*Contributions of the Center for Bead Research 4*

# B E A D S  A N D  T H E  B E A D  T R A D E

# I N  S O U T H E A S T  A S I A

A preliminary report on research into the bead trade of Southeast Asia as a segment of the Indian Ocean Bead Trade Project coordinated by the Center for Bead Research

Peter Francis, Jr.
Center for Bead Research



*Center for Bead Research, 4 Essex Street, Lake Placid, N.Y. 12946 U.S.A.*

## A C K N O W L E D G M E N T S

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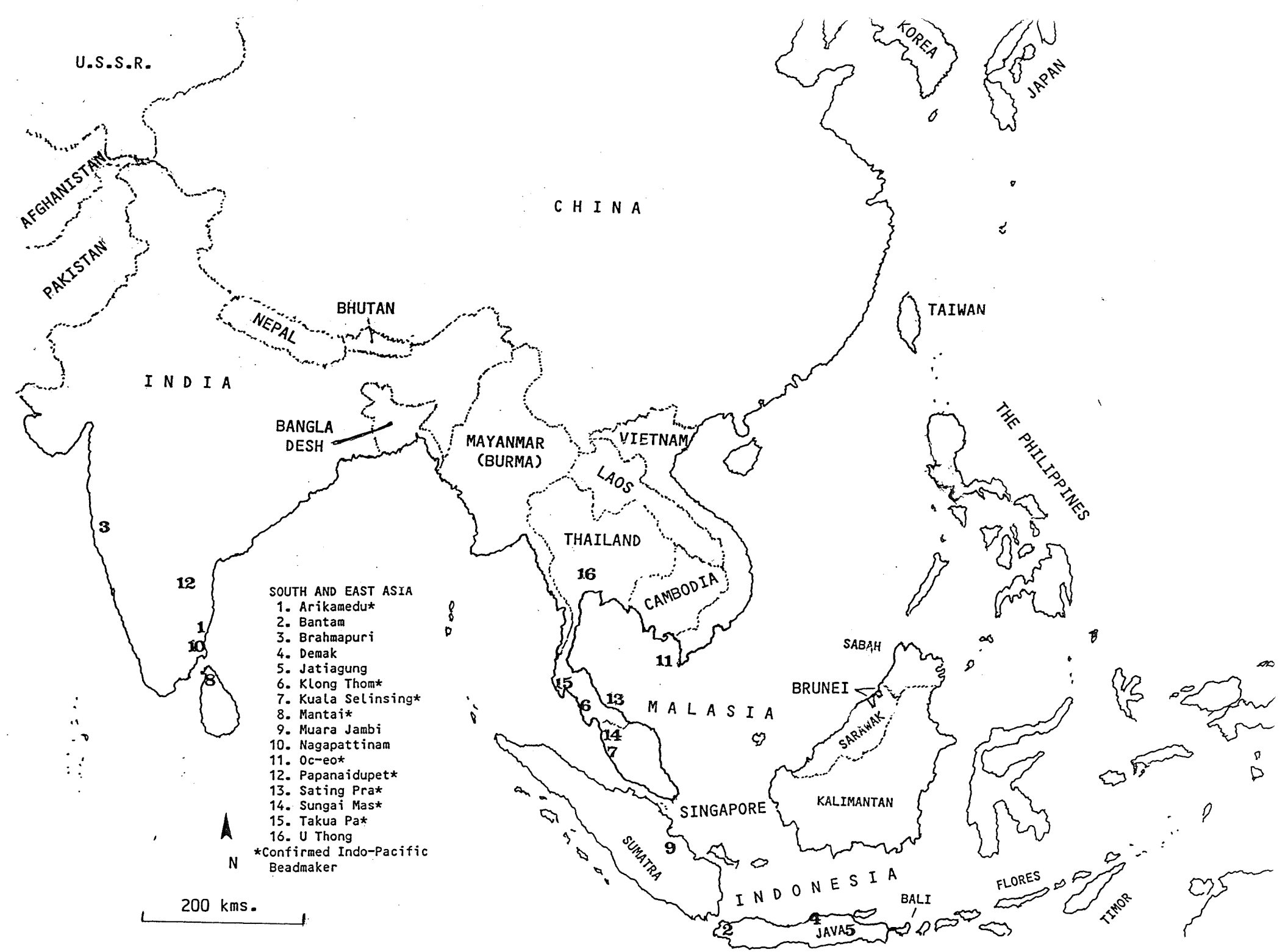
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SINGAPORE
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TIMOR
JAVA
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7. Kuala Selinsing*
8. Mantai*
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N
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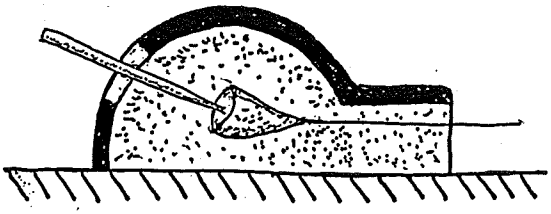

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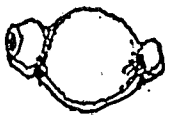

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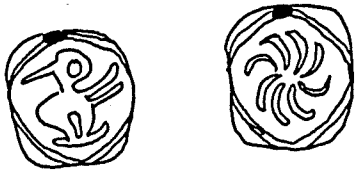

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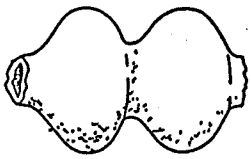

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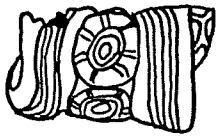

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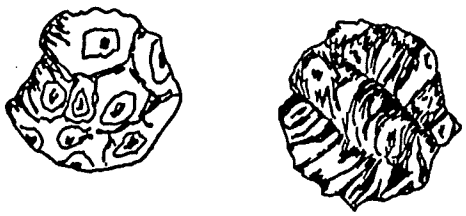

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# BEADS AND THE BEAD TRADE IN SOUTHEAST ASIA

Peter Francis, Jr.

## INTRODUCTION

### The Indian Ocean Bead Trade Project

The Indian Ocean, its tributaries and the Western Pacific, have furnished trade routes for well over two millennia. In terms of the numbers of people affected, the cultures touched upon, and the value of goods, this route has been more important than the more celebrated and better known Silk Road.

Many kinds of goods were traded. In bulk and value, textiles were first: Chinese silk, Indian cotton, and Indonesian batik. Foodstuffs (grain, wine, livestock, and above all spices) ranked next. Then came forest products: aromatic woods, medicines, lac, and bird's nests, to name a few. All these have disappeared from archaeological view; their only traces are in contemporary historical accounts. For years archaeologists have relied upon ceramics to trace this trade, but another universally traded object, the humble bead, has also left its mark and deserves serious study.

We are concerned with a period nearly 2000 years long from the mid third century B.C. until the mid 17th century A.D. These dates are not arbitrary. We begin as the first Great Empires were established in Rome, Persia, India, and China, and close as Europeans began to control the trade. It is evident that this history is cut from whole cloth, and that to understand it, we must consider it as a unit. The Center for Bead Research has enlisted the help of more than 50 institutions and authorities to this end. Many phases of the project are completed; the Southeast Asian sector is the latest.

### The States of Southeast Asia

Southeast Asia stretches east from the southern flank of Asia. Five of its states are on the mainland: Myanmar (Burma), Thailand, Vietnam, Laos, and Cambodia (Kampuchea), four are on islands: Singapore, Indonesia, Brunei, and the Philippines, and one straddles the mainland (West Malaysia) and the island of Borneo (East Malaysia: Sarawak and Sabah).

There is great contrast among these states. Indonesia is the fifth most populous country in the world; Brunei is amongst the smallest. Bangkok city has 2.5 times the area of Singapore state. Singapore and Brunei are wealthy, Thailand and Malaysia are catching up; the Philippines and Indonesia are not far behind. The other four states are devastated. Brunei, Malaysia, and Indonesia are Muslim countries; the Philippines is the only Catholic state in Asia. Except for Singapore, Buddhism dominates elsewhere. Indochina has Communist governments, Myanmar a military dictatorship; the others are more or less democratic. Each state is to some extent multi-racial, most evident in Malaysia, where Malays are a bare majority. The region has long been open to trade and cultural exchange, and the travels of Malay sailors, Chinese merchant-craftsmen, and Tamil beadmakers is a key to our story.

Southeast Asia could not help but be influenced by two great neighbors: India and China. This is evident in regional names (Indochina; Indonesia), Chinese and Indian settlers, and the traces of Buddhist and Hindu culture (Angkor Wat, Borobudur). In the past, there was a tendency to see outside cultures as paramount in the region's development. That view has been refined, and there is now more emphasis on local evolution. As we shall see with the beads, both outside and local strains were important.

State formation was slow relative to China and India. The first known state is Funan (modern Cambodia and southern Vietnam), not recorded until the 2nd century A.D. The Khymers on the mainland and Srivijaya of Sumatra and Malaysia followed, though the nature of the latter state raises many questions. Java, Sumatra, and the mainland witnessed struggles between competing centers of power, but no state was formed in the Philippines. Islam in the 13th-14th centuries changed the regional balance of power, as did the Europeans from the 16th century. Save for Thailand, all Southeast Asia became European colonies, regaining freedom by the mid 20th century.

This is not the forum to discuss the historic, socio-economic, or ethnodemograhic complexity of Southeast Asia. The interested reader is especially referred to Cady (1964) and Fisher (1967).

## The Methodology of The Bead Study Project

The Center for Bead Research's methodology has proven successful in many different contexts. Data is gathered from several sources: archival (history and ethnohistory), comparative literature (archaeology and ethnology), and direct observation (a detailed cataloguing of a bead assemblage). This data is used to answer many questions we might ask of beads, which can be grouped into four: 1) What is the origin of the bead? 2) How did it arrive at the site? 3) How was it used? and 4) How did it leave the systemic (living) context to enter the archaeological or ethnographic context? When several related sites have been studied their data can be collated to produce a regional or intrasite bead history. This is often done, as here, with a particular topic in mind, in our case, trade and origins in general.

Clearly, to study beads properly they must be examined and access to libraries and knowledgable individuals is needed. This nearly always requires going to the places involved, hence this tour. The limits of this project, however, should be fully understood. They include:

1. Only five states have been visited. The political situation in four (Myanmar and the Indochinese states) makes it impossible currently to carry out such work. The lack of money and time also meant that Brunei was not visited; most beads that have been excavated there have been published.

2. Published material is primarily in English, and for Indochina in French. This has been collated, and for Indochina remains our chief source of information. Few early Dutch publications are of much value (some have been partly translated for us). In modern Indonesia and often in Malaysia, publications are in Bahasa Indonesia/Malay. The author has begun to study this fascinating language and is able (slowly) to read recent studies. Material in Thai or Chinese is inaccessible except a few key papers which have been translated, in part for us. There is no doubt much to be learned in Manila archives. Philippine archaeologists who do not know Spanish urged me to study there, but time has not permitted this yet.

3. In general, archaeology is poor in Southeast Asia. This does not reflect on individuals nor the quality of their work. Rather, it is due to the limitations, human and financial, with which they struggle. Archaeology is not, and cannot be, a priority of developing nations. It is yet new to these states, and few have the resources to develop its full potential. But, things are changing quickly; I was struck by the advances made in Thailand since my visit five years ago. The timing of this project is fortunate, as several key bead sites are being re-excavated. There is an emphasis on "salvage archaeology," different from the American variety, aimed at saving a site before the looters arrive. Illegal excavation is a mounting danger; in Thailand organized gangs are so bold that they keep working even with the archaeologists present. Indonesia and the Philippines have similar problems.

4. It was not physically possible to catalogue all the collections seen. One which did receive concentration is the Type Collection of the Philippine National Museum [Francis 1989a]. For the rest, only notes and samples could be taken. The task of properly cataloguing these collections must fall upon the staff of the institutions involved. Movement is underfoot to provide training to staff members so that this important task may be completed in unison to add to our knowledge.

Despite these limitations, much was accomplished. In each country on the tour (the Philippines, Indonesia, Singapore, East and West Malaysia, and Thailand) the National Museum and/or Center of Archaeology was consulted, in addition to universities with related programs and provincial museums. The archaeological, and where appropriate the ethnographic, collections of a total of 15 institutions were examined.

While discouraging anything which might lead to looting, some 14 private collections were also examined. Their provenience varied widely, from surface finds by the collector to purchase on the antiquities market. Some were ethnographically informative. Most at least alert the student to what may be found in a scientific context. The value of this material is not, of course, as great as that scientifically uncovered by trained personnel. Nonetheless, some collectors have a deep knowledge of local traditional bead use and have valuable observations to contribute.

Aside from collections, I consulted two gemological institutions and read in seven libraries/archives in the region. Eight lectures were given on the goals and progress of the project, two in India (Deccan College, Poona and the Pondicherry Historical Society) and others at the Philippine National Museum and the Oriental Ceramic Society in Manila, the National Research Center for Archaeology (Jakarta), the National Museum of Singapore, the Sarawak Museum, and the Division of Archaeology/Fine Arts Department (Bangkok). Samples, mostly of Indo-Pacific beads, were received from nearly every consulting institution. Their analyses will extend our data base. Considerable enthusiasm for this project and the study of beads has been engendered among the staff of institutions. Future contacts are assured.

## The Nature of this Paper

Within the confines of a short paper, it is not possible to recount all details which have been noticed concerning the Indian Ocean Bead Trade and especially the Southeast Asian sector. Rather, this report summarizes what was observed. More details will be forthcoming in other publications.

Glass beads are discussed in Sections A and B. Two technical terms are needed to understand glass beads. "Drawn" refers to a bead cut from a glass tube which was pulled or "drawn" out from a gather of glass (Section A). "Wound" refers to beads made by winding glass around a rod, in one of several ways (Section B). Stone beads are discussed in Section C. Section D is a summary of the study and its place in the Indian Ocean bead trade.

## A. THE INDO-PACIFIC BEADS

### Introduction

Small, monochrome drawn beads of rather dull and limited colors are the most common trade item in Africa and Asia for some 2000 years. They are found in the tens of thousands from South Korea to South Africa, Mali to Bali.

These beads have been discussed by many scholars, some giving them names still current. Van der Sleen [1956] coined "Trade Wind Beads," for both drawn and wound beads which crossed the Indian Ocean to East Africa [1958: 210-1]. Davison [1972:149] adopted the term and further defined a Trade Wind Beads Chemical Group, with a trace of uranium. In correspondence and by inference in publications she considered these the "true trade wind beads." The differences between drawn and wound beads are so profound that there is no justification for grouping them together. They were made at different places and must be considered separately.

Lamb [1965a,b] introduced English readers to the Malay term "mutisalah," (false pearls) for the opaque red drawn beads. Soon thereafter van der Sleen [1966] took Lamb to task for this. According to Sleen, mutisalah beads were not drawn but very small wound beads with some 40% lead content. Both men were correct; the Timorese call any small opaque red or orange bead mutisalah, whether drawn or wound [Adhyatman 1989]. The drawn ones are Indo-Pacific beads; the wound ones are Chinese "coil" beads. Again, these two must be sharply separated, and there is no reason to concentrate on one or two colors at the expense of other similar beads.

As a result of these confusions it is appropriate to introduce a new, closely defined name for these beads. "Indo-Pacific" is short for "Indo-Pacific Monochrome Drawn Glass Beads," indicating their distribution, color, manufacturing method, and material. They are further defined as beads made from tubes drawn by the lada method, as described herein.

Many scholars have discussed these beads, usually attempting to discover where they were made. This was never really successful; most guessed they were "from India." Despite a vigorous archaeological agenda in India, no site has ever been found which could possibly have made and exported so many beads over such a long time. Only Lamb [1965b:95] saw further when he wrote: "One is tempted to postulate...the existence of something like a nomadic bead making group, perhaps of Indian origin, which established itself at various South-east Asian centers where a bead demand existed."

It has long been recognized that these beads were made at Arikamedu (ca. 250 B.C. to A.D. 250), on the southeast coast of India, near Pondicherry. Similar beads are currently made in Papanaidupet, Andhra Pradesh [Francis 1982a:16-18] by a unique method. After documenting the modern process and comparing the remains with those from Arikamedu the inescapable conclusion is that the two places made/make beads in the same manner [Francis 1987a:35].

## Making Indo-Pacific Beads

Briefly, molten glass is poured into cakes or ingots, which are broken up and taken to a specially built furnace, where the chunks are placed on a long trough attached to one side. A crew of a dozen men go to sleep, while one of them feeds the fire and watches the glass until it begins to melt. Shortly after midnight the workers are awakened, and they take the glass onto long poles sheathed in iron, called "gedda paru," the Tamil name for sticks used to stir mud for housebuilding. The glass is put into the furnace and stirred with the gedda paru until it is well melted. Then it is put onto a long iron tube, the lada. On the lada the glass is rolled along the top of a low wall and formed into a cone. Through the lada a long iron rod, the cheatleck, is thrust to pierce the cone from base to apex. The perforated cone, still on the lada, is returned to the furnace. From the opposite side a master takes an iron hook and pulls at the tip of the cone. After a few attempts, he has a tube, drops the hook, walks back five meters, and pulls the tubing out hand-over-hand, breaking it into meter lengths.

The tubes are cut into sections by a man who holds a dozen or so in one hand with a short length protruding over the edge of a blade driven into the ground. He brings down another blade held in the other hand to cut the tubes. To smooth the resulting sharp ends of these segments, they are packed in ash and heated and stirred for a half hour in a small furnace. Then the beads are shaken out of the ash and strung up by women and girls.

Every step of this process duplicates the way small drawn beads were made in Europe and elsewhere before the introduction of machines, <u>except</u> the way in which the tubes are made. That complex procedure requires a unique furnace, a unique set of tools, and at least a dozen trained men, who work up to 50 kgs (110 lbs) of glass over a seven hour period. The complexity and the relative difficulty of transferring this technology should be noted.

Each step of the process leaves physical traces in the form of waste. By identifying this waste we can identify where these small beads were made for the last 2300 years. Although gaps remain, the story is now largely known.

## Indo-Pacific Beadmakers

The industry began at Arikamedu, almost from its founding; there is no evidence for earlier drawn beadmaking. The city was a flourishing port for more than five centuries, and is identified with Ptolemy's Poduca emporium, with a small colony of Roman merchants. It was abandoned by the 3rd century A.D., likely overrun by the Kalabhras, which the Tamil Sangam literature depicts as "barbarians" [Ramasamy 1987:14-5]. Before it was abandoned beadmaking was transferred to three other sites by the 2nd century:

1. Mantai, Sri Lanka (1st/2nd to 10th centuries), the major transfer point for ships from the West and the East and easternmost terminal of Western sailors. It is identified with Modutti emporium [Francis n.d.a, b].
2. Klong Thom, in southern Thailand (2nd to 6th centuries), the western port for the trans-isthmus trade across the Kra peninsula. Recent finds of Roman glass beads and a Han bronze mirror suggest that this was the spot near Trang identified by Braddell [1980:40] and widely accepted as Ptolemy's Takkola emporium.

3. Oc-eo, or Go Oc Eo, Vietnam, the port of Funan, (2nd to 7th centuries) the major stop between Malaya and the Far East [Malleret 1962]. Malleret and others are inclined to identify it with Ptolemy's Kattigara emporium [Chakravarti 1972:110].

All three sites show affinity with each other and with Arikamedu. The bead evidence alone (Indo-Pacific beadmaking, stone beadmaking, the presence of Roman beads, and intrasite trade) indicates that.

Mantai sold beads west through the Arabs and Persians, and were probably the first to reach Africa. Oc-eo may have served prestigious East Asian markets. The Annals of Wu (A.D. 222-280), says that Funan envoys presented liu-li or opaque glass to the Wu court at Nanjing. Opaque glass would not refer to vessels; the only opaque glass made in Funan was Indo-Pacific beads. The History of Liang (A.D. 502-566) says that King Rudravaram sent tributes to Liang at Nanjing in 519, which seem to have included glass beads [Pelliot 1903:283, 270]. The presents sent by the King of Paekche in Korea to the Japanese court in 543 may have contained beads from Funan, where the merchandise was bought [Best 1982:466]. Certainly, Indo-Pacific beads were fit for royalty; the Korean kings of Paekche and Silla were buried with tens of thousands of them [Francis 1985a:11, 13]. The market for Klong Thom beads may have been Southeast Asia. Perhaps her beads reached Gilimanuk, Bali, and supplied Philippine and Borneo sites. Analyses will help confirm or revise these suggested market structures.

Oc-eo was overrun by the Khymers in the late 6th/early 7th centuries; Klong Thom was abandoned about that time. We have no further information on the making of these beads in Indochina. It may have continued under the Khymers, but possibly did not. On the Malaya peninsula, however, the industry did survive.

In southern Thailand, Sating Pra (7th to 10th centuries) became an Indo-Pacific beadmaker. It was related to Oc-eo and like Oc-eo built canals for inland transportation, even linking the South China and the Andaman Seas. It was a large city of perhaps 110,000 people -- Khymers, Tamils, and Malays -- and an important link in the Srivijaya system [Stargardt 1973:12-14; Bentley 1986:281]. Perhaps it can be identified with Ch'ih-t'u of the Chinese annals, a Funan vassal that became the major regional trading partner for China after the fall of Funan [Wang 1958:68].

At the same time, Kuala Selinsing, Perak, made these beads. An island at the mouth of the Selinsing River, it was not an ideal port. Its beads were sent northwards to Kedah, the Merbok Valley with its excellent harbor in the shadow of Kedah Peak (Gunung Jerai), visible 50 kms out to sea. Kedah was the region's great emporium. Braddell [1980] stressed its connections with Trang (Klong Thom). Thus, it may be that beadmakers from Oc-eo settled in Sating Pra, while those from Klong Thom settled at Kuala Selinsing.

In the 10th or early 11th century all the beadmaking sites shifted, perhaps due to the Chola invasions. Mantai was destroyed by the Cholas and the beadmakers settled again in southern India. J. Lavanaha in 1593 said the Portuguese went to India to buy beads, because they were the only ones wanted in East Africa: "They are made in India at Negapatam [Nagapattinam], whence they are brought to Mozambique" [Theal 1898:303]. A surface survey I directed devoted ten man-hours covering the old city at Nagapattinam in 1988, but no evidence for glassmaking/working was uncovered. The beadmakers were probably near rather than at the city, and moved to Papanaidupet later.

Kuala Selinsing was abandoned about the 10th century; ecological factors may have played a part (there are now eleven islands where one once was), or it may have been attacked by the Cholas. The beadmakers moved closer to their outlet, to Sungai Mas, near Pengkalan Bujang, the leading Kedah port.

One other place in southern Thailand, Takua Pa, (9th and 10th centuries) made these beads. The late remains there indicate that it should not be identified with Ptolemy's Takkola. Given the date for Indo-Pacific beadmaking, it may be that the workers came from Sating Pra.

Two places in Indonesia, Muara Jambi in Sumatra and Demak in Java, and two sites in central Thailand, U Thong and Nan Yong may have also made Indo-Pacific beads. Unfortunately, we do not have sufficient evidence at the moment to say with certainty if these were beadmakers.

By the 13th century Indo-Pacific beadmaking had ceased in Southeast Asia. Why this happened is not fully understood. Arab power begins to be felt, and the bead evidence shows intense Arab trade along Malaya. Chinese beads are much in evidence east of Malaya, and perhaps competition speeded the decline of the industry.

That Southeast Asian Indo-Pacific beadmaking industry died at this time is clear. There are no known beadmakers later than the 13th century; Sungai Mas was the last, but no beads are found in levels with Ming pottery (from 1368). Moreover, importing sites in the Philippines and Sarawak from the 13th century had no Indo-Pacific beads, which had dominated until then; they are completely replaced by wound beads, likely to be Chinese. See Table 1.

T A B L E 1

Beads Assemblages from Philippine and Sarawak Sites

Sarawak

| Site, Locale | Dates (A.D.) | Beads Uncovered |
|---|---|---|
| Kian Hitam, Niah | 9th C. | Nearly all Indo-Pacific |
| Sungai Jaong, Sarawak R. Delta | 9th - 10th | Indo-Pacific + Muslim beads |
| Bongkissam, Sarawak R. Delta | 12th - 13th | Coils and other Chinese beads |
| Gedong, Kuching district | 13th - 14th | Coils and other Chinese beads |
| Bukit Sandong, Kuching dist. | 14th - 16th | Few coils, many Chinese beads |

The Philippines

| Period | Dates | n. Beads | Indo-Pacific | | Chinese | |
|---|---|---|---|---|---|---|
| MA(E) | to 200 B.C.+ | 235 | 111 | 47.2% | 0 | 0.0% |
| MA(D) | to 12th C. | 282 | 196 | 61.5% | 0 | 0.0% |
| AT (E,M) | to 14th C. | 1003 | 11 | 1.1% | 534 | 53.2% |
| AT (L) | to 16th C. | 632 | 186 | 29.9% | 313 | 49.5% |

[MA = Metal Age, AT = Age of Trade and Contact with the East; (E) = Early, (D) = Developed, (M) = Middle, (L) = Late]

A few remarks are appropriate for the Philippines. If for no other reason than the large presence of Indo-Pacific beads, the terminal date for the Early Metal Age should be brought down to the first few centuries A.D. The date of 200 B.C. follows Fox's chronology. There appears to be a resurgence of Indo-Pacific beads in the Late Phase of the Age of Trade and Contact with the East. This is probably illusionary. They were found at only three sites, two of which accounted for 82.5%. These sites are early, dated to the 14th-15th centuries [Fox 1967:47], and could be earlier still. The others come from Calatagan, a very large cemetery that certainly had a longer period of use than Fox suggested. At least one bead there (a large orange disc) is an heirloom.

These caveats aside, the evidence from the two importing areas of the Philippines and Sarawak indicate that Indo-Pacific beads were gone in these regions sometime during the South or Late Sung Period, at a medium date of A.D. 1200.

## Indo-Pacific Beadmaking Evidence

Evidence of beadmaking does not rest on the uncovering of great quantities of beads but rather on the waste materials discarded by beadmakers. We can identify Indo-Pacific beadmaking sites by examining the wasters attesting to different stages of the process. To confirm beadmaking, especially by the complex Indo-Pacific method, requires finding the wasters. The stages of beadmaking and their waste products are described briefly below:

1. Glassmaking. This can only be confirmed by finding a furnace (not known yet from any of our sites) or discovering slag. Glass slag (or gall, skimmed off the top of the melt) is light in color and weight and highly alkaline [Bachmann 1982:20]. Beads and tubes melted into chunks indicate glassmaking, as these were reused as cullet in the production of a new batch of glass. Chunks of translucent "bottle green" glass, and the absence of beads of this color, indicates glass coloring at the site, as this is the first glass to be made in the absence of colorizers. These last two items are strongly suggestive but not conclusive for glassmaking.

2. Glassworking. Glass can be made at one site and brought to another for working. Chunks of colored glass in quantity suggest that it was being used for something. Small melted bits of glass (drips and splatters) indicate that glass was heated at the site.

3. Tube drawing by the Lada method. This process creates wasters so diagnostic that workers can identify the action which created them. Gedda paru flakes are thin and curved often with a little tail. They are bits of glass caught on a gedda paru and later knocked off. Horns and unperforated/twisted/bangle-like tubes come from early unsuccessful attempts to draw a tube from the cone. Flares are created at the end of the draw as the glass is almost exhausted and the tube expands to match the diameter of the lada. Collapsed tubes are very thin, wide tubes made by the end of the glass coming off the lada and collapsing on the ground of their own weight.

4. Cutting the tubes. Short segments with sharp edges are sometimes scattered and do not get reheated and made into beads. Tube ends (typically 1.75 to 2.00 cm long) are discarded because the cutter cannot hold tubes any closer to his cutting blades. Knots are tubes with bits of refractory material, introduced accidentally or on purpose. Stern's [1987] enthusiasm for these as diagnostic of the whole process is a gross oversimplification. Knots clog beads, and are discarded whenever they are spotted.

5. Reheating the beads. Overheating in spots will melt some beads together, forming clumps. Beads may also melt onto the clay dish or tray on which they were reheated, and sherds of this may be found.

6. Stringing the beads. Beads which cannot be strung because they contain knots, they collapsed during reheating, or because they have perforations too small to string, are discarded by the stringers. Included here are beads which were broken before they were reheated.

One problem to solve is whether all stages were done at a given site. The stringing of beads is especially tricky. At Papanaidupet and in Europe, stringing goes on at the beadmaking site. Stringing adds value to the beads, as they are assured of being usable. This value is retained by the beadmakers and creates employment. At Papanaidupet some 250 men make beads, but 5000 women and girls string them part-time. However, if beads are shipped in bulk, stringing takes place at the importing site, and discards (drips and splatters, small clumps, heated broken pieces, etc.) can be found there. This is the case with Laem Pho Chaiya, Thailand; the beads were made at Takua Pa, but some were strung at Laem Pho, where there are bits of discarded glassworking materials.

Table 2 indicates the evidence for Indo-Pacific beadmaking at various sites. Most data comes from first-hand observation, but in a few cases (especially Sating Pra and Klong Thom) interviews with excavators added information. That for Oc-eo comes entirely from Malleret [1962].

The evidence is strongest for the most closely examined sites (Arikamedu, Mantai, and modern Papanaidupet). However, there is enough to show that others were involved in the long lasting and widespread Indo-Pacific bead industry. The exception is Muara Jambi, where only bead stringing can be confirmed at this time. The excavation trench was in a temple yard, hardly a place for a furnace, but a remelted piece suggests that there might have been beadmaking nearby. More work is needed before we have a final answer.

T A B L E 2

Evidence for Indo-Pacific Beadmaking

| Material \/ Site: / Date: | ARK -3/+3 | MAN 1–10 | PAP 19–20 | O-E 2–7 | KT 2–6 | SP 7–10 | KKK 9–10 | KS 6–10 | SM 9–13 | MJ 13? |
|---|---|---|---|---|---|---|---|---|---|---|
| **Glassmaking:** | | | | | | | | | | |
| Slag | x | | x | | | x | | x | | |
| Bottle-green chunks | x | x | x | x | x | | x | x | | |
| Remelted Pieces | | x | x | | x | | x | x | | x |
| **Glassworking:** | | | | | | | | | | |
| Colored Glass Chunks | x | x | x | x | x | x | | x | x | |
| Drips & Splatters | x | x | x | x | x | | | | x | x |
| **Lada Tube Drawing:** | | | | | | | | | | |
| Gedda Paru Flakes | x | | x | | | | | | | |
| Twisted, etc. Tubes | x | x | x | x | x | | | x | | |
| Flares | x | x | x | | | | | | | |
| Collapsed Tubes | x | | x | | | | | | | |
| **Beads From Tubes:** | | | | | | | | | | |
| Knots in Tubes | x | x | x | | | | x | x | | |
| Cut Segments | x | x | x | x | x | x | x | x | x | |
| Tube Ends | x | x | x | x | x | x | | | x | |
| Bead Clumps | x | x | x | x | x | | x | x | x | x |
| Beads on Clay Tray | x | | | | x | | | | | |
| Discarded Beads | x | x | x | x | | | x | x | x | x |

Abbreviations. All dates given in centuries A.D., except ARK, 3rd C. B.C. to 3rd C. A.D.
ARK = Arikamedu, India; MAN = Mantai, Sri Lanka; PAP = Papanaidupet, India; O-E = Oc-eo, Vietnam; KT = Klong Thom, Thailand; SP = Sating Pra, Thailand; KKK = Takua Pa (Ko Kakao, Kakao Island), Thailand; KS = Kuala Selinsing, Malaysia; SM = Sungai Mas, Malaysia; MJ = Muara Jambi, Indonesia.

## B. OTHER TYPES OF GLASS BEADS

Glass is a most versatile substance, available in any shape or hue. This is a major reason why it is such an important bead material. Not only is there a great variety in style, but there are also many ways to make glass beads. Their profusion in Southeast Asia testifies to the art of the beadmaker, the varied cultural influences on the region, and the wide taste of the natives.

Indo-Pacific beads were made at several sites over a long period, but other types of beads often have restricted distributions, distinct in place and time. Since at least some of these beads are imports, we shall consider data from neighboring regions: India, Sri Lanka, China, and Korea.

Due to the variety of glass beads, our remarks here will cover only some of those in the region. We shall divide them technically by method of manufacture, consider their geographic and temporal limits, and attempt to identify their places of origin.

Identifying origins is difficult. Evidence is scanty for where many beads were made, but we can suggest origins for most. These identifications are hypotheses based on known facts. We postulate six areas of manufacture for these beads, as follows:

1. India. Beads are identified as Indian when they are known to have been made in India or are most common there. In some cases we can assign a north Indian, south Indian, or Deccani (central peninsular region) origin.
2. China. There is little firm evidence about Chinese beadmaking, but we do recognize beads likely to have been exported from there. Much Chinese glass has purposefully added lead; we have several 12th to 17th century recipes for Chinese glass, and most call for lead [see Francis 1989a]. Although not all lead glass is Chinese, such beads in contexts likely be Chinese is a strong hint.
3. The Muslim West. We have recently learned much more than known before about beads in Early Islamic contexts [Francis 1987b; 1988a; n.d. c]. Much remains to be learned, but an idea of the range of beads from this source is now possible.
4. European. By this is meant European glass trade beads of the last 500 years. We can now date and place most manufacturers [Francis 1988b]. Except as intrusions, these do not interest us here, but see Francis 1989b.
5. East Asian. This term indicates beads whose distributions are limited to East Asia as far as is known, but whose precise origin cannot be suggested at this time.
6. Local. By this is meant beads made within Southeast Asia. In some cases we have a more precise information about specific locales.

In the following discussion each bead type is given an alphanumeric code with a letter indicating manufacturing type and a serial number. If a specific site is named, the bead was found in an archaeological context; when a region or country is named the beads have been recorded from there, but from other than scientific contexts. A list of sites, their probable dates, and their sources of information follows (Table 3).

TABLE 3

Sites from which Beads were Examined
(Dates are in centuries or years A.D. unless otherwise specified)

| Site Name, Location | Dates | References |
|---|---|---|
| Arikamedu, S.E. India | 3 B.C,-3 A.D. | Pondicherry Museum |
| Babuyan Island, Philippines | 15-16 | PNM |
| Ban Lum Khao, N.W. Thailand | ? | Thammaset U., Bangkok |
| Batanes Prov., Philippines | 15-16 | PNM |
| Bongkissam, Sarawak River Delta | 11-12 | Sarawak Museum |
| Buah Cave, Sarawak River Delta | 10-13 | Sarawak Museum |
| Bubulungun, Palawan, Philippines | 12-13 | PNM |
| Bukit Maras, Sarawak River Delta | 11-12 | Sarawak Museum |
| Bukit Sandong, Sarawak | 14-16 | Sarawak Museum |
| Calatagan, Luzon, Philippines | 14-15 | PNM |
| Canton (Guangzhou), China | 1-3 | Guangdong Mus., Guangzhou |
| La Concepcion, Galleon Wreck going from Manila to Acapulco | 1638 | Flecker 1988, 1989, personal observation. |
| Dvaravati (mostly Lopburi), Central Thailand | 7-9 | National Museum, Bangkok |
| Fort Canning, Singapore | 14 | Ft. Canning Hist. Project |
| Gedong, Sarawak | 13-14 (+) | Sarawak Museum |
| Gilimanuk, Bali, Indonesia | 1-3 | NRCA |
| Hitam, Niah, Sarawak | 9 | Sarawak Museum |
| Jatiagung, E. Java, Indonesia | 10? | Yogyakarta Branch NRCA |
| Johore Lama, S. Malaysia | | MAA, Lamb 1964, NMKL |
| Kabwan Cave, Palawan, Philippines | 15-16 | PNM |
| Klong Thom, S. Thailand | 2-6 | DA/FAD |
| Kongju, S. Korea | 526-529 | Francis 1985 |
| Kota Batu, Brunei | 7-16 | Harrisson 1973 |
| Kuala Selinsing, W. Malaysia | 6-10 | Excavation team, NMKL |
| Kuber Kalong, E. Java | 10? | Yogyakarta Branch, NRCA |
| Kyongju, S. Korea | 4-10 | Francis 1985 |
| Laem Pho Chaiya, S. Thailand | 9-10 | DA/FAD |
| Luguna Lake, Luzon, Philippines | 15-16? | PNM |
| Mantai, N. Sri Lanka | 1/2-10 | Francis n.d. a |
| Morong, Luzon, Philippines | ? | PNM |
| Oc-eo, S. Vietnam | 2-7 | Malleret 1962 |
| Pengkalan Bujang, N.W. Malaysia | 10-14 | Lamb 1966 |
| Royal Captain Wreck No. 2, Chinese ship going to Borneo | 1573-1620 | Cuevas 1985, Goddio et al. 1987, Goddio 1988 |
| Santa Ana, Luzon, Philippines | 12-16 | PNM |
| Sungai Jaong, Sarawak River Delta | 10-13 | Sarawak Museum |
| Sungai Lumut, Brunei | 15 | Burke 1971; Harrisson 1973 |
| Sungai Mas, N.W. Malaysia | 10-11 | Merbok Museum |
| Takua Pa (Ko Kakao), S. Thailand | 9-10 | Lamb 1961, DA/FAD |
| Uraiyur, S.E. India | 1-? | U. Madras Museum |

Abbreviations: DA/FAD Division of Archaeology, Department of Fine Arts, Bangkok; NRCA = National Research Center in Archaeology, Jakarta; NMKL = National Museum, Kuala Lumpur; PNM = Philippine National Museum, Manila; MAA = Museum of Archaeology and Anthropology, Cambridge University.

## Special Types of Drawn Beads (Class DS)

The Indo-Pacific beads discussed in the last section were made in Asia. Some of the beadmakers made additional beads using the Indo-Pacific tubes. This began at Arikamedu [Francis 1986a], and other but different subsidiary industries operated in other Indo-Pacific beadmaking areas; the beads were exported over the entire region. One type of drawn bead found in the region (DS 5) is not associated with Indo-Pacific beads.

### DS 1 Pinched Beads

In this process beads are detached from a tube by constricting it. The result is somewhat different from segmented beads (Class S; see below), as the beads are not hollow, have large diameters, are never left in series, are usually reheated, and show no sign of constriction inside the perforation. They are basically Indo-Pacific beads which had to be treated this way because such large tubes cannot be rounded by heating/tumbling.

These are numerous at Mantai, Oc-eo, and Sungai Mas, but perhaps rarer at Kuala Selinsing, among Indo-Pacific beadmakers. At Sungai Mas one was broken before reheating, suggesting manufacture, as is suggested for Mantai and Oc-eo. These are also found at Uraiyur, Kuber Kaling, Jatiagang, Bukit Maras, Sungai Jaong, Ban Lum Khao, Dvaravati, and Royal Tombs at Kyongju.

### DS 2 Collar Beads

These are made from large drawn tubes which were reheated and pressed into flat or oblate beads with extra glass collars around the apertures.

They were certainly made at Arikamedu, and are rare enough elsewhere that this may be their only source. They are a few at Mantai, Oc-eo, and Klong Thom, all with Arikamedu affiliations. They are also known from early centuries A.D. at Gilimanuk; the latest occurrences are at Laem Pho and Dvaravati. In the Indian context they are rare after A.D. 300.

### DS 3 Square Drawn Tubes

These are drawn beads made from tubes with square cross-sections.

A single yellow bead (disc rather than tube) was found at Mantai (surface find), and eight green tubes at Kongju. Square drawn tubes were found at Sungai Jaong, Sungai Mas, Ban Lum Kao, Dvaravati and Changwat Nakhon Patan, Thailand, 7th to 9th century [National Museum Bangkok]. Sungai Mas may have made them, but the Korean occurrence is much earlier.

### DS 4 Striped Drawn Beads

Drawn beads with longitudinal stripes are scarce, but steady components of assemblages in the region. The most common style has 6 to 10 white stripes on dark translucent blue beads, found at Sungai Mas, Klong Thom, and Laem Pho. Takua Pa also had a collapsed one, a small clump, and one pinched or segmented so much that the perforation was closed; this suggests local manufacture and that the beads were not cut from the tubes. Next most common is white stripes on black, found at Mantai, Sungai Jaong, and Sungai Mas. At Klong Thom a black body had wide white stripes, on which red stripes were placed. Beads of other color combinations come from Mantai, Oc-eo, Laguna Lake, Kuala Selinsing, and Dvaravati. Mantai had a tube end, suggesting manufacture. Both Mantai and Takua Pa seem to have made them.

### DS 5 Green on Yellow Beads

Translucent green over opaque yellow tubes and small oblates are found primarily in the Deccan region of India in the Early Historic and Medieval Periods; one was found at Nishapur, Iran [Francis 1987b:14]. They are also found at Mantai and Sungai Mas.

DS 6 Paddled Prisms

Drawn tubes of translucent green glass paddled to square and hexagonal shapes are known to have been made in Arikamedu. Similar beads were found at Oc-eo and Mantai, but only in small numbers.

Wound Monochrome Beads (Class WM)

The oldest and most widespread glass beadmaking technique is to dip an iron rod (mandrel) into molten glass, and twirl it to build up a bead. While hot, the bead may be shaped (paddled) or decorated with other colors. When finished and still hot it can be knocked off the mandrel because cooling glass contracts slightly slower than iron; the perforation may have a black coat of iron oxide. This process is called furnace-winding.

Glass sherds or chunks may be melted and dripped around a mandrel, often coated to help the bead slip off. This is an old Chinese technique. Glass may also be drawn out from a batch into long rods (canes) which are given to workers, who heat them over a flame and wind the glass around a wire, again often coated. This lamp-winding is of more recent vintage.

Wound glass beads have fabric and inclusions which encircle the perforations (often most visible around the apertures), and are quite different from drawn beads, whose fabric runs parallel to the perforation.

WM 1 Coil Beads

The most common wound beads in the region are the smallest, made by wrapping one or more thin twists of glass up a thin wire. The Filipinos appropriately call them "coil beads."

The Philippine National Museum has 15 different types of these, all from Calatagan. They are rare at Hitam, Bukit Sandong, Kuala Selinsing, and Sungai Mas, and common at Bongkissam, Gedong, Pengkalan Bujang, Sungai Lumut, Fort Canning, Northwest Thailand (often used as heirloom beads) [Lewis 1986:28, 30], in the Seungan Temple near Kyongju, Korea, and almost exclusive at Kota Batu, suggesting a late date for its bead trade.

Their distribution suggests a Chinese origin. The specific gravity of those in the PNM ranges from 2.48 to 3.423, with a mean average of 2.948, indicating lead and pointing to China. They were made at the 14th century Chinese settlement at Fort Canning, Singapore, a "branch" of the main industry. These are also the most common beads found on the Royal Captain Wreck No. 2, a Chinese ship wrecked on Royal Captain shoal near Palawan, apparently headed for Borneo.

An interesting aspect of coil beads is the seeming sharp distributional division in regards to colors. In the Middle Phase of the Age of Trade and Contact in the Philippines, white accounted for 62.8% of the coil beads, while at contemporary Gedong, Sarawak, yellow accounted for 61.7 % [Nyandoh and Chin 1969:86]. In Timor and Flores they are overwhelmingly the red-orange "mutisalah" [Van der Sleen 1975:98]. At Sungai Mas they were translucent copper red, and at Kuala Selinsing they were all white. At Sungai Lumut they were 50 or 53% blue and 40 or 38% white, while at Kota Batu they were 75% blue. What this means is unknown, but the same effect is seen with the one beadmaker we know, Singapore, where they were mostly yellow, and the one trader we know, the Royal Captain Wreck No. 2, where they were mostly translucent red.

The earliest dates for the coil beads are the 9th or 10th century Seungan Temple and 9th century Hitam. By about 1200 they have largely replaced the Indo-Pacific beads in both the Philippine and Sarawak contexts. They are themselves on the wane by the 14th-15th century in these sites.

WM 2 Dark Blue Barrel Beads

A dark translucent blue or blue-green barrel bead, with flat or concave ends, some 8.5 to 10 mm. long is a prized possession of the Kelebit of Sarawak [Roth 1896:77; Harrisson 1964:207; Munan-Oettli 1981:19-20]. Except for the Kelebit, who can spot them immediately from among similar beads [Harrisson 1964], they are undistinguished but have 15.25% to 30% lead [Harrisson 1968:129].

Visually similar beads were found at Kabwan Cave, Calatagan, Gedong, Sungai Jaong, and Bukit Sandong. Analyses of excavated beads from Sungai Jaong and two other Sarawak sites showed that little lead in them [Harrisson 1968]. The beads from the two Philippine sites, however, have high specific gravities, indicating lead. The Philippine and Kelebit beads were most likely made by Chinese living in Bantam (Banten), Java, but how these relate to the other excavated beads is not certain [Francis 1985b:4-6; 1989b].

WM 3 Pressed Hexagonal Bicones

Translucent dark blue or green wound beads pressed into hexagonal bicones are found at Mantai (surface), Uraiyur, Oc-eo, in Han tombs near Guangzhou, Indonesia, and the Philippines. Malleret had some from Oc-eo analyzed; they were unlike the Indo-Pacific beads and were assumed to be imports [1962: 466]. Other pressed shapes such as a long cornerless cube from Calatagan, a standard one from Laem Pho, and both shapes in Indonesia do not seem to be related to these beads.

WM 4 Translucent Copper Red Beads

These are distinguished by color, a dusky translucent red, rather orange in transmitted light. They were colored with copper, a process known in Medieval Europe, but lost until rediscovered by George Bontemps in 1826. In the meantime, Europeans produced a superior translucent red with gold by the mid 17th century, later using the more strident selenium from ca. 1890 [Francis 1988b:18]. Hence, Asian translucent red beads are the only ones of that color known at this time.

Round and square tubes and a bicone were found at Calatagan, a suboblate from Buah Cave, a square bicone from Gedong, and coils and oblates from Sungai Mas. Biconical or fusiform beads were on the Royal Captain Wreck No. 2. Translucent copper Red beads were also on the La Concepcion Galleon wreck. The specific gravity of the Philippine beads ranges from 2.305 to 3.976, with a mean average of 3.387, indicating lead, suggesting China. Lead also helps copper to dissolve in glass.

WM 5 Tabular with Raised Edge and Center

These are mostly dark translucent blue (most are heavily corroded) which were pressed into a round tabular shape with a raised edge and center. This distinctive bead has been found at Mantai, Sungai Mas, and Dvaravati.

## Wound Polychrome Beads (Class WP)

WP 1 Polychromes with Combed Decorations

Combing is an old technique, done by pulling a wire or stick through glass threads which were trailed onto the bead. Different patterns are made by varying the width and direction of the combing. In the Philippines three

sets of combed beads are found. The earliest from Babulungun (12th-13th century) are large suboblates and barrels with ogee decorations. Barrels with combed waves are found in 14th-15th century Santa Ana, while smaller suboblates with waves are found in 15th-16th century Calatagan. All ten beads have lead, with specific gravities ranging from 3.185 to 3.984 (mean average 3.529); they are likely Chinese. We are tempted to see an evolution of style in these beads, but our sample is too small to draw any conclusions. Other combed beads are found at Bongkissam and Bukit Sandong.

WP 2 Takua Pa Eye Bead

Beads with spots or circles resembling eyes are often used as amulets for the Evil Eye superstition. This eye bead is so named, not because it is certain that was made in Takua Pa (though perhaps it was), but because it was first described from there [Lamb 1961:52]. They are oblates of dark translucent blue (or green) glass with irregular and irregularly spaced large white spots with blue pupils. They are found at Takua Pa, Mantai, Morong Rizal (the Philippines), Sungai Mas, and Laem Pho.

WP 3 Oval Eye Spot Bead

This eye bead is made on amber colored oblates. The multistratified eyes are ovals of white, amber (or manganese purple), white, and blue pupils, often grouped around the equator of the bead. They were found at Sungai Jaong and Sungai Mas.

WP 4 False Chevron Beads

The drawn or true chevron bead is European, but these wound imitations decorated with wavy lines are often well done, even down to faceting the ends. They are found in the Batanes Island Province and known from Sarawak, Malaysia, Bali, and Taiwan. They are usually heirloom beads, and since they must have been produced after Europeans brought the first chevrons, they are likely 16th century products; they are probably Chinese.

WP 5 Bird Beads

These are oblates or tabulars of black or dark blue glass. On one side is a white standing bird (sometimes a squirrel) on the other a sunburst (or flower). They are known from Oc-eo, Klong Thom, Dvaravati, and Indonesia. The similarity with an etched carnelian from Kosam (Kosaumbi) India [Dikshit 1949:69 #10] is striking, and one wonders whether they could be North Indian. Otherwise they are East Asian.

WP 6 Large Javanese Polychromes

These beads are treated as a group because of shared characteristics, though one is not a polychrome. Usually large (one to three cm diameter), they were made on a core of poorly fired glass, perhaps by molding, which leaves a large hollow in the center of the perforation. Over this crude core is: a.) a strong yellow coat, b.) an eye design of white oval spots surrounded with a later coat of dark green-blue glass, or c.) multiple combed stripes of red, white, yellow, and green-blue. A number of broken and collapsed specimens at Jatiagung, East Java, suggests they may have been made there around the 10th century.

Segmented Beads (Class S)

Segmented beads are made from tubes, usually with thin walls. The tubes are probably put on wires, reheated and then constricted along their lengths to make a series of bulges which are cut apart into individual or multiple beads. The precise process is not understood. Once an important class of beads, their manufacture has not survived. There are many different types

of segmented beads. They are found in Europe and through the Middle East. At the moment, there is no classification scheme for these beads and rather little is known of them. Plain types have been found at Mantai, Kuber Kaling, Kuala Selinsing, Takua Pa, Laem Pho, Dvaravati, Bukit Maras, Sungai Jaong, Gedong, and Sungai Mas; only some special types are considered here. They are most likely from the Middle East.

S 1 Segmented Gold-Glass Beads

In this type a tube coated with gold foil is inserted into a larger tube which protects the foil. These were made in Egypt [Boon 1966], but may have been made elsewhere as well. True gold-glass beads have been found at Oc-eo, Jatiagung, Mantai, Arikamedu, Kongju, and possibly Kuala Selinsing.

At Babuyan Island and in Philippine heirloom collections there are wound, not segmented gold-glass beads. Precisely how this was done and whether gold was actually involved is not yet known.

S 2 False Gold-glass Beads

These are identical to type S 1 except that the outer tube is amber in color and the inner tube has no foil. The inner tube is apparently retained to produce a sheen. The "mystery here that require[s a] solution" [Lamb 1966:93] is solved: these beads simply do not have gold, which is why none were found in Lamb's analysis.

False gold-glass beads are more numerous than true ones. They are found at Sungai Mas, Laem Pho, Takua Pa, and Dvaravati. A single and several multiples of these beads which had been so deeply constricted as to close the hole and make them impossible to string at Takua Pa suggests they were made there. Lamb also found one at Takua Pa [1961:53].

S 3 Segmented Melon Beads

These are gadrooned down their sides. The few at Mantai were of clear to yellowish glass. A yellow one with eight lobes was found at Oc-eo, ones with eight and six at Sungai Jaong, and one with seven at Gedong. A fairly large number with various numbers of lobes was found at Sungai Mas in yellow (most numerous), amber, green, and dark and light blue.

Mosaic Cane Beads (Class M)

As the name implies, these are made or decorated from small pieces as in a mosaic. Colors are added to a gather of glass until a design is built up. When the gather is stretched into a cane the pattern continues through its length. Short sections decorate the surfaces of beads. Longer sections can construct an entire bead of a given pattern. All the mosaic glass seen here was made by adding hot strips of glass to the initial gather, rather than by the techniques of "bundling" or "molding" [Francis 1986b].

M 1 Roman Mosaic Beads

Of the many beads often said to be Roman from this region, only a handful actually match Roman technology and styles. They are: a round tabular with a sunburst design on both sides from Arikamedu and a similar one from Johore Lama, Malaysia (we do not believe this site is nearly that old); a sky blue bead completely covered with rows of square eye canes and alternating zones from Mantai, three crude face cane sections made into tabulars from Klong Thom, a bundled cane face bead with a duck on the reverse from King Mich'u's tomb area in Korea, and perhaps some from Oc-eo.

M 2 Long Folded Tubular Bead with End Zones and Complex Eyes

These beads, in blue, orange-red, yellow and white, are found at Sungai Mas, Takua Pa, and Sarawak. They are also known from Scandinavia, and along with our M 3 beads form a group assumed to be from the "central Caliphate" [Callmer 1977:99; Type G050]. This is probable, but as they are not found in Iran or at Fustat (except one), they are perhaps Syrian or Iraqi.

M 3 Round Mosaic Eye Bead Made by Joining Canes

These are striking beads, closely related to M 2. They have eyes at their sides in combinations of blue or green, yellow, or white and red. Parallels exist in Scandinavia, and they are assumed to be from the Islamic West. They are especially plentiful at Sungai Mas, but are also found at Takua Pa, Laem Pho, Dvaravati, and in Java.

M 4 Round Blue and White Mosaic Beads Made By Joining Canes

These are usually large beads made from simple blue mosaic sections with one or two concentric white circles. They are found in Indonesia, at Takua Pa, and at Sungai Mas. At Sungai Mas fragments are so numerous that one wonders whether they could not have been made there.

M 5 Java Mosaic Beads

Spectacular mosaic cane beads found in Indonesia maddeningly do not resemble the products of any known industry. Most are from Java, and are also known from Kuala Selinsing, Sarawak, and Sumatra. The canes are simple, cut very thin and placed on a core of poorly fused glass, made somewhat differently than those of WP 6.

The dating of these beads is problematical. At least some from dolmens would be 9th or 10th century at the latest. Most authorities are convinced they were made in Java, but the canes could have come from outside (the same people supplying Sungai Mas with canes for M 4 types?). The cores look "home made," as they are very poorly fused. The canes are cut so thin as to suggest that they were imported and very rare [Liu 1986]. Van Heekeren [1958:41] published an analysis of one such bead with high sodium (21.61%) and 3.12% lead, but no distinction was made between the core and the canes, as there no doubt ought to be.

We can fit the preceding information into a table that tells us at a glance the patterns found in the bead trade in Southeast Asia. Table 4 lists the following information:

Bead Type, coded with the numbers used herein and given a very short title to jog the memory. Indo-Pacific beads are included for reference.

Zones/places in which found. These include single sites generally older and outside Southeast Asia proper:

A = Arikamedu O = Oc-eo K = Kyongju or Kongju
M = Mantai C = Canton (Guangzhou) U = Uraiyur

Zones within Southeast Asia:

I = Malay Peninsula II = Java and Bali
III = Western Borneo (Sarawak and Brunei) IV = The Philippines

Dates. These are given in centuries. The maximum range is the earliest date of the earliest site and the latest date of the latest site containing these beads. The minimum range is the period in which all the sites overlap and were contemporary. Dates have been compiled from the literature and discussion with the excavators. They are, of course, estimates.

Origin. This is the suspected origin of the beads.

## T A B L E 4

Other Types of Southeast Asian Glass Beads:
Provenience, Dates, and Possible Origins
[Centuries in A.D.; those with minus sign (-) are B.C.]

| Bead Type | Zone | Max. Date | Min. Date | Origin/Notes |
|---|---|---|---|---|
| Indo-Pacific | A M O C K U I II III IV | -3 - 13 | 1 - 13 | Indo-Pacific Sites |
| DS 1 Pinched | M O I II III K U | 1 - 11 | 1 - 11 | Indo-Pacific Sites |
| DS 2 Collar | A M O I II | -3 - 10 | 2 - 9 | Arikamedu and ? |
| DS 3 Square | M K I III | 2 - 13 | 6 - 10 | Malay Peninsula ? |
| DS 4 Stripes | M O I II III | 2 - 13 | 2 - 10 | Indo-Pacific Sites |
| DS 5 G/y tube | M I | 2 - 11 | 9 - 10 | Peninsular India |
| DS 6 Hex tube | A M O | -3 - 10 | 2 - 3 | Arikamedu |
| WM 1 Coils | I II III IV K | 6 - 15 | 9 - 15 | China, Singapore |
| WM 2 Barrel | III IV | 10 - 19 | 13 - 16 | Bantam, Java and ? |
| WM 3 Hex bic | U M I IV C | 1 - 10 | 1 - 7 | East Asia |
| WM 4 Tr. red | I III IV | 10 - 15 | 11 - 15 | China |
| WM 5 Tabular | M I | 2 - 11 | 9 - 10 | East Asia |
| WP 1 Combed | III IV | 11 - 16 | 11 - 16 | China |
| WP 2 T.P. eye | M I IV | 2 - 11 | 9 - 11 | Takua Pa? |
| WP 3 Oval eye | I III | 10 - 13 | 10 - 11 | Malay Peninsula? |
| WP 4 Chevron | III IV | 16 - 19 | 16 | China? |
| WP 5 Bird | O I II | 2 - 9 | 6 - 7 | East Asia |
| WP 6 Java | II | 6 - 10 | 6 - 10 | East Java |
| S 1 Gold-g | A M O K II | -3 - 10 | +3 - 10 | Mediterranean + ? |
| S 2 False Gg | I | 7 - 11 | 9 - 10 | Takua Pa |
| S 3 Melon | I III | 2 - 14 | 7 - 13 | Islamic West |
| M 1 Roman | A M K I | -3 - 8 | 2 - 6 | Mediterranean |
| M 2 Folded | I III | 9 - 11 | 10 - 11 | Islamic West |
| M 3 Eyes | I II | 7 - 11 | 9 - 11 | Islamic West |
| M 4 B & W | I II | 10 - 11 | 10 - 11 | Sungai Mas?? |
| M 5 Java | I II III | 6 - 10 | 6 - 10 | East? Java |

Discussion

With one exception, these beads form coherent groups with spans of a few centuries and distributions related to their supposed origins. The gold-glass beads (S 1) have a great spread in time and place, but this was known earlier. Otherwise, we can divide the Southeast Asian bead trade into four periods and see changes in the patterns of trade. One should keep in mind the constant "background" of Indo-Pacific beads in this region down to the 13th century.

The first period begins in the early centuries A.D. and extends through most of the millennium. It consists of beads from the Mediterranean (Roman mosaics and gold-glass beads), by-products of the Indo-Pacific beadmakers (collar beads, hexagonal tubes, and pinched beads), and one East Asian bead (pressed hexagonal bicones). The pinched beads and the hexagonal bicones were well circulated. The other beads are restricted to Arikamedu, Mantai, Oc-Eo, Klong Thom, and the Malay Peninsula and Indonesia.

From the 6th century we have an upsurge in locally made beads, including the striped drawn beads, the Java mosaic and polychrome beads and possibly (unless an import from India) the bird beads. Pinched beads continued to be made. Segmented melon beads are the first imports from the Muslim West. Most of these are found throughout Southeast Asia except in the Philippines.

From the 9th to the 11th century we have significant changes concentrated in the Malay Peninsula (Zone I). Imports include the green on yellow tube from Central India, but more importantly the mosaic eye beads (M 2, M 3) of the Muslim West. These rarely penetrated beyond Zone I into Borneo and Java. At this time locally made beads include false gold-glass beads, square drawn tubes, the Takua Pa eye bead, and possibly the oval eye bead and the tabular with raised edge and center. Whether plain blue and white mosaic eye bead were made in Sungai Mas remains to be learned. Most Malayan made beads penetrated into Java and Sarawak.

In the early second millennium we have a sea change in the entire region. Local manufacturing was disrupted; the Indo-Pacific and subsidiary beads are gone by the 13th century. Chinese beads are preponderant: coiled beads, translucent copper red beads, combed beads, and probably false chevrons. The coil beads are widely distributed and take the place of the defunct Indo-Pacific beads in Borneo, the Lesser Sundas, the Philippines, and elsewhere; they are on the wane themselves by the 15th century. For the most part, the chief recipients of Chinese beads are Zones III and IV. Sarawak (Zone III) had received some fancy beads from Zone I and II for a long time. Now, however, it was time for the Philippines (Zone IV) to also come into the picture.

We have definite literary evidence of this latter stage of the bead trade from the Chinese side. Chau Ju-Kua's (Zhao Rugua) Chu Fan Chi of 1225 tells Chinese mariners to take colored (perhaps meaning polychrome) beads to Ma-i, said to be Mindoro and perhaps Luzon, and to San-su, identified with Palawan and the Visayas, and beads to P'o-ni, identified with Borneo [Hirth and Rockhill 1911:160, 162, 156]. A century later Wang Ta-yuan's (Wang Dayuan) Tao i Chih Lio of 1349 suggested taking beads to Luzon, Annam, Java, Cambodia, Molocca, Palembang, Siam, Fandaraina, Cananore and Eastern Tan-mo, and red and green beads to Kelantan, dark red beads to the Jung of Malaysia, colored beads to Ligor, yellow ones to Tan-Mo, blue ones to the Sulus, red ones to Eastern Sumatra, and red and white ones to Fang-pai, possibly Bombay [Rockhill 1915]. Later Fei Hsin's Hsing Ch'a Sheng Lan (1436) urges the delivery of beads to Cambodia, Siam, and Calicut and colored beads to Molocca and Java [Rockhill 1915]. All these place identifications need more scrutiny; we are in no position to evaluate them here.

## A Few Other Beads

Although not widespread enough to enter into the discussion above, a few other wound beads in the region merit some attention.

The distinctive wound monochromes from Ban Chiang, Thailand and a few contemporary sites are translucent green and blue oblates, truncated bicones, and very long cylinders. Unfortunately, as with most Thai sites, the vast majority of Ban Chiang beads are on the antiquities market; few were actually excavated. These beads are roughly dated from 500 B.C. to A.D. 200. The Thais believe they were locally made, though there is no proof of that yet. But the long (8 cm or more) cylindrical beads beveled at the ends (most likely folded to shape) are similar to stone beads from Kok Charoen, radiocarbon dated 1480 to 880 B.C., but thought to be somewhat earlier [Loofs and Watson 1970:76] and Ban Kao, with dates of 3720 ± 140 B.P. and 3310 ± 140 B.P. [Sorensen 1957:9, pls. 25, 26a, 27.12]. These long beads are local types, and do suggest that similar shapes in glass may have been locally made as well.

Beads resembling two interlocking chain links found at Pengkalan Bujang [Lamb 1961:88] are known from Early Historic Indian sites such as Nevasa [Deo 1960:357, pl. 168.6] and Maski [personal observation, Hyderabad Archaeological Museum], which is not well stratified, but may include Medieval material and may have been a beadmaker. The "capstan bead" from Oc-eo [Malleret 1962:254] is Han Chinese; it is not really a bead but an ear plug [Francis 1985a:19).

## C. STONE BEADS IN SOUTHEAST ASIA

### Introduction

For stone beads we have less data and face more problems than with glass beads for several reasons. Stone beads are far less common than glass beads on nearly every site in this survey. They do not provide the variation necessary to study them as easily as do glass beads. Nor have we developed techniques to study stone beads as fully as with glass ones.

On the other hand, we do know something about stone beadmaking technology and possible origins. It is not difficult to identify a stone beadmaking site, but it is difficult to trace a stone bead back to a particular site.

The word "stone" has no geological meaning. We use it here in the widest sense to include all rocks and minerals. We shall concentrate on one family of mineral beads: the quartz group, which includes crystalline (rock crystal, amethyst), fibrous microcrystalline (the chalcedonies; agate and, especially, carnelian), and the granular microcrystalline (flint or chert and jasper) varieties. The last section will cover some other stone beads in the area.

### Technological Considerations

Nearly all descriptions of stone beadmaking are based on observations of only one living or one archaeologically researched site. This has limited the understanding of the ways in which stone beads can be made. There is no broad study on this topic; this initial attempt at generalizations is fraught with peril, as are all first studies.

We must recall that at one time all men (and probably most women and children) could work stone. Stone was used for tools, and supplemented other tool materials. Hence, some aspects of stone working are very

ancient. Hard stone beads appear first in the Neolithic, after improvements in polishing and the invention of the bow drill, being worked on a large scale in some places such as India. Following the introduction of metal tools, stone beadmaking expanded in many places, but whether beadmakers belonged to a "Great Tradition" or purely local ones remains to be learned. The steps in making beads from stone are as follows:

One begins with raw stone, and their sources are important to identify. Large beadmakers often imported raw materials some distance. Smaller beadmakers probably used stones locally available, which may account for the industries there. Large chunks of raw stone could be sawed, but in our experience, stones were more often reduced by flaking. What are often interpreted as saw marks are usually lines of abrasion from grinding.

A nodule is made into a crude bead shape called a roughout. Today in Cambay, India, the stone is braced against the point of an iron stake driven into the ground and hit with a hammer of water buffalo horn mounted atop a thin bamboo stem. At Kotalingala and Arikamedu, India (500 B.C. to A.D. 300) there were several quartz or amethyst crystals which had been thinned by flaking and heavily battered at the point. Some are definitely associated with beadmaking refuse, and they were likely used to chip stones, but whether they served as the iron point or the hammer head is not known.

The roughout is next reduced to the approximate shape of the finished bead, commonly by grinding on large flat slabs with grooves (whether worn or made into them). This step can also be done by pecking at the surface of the bead, possibly with a diamond point.

Two operations are left: the final polish and drilling the perforation. There is little uniformity in which operation was performed first.

Double tipped diamond drills have been the only instrument for boring quartz beads for a long time. This may well have been invented at Arikamedu; it is at least first recorded from there [Gwinnett and Gorelick 1988]. China got diamond drills from India in the first century A.D. [Laufer 1915:28-35]. Such drills were apparently used for all the beads in Southeast Asia for the last 2000 years.

Preceding drilling, a rough spot ("dimple") is usually made to give the drill bit a place to "bite." This can be done by grinding a round surface flat, sawing a groove, chipping a small piece out, pecking in a small area, or drilling with a larger, one diamond drill bit, as in modern Cambay. Chipping and drilling were most common in this survey.

Polishing can be done in one of two ways. A fine abrasive can be used in a process akin to grinding. Soft polyhedral sandstone nodules found in a beadmaking area at Kotalingala were probably used for this; plates of copper or teak or even leather will also work. This process leaves abrasion marks on the stone, and gives faceted stones sharp edges. Alternately, stones can be tumble polished. The only recorded older method was to put the beads, some agate dust, and water into a goat skin bag and roll it on the floor between two men for two weeks. The result is a higher polish than abrasion usually achieves, the obliteration of grinding marks, and a rounding off of the edges of facets. Although tumbling was used for round beads for some time, faceted beads imported into Scandinavia (presumably from India) were not tumbled until ca. A.D. 950-960 [Callmer 1977:91].

Finally, stone colors can be altered. Carnelian, onyx, and citrine are almost never found in nature; nearly all have to be altered. Citrine requires a complex two step heating process upon low-grade amethyst. As it is not an important stone in this survey, we shall not detail the process.

Carnelian is dull brown or olive when dug from the ground. To redden it, it must contain iron and be heated in a muffled furnace. The carnelian cut in Germany comes from Brazil and is soaked in a solution of iron in nitric acid for a few weeks. Heating then brings out the red color. A secret of the western Indian agate bead industry is that the stones have been buried in red silt for at least 22,000 years absorbing iron from the surrounding earth, thus they need only to be fired. Carnelians from Java are neither impregnated nor fired. The source of their iron is not known, but they have apparently been subjected to heat from volcanic action.

Onyx is made by soaking banded agate in honey or sugar water for a few weeks. The porous bands absorb the sugar, while the less porous white ones do not. The stone is then heated to caramelize the sugar to make brown and white onyx or put into sulphuric acid to carbonize the sugar and make black and white onyx. Often this coloring is only a few millimeters deep, so altering is done to finished beads.

## Tracing Beadmaking Sources

It has been hoped that geochemical and geomorphological studies of stones may help us source beads. Unfortunately, the largest known stone beadmaker, in western India, has as its major source nodules which are not in situ but were secondarily deposited along the Narmada River. Two neighboring stones could have come from any of the many mountains this large river drains. Deposition went on for some time, ending only 22,000 years ago. Thus, sourcing from this key site is probably a futile task.

The major beadmaker bordering Southeast Asia is India, especially Gujarat, where agate/onyx beads have been made for at least 4000 years. The craft was probably introduced by the Harappans, whose beadmaking roots go back some 7000 years. Contrary to the popular notion, Cambay (Khambat) is only the latest lapidary center, having made beads only since the 17th century. Ujjain was the center until the 10th century and Limodra after that. For 500 or 600 years Arikamedu was a major beadmaker and exporter, and a pioneer in treating and working stone. There were also other minor beadmaking centers in India; 24 were listed recently [Francis 1982b:39].

China has also made stone beads for a long time. Unfortunately, we know much less about their ancient industry. There is little evidence for interest in semiprecious stones by the Chinese. Though they were found in China, jade was so overwhelmingly important that other stones were hardly ever mentioned in the literature.

The earliest stone beadmaking site for our interest was Arikamedu. The sources of stones were at some distance, but all beadmaking steps went on there. Arikamedu pioneered the use of double tipped diamond drills, the blackening of onyx, and the making of citrine. Crystalline and chalcedony stones were usually treated differently. Crystalline stones were pecked, then polished, and finally drilled. Chalcedonies were ground to shape, drilled, and then polished. We are not sure why this difference existed. The beadmaking industry at Arikamedu was very large and geared for export both to the Roman West and elsewhere in Asia.

The three sites associated with Arikamedu were also beadmakers. Neither sources for raw materials nor their markets have been determined. Oc-eo worked quartz, amethyst, agate, carnelian, and maybe other stones; polishing apparently followed perforating. Klong Thom worked at least carnelian; in

one case polishing also followed drilling. Mantai did not make stone beads before the 7th century, about when Klong Thom and Oc-eo were abandoned; whether beadmakers went to Mantai from one of these sites is not known. Rock crystal and carnelian were most common. The former were tumbled, dimpled with a drill, and then perforated, while carnelian was ground, then dimpled by chipping or drilling, drilled from only one side (which leaves a large cavity on the opposite side), then tumble polished.

Other beadmakers in the area may have been geared to more local markets. These include: 1.) Demak, Java (ca. 10th-12th century). The material has not been seen personally, but square bicone carnelian roughouts were found there [Ambary et al. 1977:46]. Central Java deposits south of Solo from Wonasar to Malang [Sukoco 1989] were probably exploited. 2.) Kuala Selinsing, long recognized as a stone beadmaker; it may have exported its beads. Rock crystal was local, with carnelian and agate perhaps imported; Evans [1932:90-1] said there were no carnelian or agate roughouts, but carnelian chips (and a quartz roughout) are in the National Museum, Kuala Lumpur. The current excavators have found no unfinished beads so far, but have uncovered a grinding slab. 3.) Bukit Maras in the Sarawak River delta made oblate and barrel carnelian beads, apparently from a local conglomerate [Everett and Hewitt 1908:7]. They were ground, then polished, chip dimpled, and drilled with a diamond drill, as a silicon impression has confirmed.

Finally, we shall mention Ban Don Ta Phet, Thailand, with the greatest number and variety of stone beads known in the region. These were not examined closely. It is a burial complex and imported all its beads, and the National Museum, Bangkok have made things increasingly difficult for visiting specialists. From a study of these beads [L. Williams 1984] it is clear (though not to the author) that diamond drills were used. Other technical questions that interest us here were not raised.

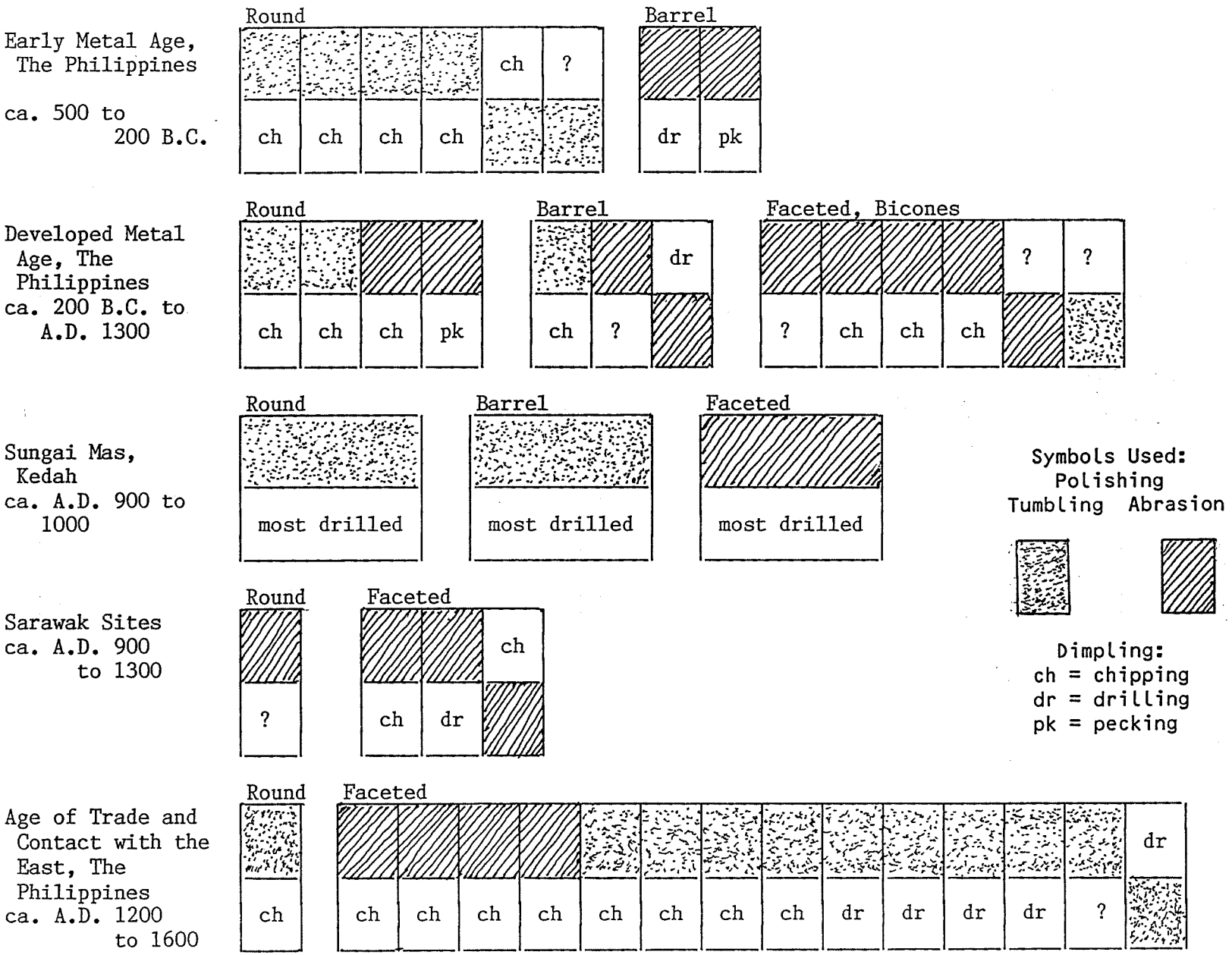
## Excavated Stone Beads

Studying quartz group beads has the advantage of giving a chronological frame, but the disadvantage of not telling us where they were made. Notes on carnelian and agate beads were taken on: the Type Collection of the Philippine National Museum; Sungai Mas (10th-11th C.); and Sungai Jaong (10th-13th C.), Bongkissam (11th-12th C.), and Gedong (13th- 14th C.), Sarawak. This is a small sample, and the results are presented only as a guide. The PNM Type Collection is divided into long time periods and has yet to be refined into tighter chronological divisions. There was no time to examine all beads at Sungai Mas; only broad observations were recorded.

The results are shown in Chart 1, divided by period, locale and bead shape: round (or oblate), barrel, or faceted forms (and bicones). The data is recorded in cells, one for each bead, each with an upper and lower division. The upper half shows the operation done first, polishing or drilling; the lower half shows the second operation. Stippling indicates tumbling, lines indicate polishing by abrasion. The letters in each cell indicate how the bead was dimpled (ch = chipped, dr = drilled, pk = pecked). Drilling followed dimpling. Hence, a cell stippled in the top half with a "ch" in the bottom indicates a bead tumbled first, then chip dimpled and drilled. One with a "dr" in the top and lines in the bottom represents a bead drill dimpled and drilled, then polished by abrasion. Although this explanation sounds complex, the chart shows at a glance how these beads were worked. For Sungai Mas only overall impressions are recorded.

C H A R T 1

Characteristics of Some Excavated Stone Beads in Southeast Asia



Discussion

Before trying to draw conclusions from this data we must consider the nature of the evidence. There are changes over time, but do these reflect changes in one or several related industries or do they reflect different industries at different times?

There is little problem in assuming that the stone beads from the first millennium came from India or perhaps a related Indo-Pacific site. Glass beads indicate that Sungai Mas traded heavily with the West, so its stone beads may well have been brought by Persians and Arabs from Gujarat. In the 11th century the industry, recently settled at Limodra by the Solankis, doubtless revived, taking advantage of increased trade. Beads in Sarawak and the Philippines may have similar origins, as they received glass beads which were abundant in Malaysia and Java, though in reduced numbers, except that the round Sarawak bead could have come from Bukit Maras.

But what of the later Philippine assemblage? Although long receiving Indo-Pacific beads, from about 1200 new types arrived from China. If Chinese glass beads dominated there, might the stone beads also be Chinese?

In T'ang times (618-906) the word for carnelian was ma-nao, and it was chiefly imported, even as a raw material [Schafer 1963:228]. The 14th century Cho Keng Li includes a section entitled "Hui-hui Shi T'ou" (Precious Stones of the Muslims). Among the stones imported by Muslim traders was gu-mu-lan with, "an irregular color; it is red mixed with dark, yellow. This stone is found in large pieces, and is the least valuable of the above mentioned [including ruby and garnet]." Bretschneider [1910:174] identified this with opal on rather flimsy linguistic grounds, but it sounds much more like carnelian. A shipwreck off High Island (Sha Tsui), Hong Kong, (11th century or later) was bringing Indo-Pacific beads and a square bicone carnelian to China [Hong Kong History Museum, personal observation]. About 1515 Tome Pires said that among the goods the Chinese bought at Malacca were "a great many carnelians from Cambay" [Cortesao 1944:123].

On the other hand, the Tien-Kung K'ai-Wu of Sung Ying-Hsing (1637) said that agate, "is abundantly produced in China itself, the merchants do not trouble themselves with purchasing it from distant places" [Sun and Sun 1966:307]. A variety he called "red-flower," may be carnelian. Perhaps the Chinese had stopped importing carnelian at this time.

There is evidence of the Chinese selling carnelian to the Philippines. In 1609 de Morga observed Chinese ships bringing many goods to Manila, including "tacley, which are beads of all kinds, string of cornelians, and other beads and stones of all colours" [Cummins 1971:306]. "Tacley" may be related to the Chinese tsu chu or tu chu, which meant glass beads [S.W. Williams 1966:120]. The wreck of the Spanish galleon La Concepcion of 1638, on its way to Acapulco from Manila, had in its cargo Chinese glass beads and carnelian beads [Flecker 1988, 1989; personal observation].

We are not able to answer this question at the moment. Some or all stone beads from later Philippine sites may be from China, but others or most may also be from western India.

To summarize the evidence of Chart 1, we make these observations:

1. The earliest beads into the area were simple oblates and barrels. Late in the first millennium faceted forms and bicones became more popular, and by the 12th century are by far the most important shapes.

2. Tumbling was used early for rounded forms, but not universally. It was not used for earlier faceted beads, but by the 12th or 13th century it had become standard, even for faceted forms.

3. Polishing usually preceded drilling. By the 12th century, however, this was the standard practice.

4. Chipping for dimpling was most common in the earlier periods, but drilling became relatively more popular over time.

## Other Stone Beads

Four other types of stone beads deserve discussion. They are not widespread enough to be able to study fully, but they are distinctive enough to be recognized. They include two beads perhaps made at the early Indo-Pacific sites, soda-etched carnelians, and nephrite in the Philippines.

At three of our earliest sites - Arikamedu, Klong Thom, and Oc-eo - there are collar beads made of a soft green stone, perhaps serpentine. These usually have rather irregular shapes and are sometimes incised. At Arikamedu there are only three, out of a total of some 25,000 stone beads and wasters. None are unfinished [Francis n.d. d]. There were also three at Oc-eo [Malleret 1962:224]. However, without any broad study done on her beads, there are already at least seven of these known from Klong Thom [Srisuchat 1987; personal observation]. Could it be that these beads were made at Klong Thom?

Flat square or trapezoidal black onyx pendants perforated lengthwise through the top, were found at Oc-eo [Malleret 1962:215] and in Thailand at Thakae [Department of Archaeology] and contemporary sites [National Museum, Bangkok]. Similar beads, though not all of the same shape, were made at Arikamedu. Since black onyx was rare at the time, and perforating the length of these beads was difficult, Arikamedu is their likely source.

Etched carnelians, better called soda-etched beads, were made by painting lines of soda onto the surface of a bead and heating it for a few minutes in a charcoal fire. The soda penetrates the surface, making tiny pores, and spreads out under the surface, producing a smooth, indelible line. They were first made in the Harappan Civilization and Mesopotamia and were long an Indian product; Sasanian Persia also learned to make them [Francis 1980]. Charoenwongsa [1985] believes on the basis of certain designs that Thailand may have made them at one time. This has not been demonstrated yet.

Ban Don Ta Phet, Thailand, has a large number of etched carnelians, most with parallels from India [L. Williams 1984]. The one found at Oc-eo is a south Indian type [Malleret 1962:204; Dikshit 1949:51, type 24]. There is no evidence for Arikamedu making them, and they are quite rare there [Francis 1987a:8], though they are found in large numbers with Indo-Pacific beads in nearby Megalithic tombs [personal observation: Musée Guimet, Paris; Auroville Museum, Pondicherry]. Two were found in the Philippines. A long barrel with five zones from Guri Cave ca. 500 to 200 B.C. (Indo-Pacific beads were also found there, suggesting a more recent date) has Indian parallels. A blackened agate with a net design in white lines from Manunggal Cave (ca. 200 B.C. to 1200 A.D.) is most common in Northern India. A similar bead, but of barrel shape, was uncovered at Leang Budane in the Indonesian Talaud Islands [Bellwood 1985:307-9]. A zoned soda-etched pale carnelian was found at Kuala Selinsing [Evans 1928:123].

Nephrite is a tremolite-actinolite mineral, one of two called "jade" (the other is jadeite). Its relative abundance in the Philippines from about 700 B.C. has made Fox [1970:131] and Solheim [1981:80, n.5] think that there are local sources. The only identified source is in Zambalas, but the nephrite differs from that used for adzes, and Villegas [1983:17, 24] assumes that it was from Taiwan. It may be that the deposits have not been located because the sources are exhausted. This happened in Mesoamerica, where no jadeite sources had been located until quite recently.

There are jade lingling-o (earrings) in Indochina and southern China similar to those in the Philippines. This fact and the difficulty of boring jade tend to suggest importation. Rectangular tabular beads, similar to those found in the Philippines and grooved at end, probably for dimpling, are in the Seligman collection of Chinese beads at the British Museum [acc. no. 1940.12.14.154, personal observation].

As with many minerals, both jades are rather widespread in small deposits. A recent survey of nephrite said that it is "reported from perhaps as many as 46 countries" [Barnes et al. 1988:15], but mentioned no Southeast Asian sources. A few are known, however. One is in southwest Java, south of a line drawn from Rangkabitung to Sukabumi, while a more important source is at the northwest tip of Sumatra [Sukoco 1989]. There is apparently some in Myanmar (Burma) [Gill 1978:120]. It is also reported in Tha Chana district, Thailand [Suchitta 1985:153]. Nephrite disc beads are found at prehistoric Taiwan sites [Chen 1968:210], which has known sources.

I have grave doubts about Fox's [1970:116] reconstruction of beadmaking. To form a long cylinder and drill it to break it apart is contrary to known beadmaking practices, and would surely tax the skill of the beadmaker and abilities of ancient drills. I believe the grooves on the end of some beads were made to give the drills a place to "bite," and not from cutting apart a pre-drilled tube. Also, the grooves down the side of some beads do not appear to have been drilled, as the striae in them go longitudinally, and are not circular.

## D: TOWARD SOME CONCLUSIONS

In this section we consider three problems regarding beads in Southeast Asia, or put another way, we consider the data through three different perspectives. They are: 1.) The role of Southeast Asia in our understanding of the Indian Ocean Bead Trade, 2.) The role of beads in the over-all history of Southeast Asia, and 3.) A consideration of the bead trade in the light of core-periphery analysis, as pioneered by Rowlands et al. [1987].

### The Indian Ocean Trade

The study of Southeast Asian beads is part of a larger inquiry into the Indian Ocean and the Western Pacific trade. The Indian Ocean Bead Trade Project can potentially augment our knowledge of historical process which took place in this region. Its adds to our understanding to evaluate the evidence of a large class of artifacts which survived from antiquity. Bead Research is yet a new field, so that not all of our conclusions, or even observations, can be expected to be correct. Nonetheless, we are in a position to evaluate the contribution of the Southeast Asian bead trade to trade on a larger scale.

Southeast Asia has been the "master key" to the lock of several problems involved in the Indian Ocean Bead Trade Project. This is partly due to the timing of this research, as it came after the study of other regions, but is also due to the characteristics of Southeast Asia itself. Its central location has meant that it received beads from all the sources involved in the Indian Ocean trade: Rome and the succeeding Muslim world, India, China, and Europe [see Francis 1989b]. This has helped us learn more about the wide scale of the trade and has been useful in the analysis of sites which had been studied earlier, including Arikamedu, Mantai, and those in Korea and China. It has also helped us to identify several classes of Chinese glass beads.

Additionally, large-scale beadmaking went on in Southeast Asia. This was perhaps something of a surprise. We see that many of the beads in the region and in bordering areas were made here, often as subsidiaries to the Indo-Pacific industries. We have identified other beads simply called "East Asian," a group that requires more research, and affirmed the unique nature of the Java bead industry and probably identified one manufacturing site.

## Bead History in Southeast Asian History

If we were to write a history of Southeast Asia only through the perspective of beads we would gather the following facts: Early beads in the area came from India, as did the impetus and technology to make them. Beadmakers who settled in Mantai, Oc-eo, and Klong Thom dominated the first half of the first millennium. Around the 6th or 7th century, the latter two sites were abandoned. New beadmaking sites appeared at Kuala Selinsing (exporting through Pengkalan Bujang) and at Sating Pra. At about this time, Mantai began making stone beads. Toward the end of the first millennium these sites are paramount, although joined by Java, making quite distinctive beads of her own.

By the 9th or 10th century there is a flood of beads coming from the Islamic West. These are found principally in the Malay peninsula, slowly filtering through to Borneo and the Philippines. At this time, too, we see the end of Kuala Selinsing and Sating Pra, and a bit later Takua Pa and Sungai Mas. By 1200 the beads undergo a considerable change. They are now Chinese, and the majority of them are now going to the peripheral regions, Borneo and the Philippines. By the mid 17th century European beads have begun to take over.

This sketch admirably fits what is already known. If one substituted "influence" for "beads", "citizens" for "beadmakers" and "foreigners" for "imported beads" one would have a concise history of the region. It is gratifying to see that beads match the known history so well, but the point of bead research is to go beyond what is already recorded.

One theme that strikes us again and again is that the earliest urbanized settlements in the area were all linked with each other. Mantai, Klong Thom, and Oc-eo, the first cities of Ceylon, Malaya, and Indochina, share characteristics with Arikamedu, the first city of Tamil India. They were all Indo-Pacific beadmakers, all made stone beads, all imported some Roman beads, all were likely Roman emporia, and all imported at least of some of each other's beads. Klong Thom and Oc-eo passed on their skills to Kuala Selinsing and Kedah, Sating Pra, and Takua Pa, and perhaps stone beadmaking to Mantai.

Others have noticed the strong relationship between some of these sites, visible not only in beads but in other artifacts as well. This prompted Cady to speak of a "Funan Empire" and "vassal cities." But the empire did not stretch as far as Sri Lanka, and it was Arikamedu which was the "mother city." Rather than an empire, are we seeing some other form of polity? Perhaps more of a federation based on trade opportunities, something like the Hansaetic League? Dare we nickname it the "Arikamedu League?"

We can even go one step further. At the break-up of this "League" we have the formation of an "Empire," Srivijaya. Traditionally supposed to have been centered in Sumatra, scholars have begun to question the imperial character of Srivijaya and even the location of its capital [SPAFA 1985]. Malaysia has been cited as the true heart of Srivijaya. Could the impetus for Srivijaya have come, in fact, from Malaysia, a somewhat stronger version of the "Arikamedu League?" These questions cannot be answered just now, but as they have never been proposed in just this way before, they open a field of possible investigation.

Another interesting problem involving these sites is that in nearly every case, glass beadmakers lived and worked in the urban areas. Now, left to themselves glassmakers choose a locale which has good raw materials (sand and wood for fuel and ash) and decent communications to import the few things they need (cobalt, manganese, etc.) and export their products. Glassmakers are also asked to move their furnaces away from cities built largely of wood. Sometimes they do not move far away (Murano near Venice; Gorece near Ismir), but they often prefer a more rural environment.

Yet the Indo-Pacific and allied beadmakers lived in the leading urban areas, the one exception being Kuala Selinsing. It seems unlikely that these sites were chosen for building cities <u>because</u> they were ideal for glassmaking. It also seems unlikely that the glassmakers chose to stay in the cities <u>only because</u> of the convenience of markets to the detriment of other considerations.

Could this reflect the status of the beadmakers? If the beadmakers were Indian and had any of the status given to other things Indian, then they (or at least some of them) may have been among the richest and most powerful citizens and, indeed, had some input as to the choice of a new site. It may be more likely that the sites were chosen for other considerations, such as harbors, but the beadmakers were invited, cajoled, or forced to set up shop in the new city-state. They were making a profitable product, and from the looks of it, much profit was made. Indo-Pacific beads are virtually the only manufactured article imported (traded) to the peripheral regions, which no doubt yielded forest products and various natural luxuries for the urbanized regions.

We have yet to ask who the beadmakers were. I have to agree with Lamb that they were probably Indians, specifically Tamils. All the Indo-Pacific beadmaking cities had strong Tamil connections (the current excavators do not agree with Evans in regards to this at Kuala Selinsing). Beadmakers tend to be a conservative lot, handing down their craft from father to son. It would seem unlikely that a minority expatriate community would teach others their primary skills. Moreover, the Lada technique is so complex as to be virtually untransferrable. More has to be learned to be sure of this, but if the Indo-Pacific beadmakers were Tamils, might this provide a clue as to why the industry disappeared around 1200?

## Core and Periphery

A useful analytical tool in archaeology is to consider the interaction of "core" regions with "peripheral" ones. Core regions are distinguished by having more advanced cultural features and being importers of raw materials and exporters of finished goods. Peripheral regions lag behind in cultural affairs, import manufactured products, and export raw materials and other non-value added goods. A given area does not always stay in one category. In the case of Belgium it has been demonstrated [Haselgrove 1987] that this peripheral region become a new core region under the influence of trade.

The bead evidence suggests the same thing happened in Southeast Asia. The hinderland was slowly opened by more civilized forces. At the beginning of our survey the only core regions were India and China. By the first millennium Malaya and Indochina had become core areas and in a few centuries Java and Sumatra joined them, followed by Thailand. Other Indonesian islands and the Philippines remained peripheral. These were buffer areas between China and the new core regions stretching from Thailand to eastern Java. China began to exploit the hinderlands in the latter centuries of our survey. Had things been left alone (had the Europeans never come), we might have seen the development of new core areas in Sarawak, Brunei, Luzon, and the Sulus, and -- dare we say -- new beadmakers.

In this summary we have ignored some emerging core areas. Some are in regions not studied (Pagan and the Khymer state). Western Sumatra, if it was, indeed, a core area, has left about as little bead evidence (except possibly Indo-Pacific beadmaking at Muara Jambi) as other physical evidence of its past glory. Eastern Java and Bali often get overlooked as developed areas because they had few imperial designs, preferring to enjoy their own fruits and repel invasions without launching wars of conquest themselves. The beads reflect this: there was a lively industry in glass and possibly stone beads, but they were almost all locally consumed.

## A Final Word

Despite liberal use of words such as "likely," "possible," and "maybe," the tone of the report may strike some as authoritative or comprehensive. It is not. The author and many readers are well aware of the limitations on such a report, ranging from those discussed at the beginning, to the estimation of dates for most sites, and the shortcomings of the writer himself.

Yet this work can be useful, and it is offered in that spirit. It will be worthwhile if it stirs interest in this field, particularly in the Southeast Asian context. It is also hoped that it will inspire more work, and to this end, the following recommendations are made:

1. That a coordinated program of study by professional students of the past in and working in Southeast Asia be launched to enlarge their understanding of bead research, its problems, and potentialities.
2. That each country in the region set up a central type collection, modeled on the collection of the Philippine National Museum, as recently modified [Francis 1989a]. This collection should be kept in a central repository, properly curated, and serve as the data base for all future bead studies in the country involved.
3. That interested scholars develop a forum which would enable them to discuss their mutual problems and produce a master plan for study in this long neglected but potentially most valuable field.

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4 Essex Street
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(518) 523-1794