long time span of these beads and their wide distribution means it is unlikely that they were made at one place for the whole period. The most interesting development in the current study is that we can now begin to piece together their history, which is at once complex and significant.

The story begins at Arikamedu. Indo-Pacific beads were made at least by the 2nd century B.C. The analyses of beadmaking waste shows that tubes were formed in essentially the same way as by beadmakers producing similar beads today in the village of Papanaidupet. The complex process involves a dozen men working through the night with up to 50 kg of glass. They form a large cone which is put on a large metal tube and pierced through the tube with an

iron rod. This pierced cone is put into a special furnace and on the opposite side a master draws out a continual tube for some three hours [see Francis 1982b:16-18].

The process produces glass waste pieces, most of them so distinctive that workers can tell which step of the process made them. Identified pieces gathered at Papanaidupet were compared to those at Arikamedu and found to be completely congruent. At this point we had two ends of the industry: the beginning and current production. But, Arikamedu was abandoned by the 3rd century B.C., and though beadmaking at Papanaidupet may go back at least a century, we have no hints of really ancient production there.

This is the significance of the Mantai and Oc-eo data. Both sites were Indo-Pacific beadmakers. At Oc-eo, glass fragments, slag, drips, beads fused together from the reheating process, many cut tubes, and unreheated pieces were found. These were also found at Mantai, along with a few pieces very similar to beadmaking waste produced by the unique tube-drawing process. While we do not have all the data needed to state with absolute certainty that the tubes were drawn in the same way as at Arikamedu and Papanaidupet, it would seem most likely. We don't have this material chiefly because the excavators were not looking for it, were unfamiliar with the whole question, and excavated principally in the center of the mounds, while we would assume that glass would have been worked elsewhere. This evidence has yet to be finally confirmed, and will probably require my examining these two sites myself, a prospect that does not look too likely in the near future.

There appear to be other places where these beads were made as well, such as Thailand and Malaysia, possibly Java and Sumatra, and elsewhere in southern India. These places are currently being investigated. Because of the complexity of this process, it seems most likely that Indians either taught others to use it or themselves lived abroad making beads.

We can now sketch a tentative historic reconstruction of the industry. It began in Arikamedu, which probably held a monopoly for some time. When (or before) Arikamedu was abandoned in the 3rd century A.D., beadmakers went to Oc-eo and Mantai. Work stopped at Oc-eo in the 7th century, and beadmakers may have gone elsewhere in Southeast Asia, where early states were being formed. Mantai made Indo-Pacific beads until invaded in the 10th century. Carswell suggested that Mantai refugees went to Nagapattinam, the chief port of the south Indian Chola dynasty [1983:85], and a likely producer for a few centuries. J. Lavanaha said in 1593 that these beads were taken to East Africa by the Portuguese from Nagapattinam, whence they were made [Theal 1898:303]. Subsequent events, particularly European domination, were most likely responsible for the destruction of the industry in Southeast Asia, while in south India it may have retreated from the coast (and exporting) to the more isolated (and thus protected?) location of Papanaidupet.

Much more data is needed to refine this outline, and will be reported as it becomes available. However, at this point we have at least a sketch of this industry, which made the most important Trade Beads of all times.

Considering all the various apparent Indo-Pacific beadmaking centers, is there any way in which their products can be distinguished? One important tool is glass analyses, and a program for these beads has commenced. I am providing the beads, and Pamela Vandiver of the Conservation and Analytical Laboratory of the Smithsonian Institution will be making the analyses. Glass analyses is not easily available to everyone, of course, and some more simple distinctions will also be welcomed.

At least one distinction may come from the colors of the beads made in the different centers. Table 2 compares beads of Arikamedu, Oc-eo, Mantai, and two Medieval Malaysian sites, the latter of which may have made beads [Lamb 1965:113-5]. The figures are not strictly comparable, but given as a guide.

Table 2: Colors of Indo-Pacific Beads (in percent)

	Arikamedu beads	Arikamedu all glass	Oc-eo	Mantai	Kuala Selinsing	Pengkalan Bujang
Red	31.94	45.61	40.14	12.25	29.15	32.99
Orange	0.36	<0.01	4.22	26.55	13.07	2.54
Green-Blue				6.24	1.01	
Medium Blue	}	}	}	30.06	}	}
Dark Blue	}41.08	}24.48	}23.93	3.00	}32.16	}30.46
Black	11.98	18.97	6.12	3.57	0.50	17.66
Trans. Green	0.98	1.49	0.95	11.40		
Opaque Green	7.14	3.68	6.91		11.06	2.03
Yellow	2.00	1.05	17.46	10.83	13.07	14.21
Violet	5.27	1.75		0.17		
Sample size	4706	27635	6422	1762	844	4457
Centuries	3rd BC - 3rd AD		2nd-7th	1st-10th	pre 10th	13th

The notable changes over time are increases in orange and yellow glass, and decreases in black and violet, though at Pengkalan Bujang the importance of orange and black were reversed. At Arikamedu orange was so scarce that it was probably an accidental by-product of the red, as the yellow may have been of the green. Blue lightens over time: most at Arikamedu was dark, but medium blues increased over time at Mantai. The figures for the other sites are not broken down. Opaque green looses importance; though the Malaysian sites were said to have it, the degree of opacity is not known.

A Few Other Beads

There is hardly room to discuss in detail some other beads from these sites. At Oc-eo and Mantai, and to a lesser extent at Nishapur segmented glass beads were found of several different types; the Oc-eo and Mantai types were mostly similar. These beads were made by constricting tubes of glass and cutting them apart, either leaving several beads together or cut as single beads. The center (or more likely centers) of this industry are not known, but similar beads are found throughout Europe as well. As a class, they have not been studied, but their importance should encourage more work on them.

A complex glass bead was made at Mantai which began as a black ribbon with yellow, white, and/or red stripes. The ribbon was folded into a tube, and then constricted along its length. The resulting bulges were cut apart and reheated. Several of these striped folded segmented beads were found which were incompletely folded. Apparently similar beads are found in Thailand and Sarawak (on the island of Borneo), and more examination of them needs to be done to confirm that they are of the Mantai type.

A surprise at Mantai was evidence of striped drawn beads made there. At first I assumed they were modern intrusions, but some were dated early, and a cut tube end was also found. Mantai had the technology to make them; such beads are found at other early sites only rarely. These need more research.

Finally, it should be noted that at Arikamedu, Mantai, and Oc-eo the basic materials for Indo-Pacific beads (drawn tubes or solid canes) were also used for subsidiary beadmaking. This was reported from Arikamedu [Francis 1986a:4], and one of the beads, the paddled green or blue tubes, were found at the other two sites. Apparently at Mantai and likely at Oc-eo large diameter tubes were pinched off while heated to make large oblates and bicones. Similar pinched beads are known in Korea, China, and Indonesia. Because of the lack of general understanding of beadmaking, they have probably not been fully reported, and their distribution is not yet known.

Summary and Conclusions

The initial study of beads from this vast region and long span of time provides a framework from which later work can proceed. No doubt some conclusions reached here will have to be revised in the future, but this is the nature of research and provides continuing interest. Several important points have emerged at this time:

1. Arikamedu was a dominant bead power in Asia throughout its occupation. Beads made there have been found at Mantai and Oc-eo. More importantly, it was the origin for the Indo-Pacific bead industry, which put its stamp on the world bead trade for nearly 2000 years.
2. Shifts in trade patterns took place during this time. Mantai, Oc-eo, and Arikamedu have beads from the Mediterranean basin, although rather few. By the Medieval period no such beads turn up at Mantai, as trade links had largely been broken. In that period the bulk of imported beads were Persian or Indian and probably brought by Persian traders. Only at Mantai are there a few beads which suggest East Asian origins. Through the whole period, India remained a major bead exporter, especially Arikamedu, the Deccan or peninsular glass industry, and the western agate industry.
3. The most important evidence to emerge is a picture of the Indo-Pacific bead industry. Far from being rooted to a single locale, it clearly had several centers, some of which we can identify and correlate with historic events. Arikamedu founded the industry, which then spread to Mantai and Oc-eo. As these sites were destroyed, beadmakers moved to Southeast Asian centers, which still need to be identified, and some apparently back to India at Nagapattinam, whence they eventually migrated to Papanaidupet, the last representative of this major bead industry.

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